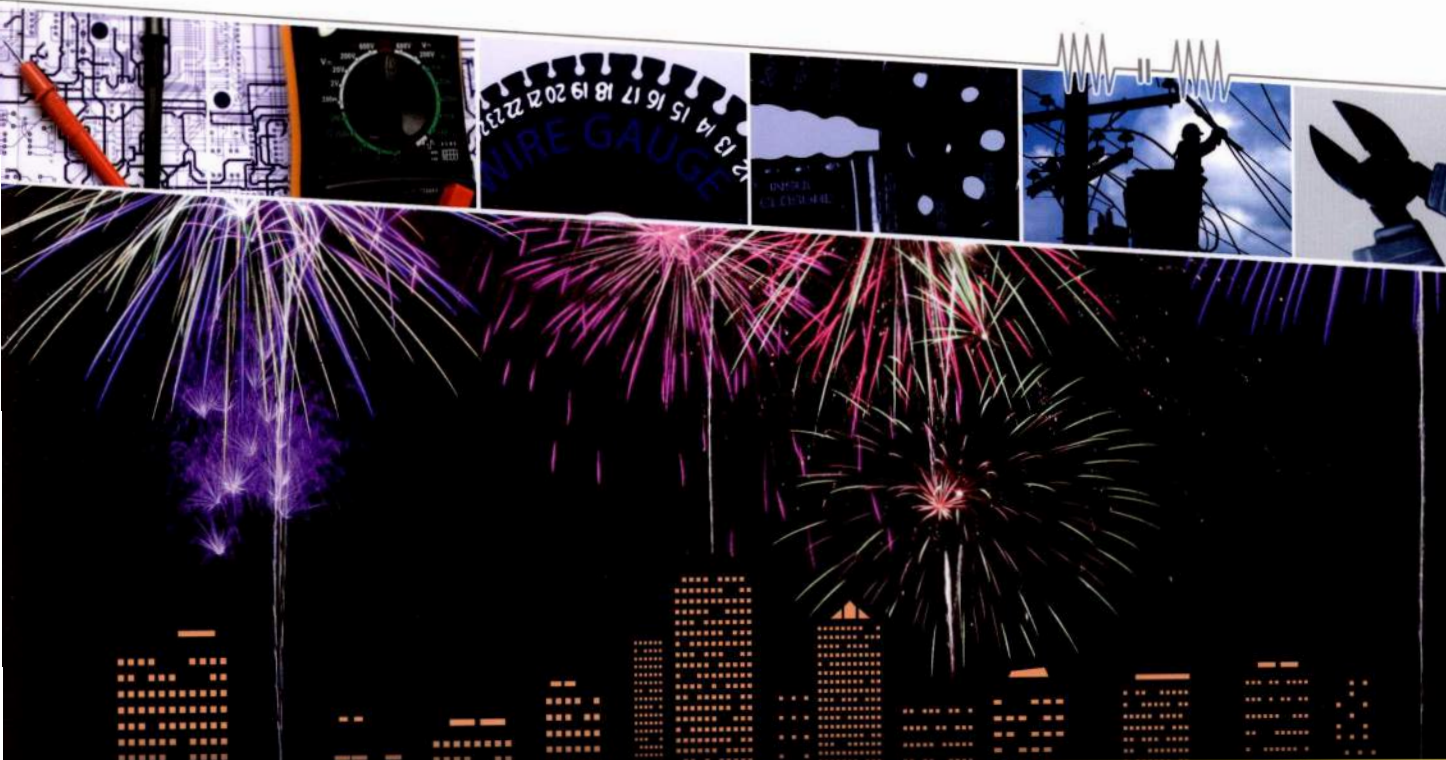


**CAREER
PATHS**

Скайп-репетитор английского языка для
моряков
vk.com/English.Odessa Viber: +380674872766
Skype: vayshengolts

Electrician


Virginia Evans
Jenny Dooley
Tres O'Dell



vk.com/englishlibrary


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**CAREER
PATHS**

Electrician

Book
1

Virginia Evans
Jenny Dooley
Tres O'Dell



Express Publishing

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Scope and sequence

Unit	Topic	Reading context	Vocabulary	Function
1	General tools	Company manual	tool kit, side cutters, long nose (needle nose) pliers, diagonal cutters, end cutting pliers, wire strippers, screwdriver, flashlight, utility knife, measuring tape	Stating a preference
2	More tools	Web forum	allen wrench, torque wrench, tool belt, electrical tape, duct tape, hammer, nut driver, crimper, socket wrench, hacksaw, Phillips screwdriver	Asking for something
3	Power tools - drills and saws	Catalog page	drill, drill bit, spade bit, auger bit, wood auger, hole saw bit, twist bit, circular saw, reciprocating saw, jigsaw	Stating an opinion
4	Specialized tools	Company webpage	conduit bender, fish tape, multimeter, plug-in analyzer, stepped drill bit, level, labeling machine, lineman's pliers, hammer drill, stud punch, masonry drill bit	Thanking someone
5	Materials	Trade magazine article	mortar, stone, block, brick, wood, plywood, steel, concrete, drywall, copper, rotary drill, rotary hammer, cement, plaster	Asking for advice
6	Safety	Safety poster	safety glasses, steel toe boots, leather gloves, electrical hot gloves, rubber mat, arc shield, hard hat, hot stick, arc flash blanket, arc flash clothing, electric shock	Getting someone's attention
7	Actions	Occupational manual	lift, stand, climb, stoop, kneel, turn on, turn off, split, grab, release	Asking for information
8	More actions	DIY instructions	push, pull, connect, install, bind, test, twist, strip, splice, inspect	Giving instructions
9	Numbers	Chart	is, equal, come to, and, plus, add, minus, less, subtract, times, multiplied by, divided by, over, eighth, hundred	Talking about calculations
10	Measurements	Magazine article	imperial, metric, round off, inch, centimeter, foot, yard, millimeter, meter, degree, Celsius, Fahrenheit, convert, caliper, micrometer	Pointing out a mistake
11	Elements of electricity	College course catalog	voltage, current, resistance, electron, AC, DC, volt, ampere, ohm, watt	Asking for clarification
12	Electrical safety	Safety pamphlet	electrocution, burn, shock, static electricity, live wire, lockout/tagout procedure, paralyze, hazard, risk, de-energize	Giving commands
13	Types of wires	Magazine article	knob and tube (K&T) wiring, armored cable (AC), metalclad (MC) cable, nonmetallic sheath (NM) cable, underground feeder (UF) cable, service entrance (SE) cable, conductor, insulated, jacket, replace	Checking for understanding
14	Wire codes	Cheat sheet	code, diameter, ought, gauge, embossed, sheath, maximum, rating, resistant, location	Asking for repetition
15	Wire connectors	Store webpage	twist-on connector, winged connector, grounding connector, crimp-on connector, underground connector, waterproof connector, push-in connector, thermoplastic, shell, spring	Offering help

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Talbot
Electrical Services

Employee Manual

Section 2.1 Tools Needed

All employees of Talbot Electrical Services will bring their own **tool kits**. Tool kits need to contain the basic tools needed for electrical jobs. These basic tools are sold at most hardware stores.

Pliers are needed for pulling and cutting wires. Your kit needs to include **long nose pliers** and **end cutting pliers**. **Side cutters** and **diagonal cutters** are recommended.

You must have **wire strippers** in your kit. Make sure they are able to strip the most common wires. You will also need several types of **screwdrivers** on the job.

A **flashlight**, **measuring tape** and **utility knife** will round out your kit.

Get ready!

1 Before you read the passage, talk about these questions.

- 1 How could some of the tools in the pictures be useful for electricians?
- 2 Why is it important to have a well-equipped tool kit?

Reading

2 Read the page from the company manual. Then, mark the following statements as true (T) or false (F).

- 1 Employees can buy the tools at hardware stores.
- 2 Side cutters and diagonal cutters are needed in the tool kit.
- 3 Wire strippers are used for cutting and pulling wire.

Vocabulary

3 Write a word that is similar in meaning to the underlined part.

- 1 Jack forgot his pliers that are only used for cutting wire at the job site.
_ _ a _ _ n _ _ c _ t _ _ r _ _
- 2 A small, battery operated light is good for seeing in dark spaces. _ l _ _ h _ _ g _ _
- 3 Mary used a tool with a thin, sharp slanted blade to cut open the box.
_ t _ _ _ t _ _ _ _ f _ _
- 4 The electrician bought a tool used for pulling out staples for his kit.
_ n _ _ _ t _ _ _ _ p _ _ e _ _

4 Match the words (1-6) with the definitions (A-F).

- | | |
|---|---|
| 1 <input type="checkbox"/> tool kit | 4 <input type="checkbox"/> long nose pliers |
| 2 <input type="checkbox"/> side cutters | 5 <input type="checkbox"/> measuring tape |
| 3 <input type="checkbox"/> screwdriver | 6 <input type="checkbox"/> wire stripper |

- A a tool with blades able to grip or cut wires
 B a tool used to tighten or loosen screws
 C a tool for cutting, twisting or pulling wires
 D a tool used to pull the covering off of wires
 E a tool used for finding the length of an object
 F a bag or box used to hold a set of tools

- 5 Listen and read the page from the company manual again. Which tools are recommended for the tool kit?

Listening

- 6 Listen to a conversation between two electricians. Check (✓) the tools that are mentioned by the electricians.

- 1 screwdrivers
 2 side cutters
 3 flashlight
 4 diagonal cutters
 5 wire strippers

- 7 Listen again and complete the conversation.

Old Electrician: How's your
 1 _____
 going?

New Electrician: Not bad. I have to
 buy some tools.

Old Electrician: An 2 _____
 are important. What
 do you need?

New Electrician: I need some wire
 strippers and
 3 _____.
 What kind do you
 use?

Old Electrician: I like to use tools
 4 _____ Patton.

New Electrician: Really? I heard
 Berkley tools are
 better.

Old Electrician: I had a pair of
 Berkley diagonal
 cutters that broke
 after one day. I
 5 _____ their
 tools after that.

New Electrician: Maybe 6 _____

 Patton tools, then.

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

I have to buy some ...

I like to use ...

Maybe I'll go with ...

Student A: You are a new electrician. Talk to Student B about:

- what tools you need to buy
- what kind of tools he or she uses
- what you've heard from others about tool brands

Student B: You are an experienced electrician. Talk to Student A about tools.

Writing

- 9 Use the conversation from Task 8 to fill out the new electrician's notes about tools.



Electrician's notes

About Tools

Tools Needed: _____

Brands of Tools: _____

Information on Brands: _____

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What tools usually come in a range of sizes
- 2 What else might electricians keep in their tool kits besides actual tools?

Reading

2 Read the web forum. Then, choose the correct answers.

- 1 What is the webpage mostly about?
 - A the best tool kits to buy
 - B the tools electricians need
 - C the different types of wrenches
 - D the kinds of tape electricians use
- 2 What advice is NewGuy12 looking for?
 - A which basic tools he needs for jobs
 - B which tool brand works the best
 - C which additional tools he needs
 - D which tools do not get used much
- 3 Which is NOT in NewGuy12's tool kit yet?

A tool belt	C hacksaw
B hammer	D Phillips screwdriver

Vocabulary

3 Choose the sentence that uses the underlined part correctly.

- 1 A John put the tool belt around his waist.
B A crimper can easily cut through metal.
- 2 A I used an allen wrench to hit the nail.
B Sam covered the wires with electrical tape.
- 3 A I need a torque wrench to tighten the loose bolt.
B The wires need to be cut by a hacksaw.

www.electricantalk.com

NewGuy12

I have the basic stuff I need to go on jobs (**hammer, Phillips screwdrivers, tool belt, etc.**). What else do I need in my tool kit?

MasterElectrician

You need wrenches for different things. I'd get **allen wrenches, socket wrenches, and torque wrenches**. Also, get **electrical tape** and **duct tape** for your kit.

WiredUp

My tool kit has a **hacksaw, nut drivers, and crimpers** in it. I don't use them a lot. But they're there if I need them!

NewGuy12

Thanks for the advice! Going to the store now.



Phillips screwdriver



socket wrench

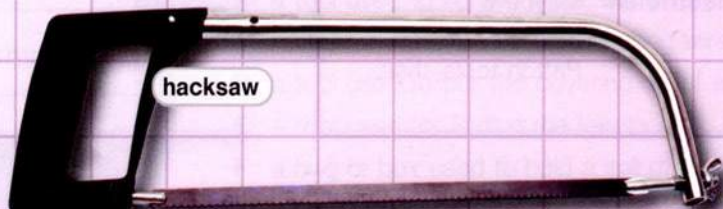


allen wrench



TORQUE
NEWTON-METER

torque wrench



hacksaw

4 Match the words (1-8) with the definitions (A-H).

- 1 ___ crimper 5 ___ duct tape
2 ___ hacksaw 6 ___ nut driver
3 ___ hammer 7 ___ socket wrench
4 ___ allen wrench 8 ___ Phillips screwdriver

- A tool with a thin blade that cuts through metal
B tool used to tighten bolts
C tool used for tightening nuts
D kind of tape made of mesh used on air ducts
E a tool with a metal top used for hitting nails
F tool used to tighten screws with a cross head
G tool used for pushing connectors around bare wires
H a tool with a six-sided head used for tightening screws or bolts

5 Listen and read the web forum again. Why does MasterElectrician suggest several kinds of wrenches?

Listening

6 Listen to a conversation between two electricians. Mark the following statements as true (T) or false (F).

- 1 ___ The woman needs a socket wrench.
2 ___ The man's wrenches are too small.
3 ___ The man left his tool kit in the truck.

7 Listen again and complete the conversation.

Electrician 1: Looks like I need an allen wrench to 1 _____. Hand me one.
Electrician 2: Okay. I have some in my 2 _____. Here you go.
Electrician 1: It isn't the right size. 3 _____ a bigger one.
Electrician 2: That's the biggest one I have.
Electrician 1: You need to get more wrenches for your tool kit. I have one that's the right size in mine. I left it 4 _____, though.
Electrician 2: Do you want me to 5 _____?
Electrician 1: Yes, please. I really need an 6 _____.
Electrician 2: All right. I'll be back in a minute.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

Looks like I need ...
Give me ...
I left it in ...

Student A: You are an electrician. Talk to Student B about:

- what tool you need
- why the tool won't work
- where you left your tool kit

Student B: You are an electrician. Talk to Student A about what he or she needs from you.

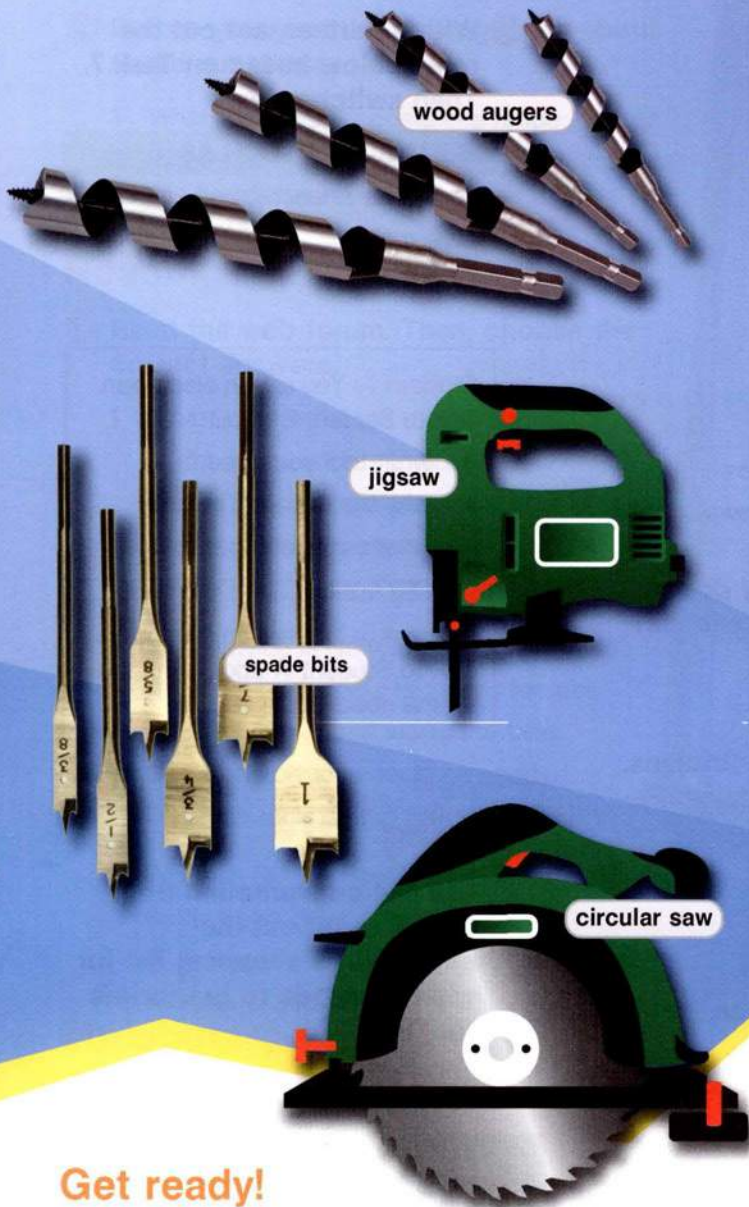
Writing

9 Use the conversation from Task 8 to fill out the electrician's shopping list for what he needs to get for his tool kit.

Shopping List

Tools Needed: _____

Why: _____



Electrical Source

SPRING CATALOG

Power Drills and Saws

Electrician's Drill Bit Kit

\$59.95

All electricians need a high-quality **drill**. Along with it, they need lots of **drill bits**. The Electrician's Drill Bit Kit has everything you need. It contains several **spade bits**. These bits are perfect for most jobs. For other jobs, the kit has **auger bits**, **hole saw bits** and **wood augers**. Also included are twelve **twist bits**.

Electrician's Power Saw Set

\$169.99

This set includes three saws all electricians should have. The tough **circular saw** cuts through anything! The powerful **reciprocating saw** comes with five blades. Finally, the **jigsaw** is perfect for cutting.

Vocabulary

3 Read the sentence pair. Choose where the words best fit the blanks.

1 circular saw / reciprocating saw

A I need to change the blade on the _____.

B The round blade fits on the _____.

2 twist bit / wood auger

A Use the _____ to make a hole in the cupboard.

B A _____ can be used on a variety of materials.

3 spade bit / auger bit

A The sharp point of the _____ will work best.

B I need the longest _____ that is in the kit.

Get ready!

1 Before you read the passage, talk about these questions.

- 1 Why are power tools useful to have?
- 2 Why do power tools come with different attachments?

Reading

2 Read the page from the catalog. Then, mark the following statements as true (T) or false (F).

- 1 The drill bit kit comes with a drill.
- 2 One spade bit is included with the set.
- 3 The jigsaw works best for straight lines.

4 Match the words (1-4) with the definitions (A-D).

- 1 — drill 3 — hole saw bit
2 — jigsaw 4 — drill bit

- A the sharp end of a drill used to make holes
B a metal tube-shaped drill bit with sharp edges used to cut rings
C a saw with a thin blade that cuts straight and rounded edges
D a tool that makes holes in different materials

5 Listen and read the page from the catalog again. Why should an electrician buy the kits?

Listening

6 Listen to a conversation between two electricians. Choose the correct answers.

- 1 What is the conversation mostly about?
A what size the hole needs to be
B what to use to make a hole
C where the hole needs to be made
D how to run wires through the hole
- 2 What will the woman likely do next?
A run the wires C find the spade bit
B smooth the hole D get the wood auger

7 Listen again and complete the conversation.

Electrician 1: I need to 1 _____ for the wires.
Electrician 2: Okay. What 2 _____ do you want to use?
Electrician 1: I think I'll use a 3 _____.
Electrician 2: Really? That's not what I'd use.
Electrician 1: What would you use then?
Electrician 2: 4 _____, a wood auger is better.
Electrician 1: Why is that?
Electrician 2: The wood auger makes a smoother hole. It's 5 _____ the wires through it.
Electrician 1: I see 6 _____. I'll use the wood auger instead.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

- I need to ...*
I think I'll use ...
In my opinion ...

Student A: You are an electrician. Talk to Student B about:

- what you need to do
- what drill bit you want to use
- what drill bit he or she would use

Student B: You are an electrician. Talk to Student A about drill bits.

Writing

9 Use the conversation from Task 8 to fill out the electrician's work order.

Sam's Electrical Service

Job: _____

What Needs to be Done: _____

Tools to be Used: _____

www.zaptools.com

Welcome to

ZapTools!

ZapTools has the best selection and lowest prices on everything electricians need.

We carry specialized tools such as **conduit benders, levels, fish tapes** and **stud punches**. We also have the largest selection of **lineman's pliers** on the Internet.

Be sure to check out our power tools too. We have saws and drills, including **hammer drills**. To go with the drills, we have specialized drill bits. We have the toughest brands of **stepped drill bits** and **masonry drill bits**.

We also sell electronic equipment for electricians. We have **multimeters, plug in analyzers** and **labeling machines**.

Get ready!

1 Before you read the passage, talk about these questions.

- 1 Which specialized tools in the pictures do you consider most helpful?
- 2 What can an electrician do if he/she doesn't have a specialized tool?

Reading

2 Read the company webpage. Then, complete the table using information from the webpage.

Category	Tools
1 Specialized	
2 Power	
3 Electronic	

Vocabulary

3 Fill in the blanks with the words and phrases from the word bank.

Word BANK

fish tape level multimeter
hammer drill labeling machine

- 1 We used a _____ to keep track of the wire connections.
- 2 The _____ showed the wire had a lot of voltage.
- 3 The wires were put behind the wall using a _____.
- 4 Kate used a _____ to make sure the picture was straight.
- 5 The _____ broke through the concrete quickly.



hammer drill



multimeter



stepped drill bit



level

4 Read the sentence pair. Choose where the words best fit the blanks.

1 **lineman's pliers / stud punch**

- A Sam used a _____ on the wall.
 B _____ are good for cutting wires.

2 **stepped drill bit / masonry drill bit**

- A I need a _____ to drill through the metal.
 B A _____ will make a hole in the concrete.

3 **plug-in analyzer / conduit bender**

- A The _____ indicates there are some loose wires.
 B Mark the conduit before you use the _____ on it.

5 Listen and read the company webpage again. What are some electronic tools electricians use?

Listening

6 Listen to a conversation between an employee and a customer. Mark the following statements as true (T) or false (F).

- 1 ___ The man wants to order a hammer drill.
 2 ___ The woman suggests masonry drill bits.
 3 ___ The man orders several different items.

7 Listen again and complete the conversation.

Employee: Thank you for calling ZapTools. How can
 1 _____?

Customer: Hi, I'd like to order some drill bits for my 2 _____.

Employee: All right. What kind are you looking for?

Customer: Well, I need to be able to drill 3 _____.

Employee: It sounds like you need some 4 _____
 _____. They're \$11 each.

Customer: Great. I'd like 5 _____.

Employee: All right. Can I do anything else for you?

Customer: No, that's it. I 6 _____!

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

- How can I help ...*
I'd like to order ...
I need to be able to ...

Student A: You are an electrician. Talk to Student B about:

- what you want to order
- what you need to do
- how many items you want to order and price

Student B: You are an employee at ZapTools. Talk to Student A about his or her order.

Writing

9 Use the conversation from Task 8 to fill out the order form.

ZapTools Order Form

Item Ordered: _____

Price per Item: _____

Number Ordered: _____



CHOOSING THE RIGHT DRILL FOR THE JOB

Most jobs can be done using a simple **rotary drill**. It can be used for **wood** and **plywood**. It can also be used for **drywall**, **plaster**, **copper** and **steel**. Of course, you need to have the right drill bits too.

What about for harder materials like **brick** and **concrete**? A hammer drill works well for **blocks**, **brick**, **mortar** and **stone**. A **rotary hammer** works best for materials like concrete and **cement**.

Sometimes the terms hammer drill and rotary hammer are used to mean the same tool. However, a hammer drill chips away at the material. A rotary hammer pounds away at it to make a hole.

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some materials electricians work with on the job?
- 2 What are some tools electricians might need to work with those materials?

Reading

2 Read the trade magazine article. Then, complete the table using information from the article.

Drill Type	Material
Rotary drill	1 _____
Hammer drill	2 _____
Rotary hammer	3 _____

Vocabulary

3 Write a word that is similar in meaning to the underlined part.

- 1 The substance that comes from trees was rotting.
_ o _ d
- 2 Reddish brown metal pipes are often found in old homes.
_ _ p _ e _
- 3 The ceiling was covered in a thin coat of a mixture of lime, sand and water.
p _ _ s _ _ r
- 4 I tried drilling the mixture used to hold bricks or stones together but the drill bit broke.
_ _ r _ _ r
- 5 The workers used a mixture of ground limestone and clay for the outside of the building.
c _ _ _ n _

4 Match the words (1-7) with the definitions (A-G).

- 1 ___ block 4 ___ brick 7 ___ concrete
 2 ___ stone 5 ___ plywood
 3 ___ steel 6 ___ drywall

- A a board made of plaster and covered in paper
 B a metal that is made from combining iron and carbon
 C a piece of material that is solid with flat surfaces on each side
 D a board made of thin layers of wood glued together
 E a hard material made with cement, small stones, sand and water
 F a block of clay that is baked until it is hard
 G the hard substance rocks are made from

5 Listen and read the trade magazine article again. What is the difference between a rotary hammer and a hammer drill?

Listening

6 Listen to a conversation between an experienced and a new electrician. Mark the following statements as true (T) or false (F).

- 1 ___ The floor is made of cement.
 2 ___ The man needs a rotary hammer.
 3 ___ The woman lends the man a tool.

7 Listen again and complete the conversation.

Experienced Electrician: You 1 _____ through this concrete floor.

New Electrician: I'm not sure what to use, though. Can you help me 2 _____ ?

Experienced Electrician: Well, you don't want to use a regular 3 _____ on concrete.

New Electrician: So, I need a 4 _____ or rotary hammer, then.

Experienced Electrician: You're on the right track.

New Electrician: Hammer drills are better for 5 _____ , right?

Experienced Electrician: Yes. So, what do you need?

New Electrician: I need to use a rotary hammer. But I don't have one in my 6 _____ .

Experienced Electrician: You can borrow mine.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

- I'm not sure ...*
You don't want to use ...
Hammer drills are better for ...

Student A: You are a new electrician. Talk to Student B about:

- what you need to drill through
- which drill you should use
- whether you have the right drill

Student B: You are an experienced electrician. Talk to Student A about what he or she needs to do.

Writing

9 Use the conversation from Task 8 to fill out the electrician's notes about what to use to drill through the floor.



Electrician's Notes

Type of Material to be Drilled: _____

Possible Drills to Use: _____

Which Drill to Use and Why: _____



hard hat

BE SAFE AT WORK!

Working with electrical wiring is often dangerous. The proper safety equipment can save your life. Remember these tips:

- Always protect your head, eyes, hands and feet. Never work without wearing the following items:
 - A **hard hat**
 - A pair of **leather gloves**
 - Steel toe boots**
 - Safety glasses**
- On the job, there is sometimes danger of **electric shock** or explosion. In these cases, dress properly. Wear the following:
 - An **arc shield**
 - Arc flash clothing**
 - Electrical hot gloves**
- When working with live wires, be extra careful. Protect yourself from shocks. Use an **arc flash blanket** and stand on a **rubber mat**. Finally, hold onto a **hot stick**.

Get ready!

- Before you read the passage, talk about these questions.
 - What are some of the dangers of working on the job?
 - What are some things electricians can wear to stay safe?

Reading

- Read the safety poster. Then, mark the following statements as true (T) or (F).
 - Safety glasses should be worn if needed.
 - Arc flash clothing helps if there is an explosion.
 - Hold a hot stick when working with dead wires.

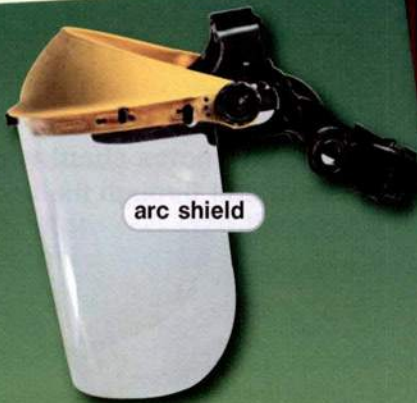
Vocabulary

- Choose the sentence that uses the underlined part correctly.
 - James put on leather gloves before picking up the hammer.

B The electrician stood on the arc shield while working.
 - A Steel toe boots protect your feet if something falls on them.

B A hot stick is worn when working with electricity.
 - A Oliver held on to the electrical hot gloves while touching the wire.

B Marie put a hard hat on her head before entering the building.



arc shield



safety glasses



steel toe boots



hot stick

4 Match the words (1-7) with the definitions (A-G).

- 1 _ arc shield 5 _ electrical hot gloves
2 _ rubber mat 6 _ arc flash blanket
3 _ hot stick 7 _ arc flash clothing
4 _ safety glasses

- A clear glasses that are made of thick plastic
B a blanket used to protect from explosions or shock
C a fiberglass rod that protects from shocks
D gloves made of rubber that protect from shocks
E a mat made of rubber that electricians stand on
F pants, shirts, jackets, and shoes designed to protect from shocks or explosions
G a protective plastic shield for the eyes and face

5 Listen and read the safety poster again. What items should you always wear? Why should you wear them?

Listening

6 Listen to a conversation between two electricians. Choose the correct answers.

- 1 What is the conversation mostly about?
A cutting a live wire correctly
B wearing the right safety gear
C watching out for co-workers
D treating electrical injuries
- 2 What should the woman be wearing?
A arc shield C steel toe boots
B electrical hot gloves D arc flash blanket

7 Listen again and complete the conversation.

- Electrician 1:** Hey, Alice! 1 _____! Stop!
- Electrician 2:** What's wrong, Jake?
- Electrician 1:** Be careful. You were going to 2 _____.
- Electrician 2:** I know. I wanted to cut it.
- Electrician 1:** But that's a 3 _____. And you're not wearing an arc shield!
- Electrician 2:** Do you really think I need one?
- Electrician 1:** Definitely! There might be an 4 _____. You could burn your eyes or face.
- Electrician 2:** I didn't 5 _____. I'll put one on. Thanks!
- Electrician 1:** Use an 6 _____ too - just in case!

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

Watch out!
What's wrong?
You're not wearing ...

Student A: You are an electrician. Talk to Student B about:

- being careful
- possible dangers of cutting live wires
- what safety equipment to use

Student B: You are an electrician. Talk to Student A about what you need to do to stay safe.

Writing

9 Use the conversation from Task 8 to fill out the safety report.

Safety Report

Job # 2651

Electrician(s): _____

Problem: _____

Action Taken: _____

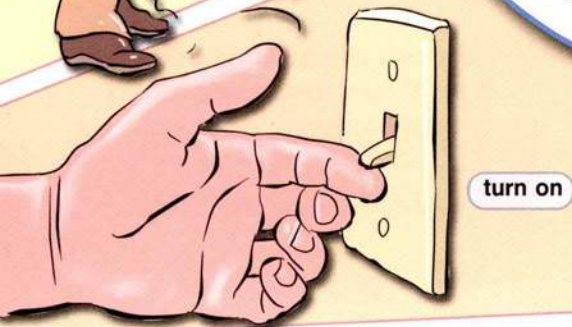
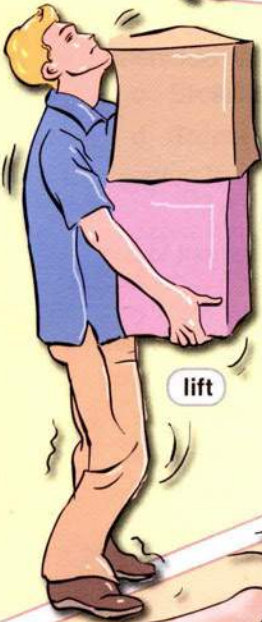


Electrician Occupational Outlook

The job of an electrician involves putting in and maintaining electrical power systems. This is done in homes and businesses.

The work of an electrician is occasionally demanding. Electricians must **lift** heavy objects and **climb** ladders. The work may require them to bend, **stand**, **kneel**, or **stoop** down low for long periods.

To be successful, electricians need to work fast. In order to **grab** and **release** tools quickly, they wear a tool belt. To prevent electric shock, electricians usually **turn off** the power source before working. They **turn on** the power when they are done. Electricians also use sharp tools to **split** wires.



Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some actions an electrician performs on the job?
- 2 How can electricians minimize bodily strain when working?

Reading

2 Read the occupational manual. Then, mark the following statements as true (T) or false (F).

- 1 ___ Electricians are expected to work quickly.
- 2 ___ Electricians must wear helmets to work.
- 3 ___ Electricians work in homes and businesses.

Vocabulary

3 Match the words (1-5) with the definitions (A-E).

- | | |
|-------------|---------------|
| 1 ___ lift | 4 ___ turn on |
| 2 ___ stand | 5 ___ release |
| 3 ___ stoop | |

- A to stop holding something
- B to be in a vertical position
- C to make something work by giving it power
- D to move something up to a higher place
- E to bend forward while standing up

4 Choose the sentence that uses the underlined part correctly.

- 1 A He released the rope and didn't let go.
B The electrician climbed the ladder.
- 2 A She split the check and paid it all herself.
B He can't lift heavy weights since his accident.
- 3 A He grabbed the bag and ran away.
B I turned on the light so it would be dark.
- 4 A He stooped to reach the top of the shelf.
B Please turn off the TV before you leave.
- 5 A It's hard to stand all day in an uncomfortable chair.
B I had to kneel to pick up the papers on the floor.

5 Listen and read the occupational manual again. How do electricians prevent electric shocks?

Listening

6 Listen to a conversation between an intern and an electrician. Mark the following statements as true (T) or false (F).

- 1 ___ The woman started out as an apprentice.
- 2 ___ The woman loves traveling for her work.
- 3 ___ The woman began working when she was twenty.

7 Listen again and complete the conversation.

Intern: I still have a few questions about your job. What do you do each day?

Electrician: Well, I travel around with my tools and 1 _____ that people have with their electricity.

Intern: When did you get into the 2 _____?

Electrician: About twenty years ago, when I became 3 _____ like you.

Intern: What is your favorite part of this job?

Electrician: I love the 4 _____ . I like climbing ladders and lifting objects.

Intern: Wow. The job of 5 _____ sounds difficult but exciting!

Electrician: 6 _____ . See you tomorrow!

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

I still have a few questions ...

When did you ...

What is your favorite ...

Student A: You are an intern.

Talk to Student B about:

- what he or she does each day
- how long he or she has done the job
- the best part of the job for him or her

Student B: You are an electrician.

Talk to Student A about your job.

Writing

9 Use the conversation from Task 8 to fill out the interview notes.

Interview Notes

Job: _____

Person Interviewed: _____

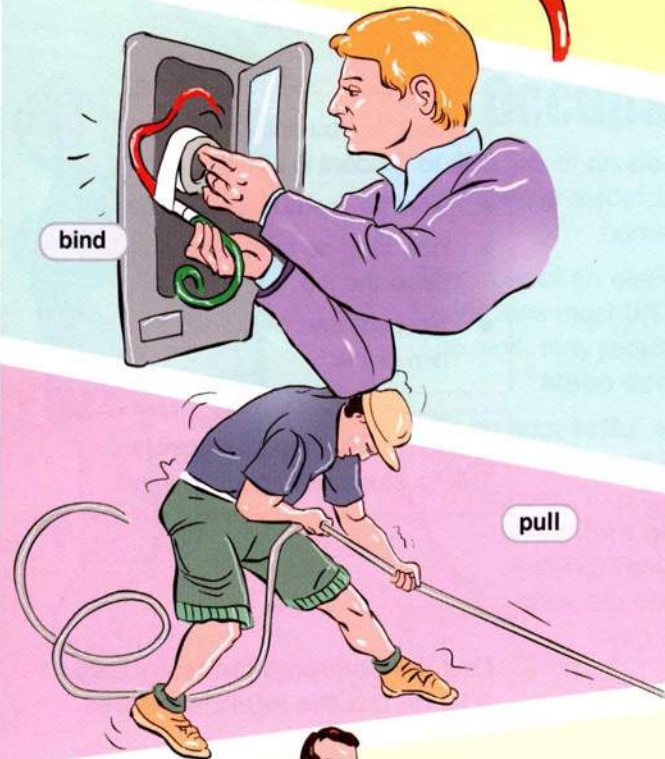
How long in the field: _____

Best part of the job: _____

What was your opinion of the job after the discussion?



connect



bind



pull



push



inspect

Get ready!

1 Before you read the passage, talk about these questions.

- 1 Why do wires need insulation?
- 2 Why should damaged wires be replaced?

Reading

2 Read the instructions for fixing underground wires. Then, choose the correct answers.

- 1 What are the instructions mostly about?
 - A why it is important to replace wires
 - B how to fix a damaged wire
 - C what insulation is made out of
 - D how to inspect an electric circuit
- 2 Why should the electricity be switched off?
 - A to make sure the wires aren't damaged
 - B to avoid getting shocked by the wires
 - C to make it easier to find the wires
 - D to check that the wires are connected
- 3 What is the last step in the instructions?
 - A strip the insulation from the wires
 - B inspect the underground wires
 - C install waterproof insulation
 - D turn on the electricity again

Do-it-Yourself: Fixing Underground Wires

Fixing underground wires sounds difficult. But it's actually simple. You just need to **splice** some wires.

To begin, switch off the electricity. Accidental shocks are always a risk when working with electricity. Next, **test** the electricity to make sure it is off. **Push** a button on the same circuit. If it is safe, dig into the ground. **Inspect** the wires, and find the damaged part. Cut it off. Next, **strip** the insulation off the wires. **Twist** the ends of the wires together. Then, **pull** on them to make sure they are joined. If they are, **bind** the ends together with tape. After that, **install** waterproof insulation plastic covering on the wires. Then **connect** the electricity.

Vocabulary

3 Match the words (1-4) with the definitions (A-D).

1 ___ install 2 ___ inspect 3 ___ connect 4 ___ test

- A to look at something closely
 B to turn on power or electricity
 C to try something to make sure it works
 D to connect something so it can be used

4 Read the sentence pair. Choose where the words best fit the blanks.

1 twist / push

- A If you _____ that wire too much, it will break.
 B I had to _____ the box up the hill.

2 pull / bind

- A The wagon has a handle so you can _____ it.
 B I used string to _____ the flowers together.

3 stripped / splice

- A I tried to _____ the wires, but they wouldn't stay together.
 B After he _____ the wires, he threw the covering away.

5 Listen and read the instructions for fixing underground wires again. What needs to be done to the wires after the damaged part is cut off?

Listening

6 Listen to a conversation between two electricians. Mark the following statements as true (T) or false (F).

- 1 ___ The damaged part of the wire is replaced.
 2 ___ The ends of the wires are spliced together.
 3 ___ The power is turned off after the wire is fixed.

7 Listen again and complete the conversation.

- Elec. 1: Okay, Jim. Let's fix the 1 _____. Do you remember what to do first?
 Elec. 2: Yes, we have to 2 _____ the power. I'll do that now.
 Elec. 1: Good. Next, you need to 3 _____ off the cable.
 Elec. 2: All right. I see the damaged wire. It's 4 _____.
 Elec. 1: You're right. You need to cut that part out.
 Elec. 2: Okay. What's next?
 Elec. 1: Now, 5 _____ together.
 Elec. 2: Then, I bind the ends and 6 _____ the plastic, right?
 Elec. 1: Right! We're done!

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

- Do you remember ...
 Next ...
 You need to ...

Student A: You are an electrician. Talk to Student B about:

- what to do first
- how to find the damaged wire
- what to do with the damaged wire

Student B: You are an electrician. Talk to Student A about how to fix the wire.

Writing

9 Use the conversation from Task 8 to fill out the directions.

Directions for fixing a wire

- First, _____

 Next, _____

 After that, _____

 Finally, _____

How do they say it?

Symbol/ Number	Interpretation/ Pronunciation	Example
=	is, equals, comes to	$\frac{1}{2} = 0.5$ One half equals point five.
+	and, plus, add	$10 + 5 = 15$ Ten and five comes to fifteen.
-	minus, less, subtract	$10 - 5 = 5$ Ten less five is five.
x	times, multiplied by	$10 \times 5 = 50$ Ten times five equals fifty.
÷	divided by, over	$10 \div 5 = 2$ Ten divided by five is two.
$\frac{7}{8}$	seven eighths	$\frac{1}{8}$ The cable measured one eighth of a meter.
1,200	one thousand two hundred or twelve hundred	The repair cost twelve hundred dollars.



Vocabulary

- 3 Fill in the blanks with the words and phrases from the word bank.

Word BANK

add times less plus
comes to hundred

- Three _____ two is six.
- Four plus seven _____ eleven.
- Fifty _____ twenty equals thirty.
- One thousand plus four hundred is fourteen _____.
- To get ten, _____ three and seven.
- Fifteen _____ two is seventeen.

- 4 Read the sentence and choose the correct word.

- One **fourth** / **times** is equal to 0.25.
- Nine **over** / **less** eight equals one.
- Start with seven. **Subtract** / **Add** three. This equals four.
- Six **multiplied by** / **divided by** two is twelve.
- Six **over** / **plus** three equals two.
- Twenty **less** / **divided by** four equals five.
- Five plus six **equals** / **over** eleven.

Get ready!

- 1 Before you read the chart, talk about these questions.

- Why are numbers and math important for electricians to know?
- What are some errors people can make when working with numbers?

Reading

- 2 Read the chart. Then, mark the following statements as true (T) or false (F).

- ___ Eight less two means the same thing as eight minus two.
- ___ Seven times six equals seven plus six.
- ___ $\frac{3}{8}$ is pronounced three times eight.

- 5 Listen and read the chart again. What are some ways to describe a total amount after subtracting numbers?

Listening

- 6 Listen to a conversation between two electricians. Choose the correct answers.

- What is the conversation mostly about?
 - how much money electricians make
 - why the deposit slip total is in error
 - the number of checks being deposited
 - the mistake the man made in adding
- What did the man do wrong?
 - He miscounted the number of checks.
 - He wrote down the wrong total.
 - He forgot to add in one of the checks.
 - He made an error in multiplication.

- 7 Listen again and complete the conversation.

- Electrician 1:** Sarah, can you help me for a second?
- Electrician 2:** Sure, Steve. 1 _____ ?
- Electrician 1:** I'm getting ready to go to the bank. But I can't get the deposit slip total to 2 _____. The cash comes to fifty dollars in bills and eighty cents in coins. It's the checks I can't figure out.
- Electrician 2:** 3 _____. There are four checks. Three checks for one hundred dollars. And one for one thousand, three hundred.
- Electrician 1:** Yeah. I multiplied the hundred dollar checks by four and added 4 _____.
- Electrician 2:** 5 _____.
- Electrician 1:** What do you mean?
- Electrician 2:** You 6 _____ the wrong number.
- Electrician 1:** Oh, what a simple mistake! Thanks.

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

Can you help me ...
There are ... checks.
Yeah, I multiplied ...

Student A: You are an electrician. Ask Student B about:

- a problem with a deposit slip
- amount of cash deposited
- how you counted the checks

Student B: You are Student A's co-worker. Help Student A find the correct total for the deposit slip.

Writing

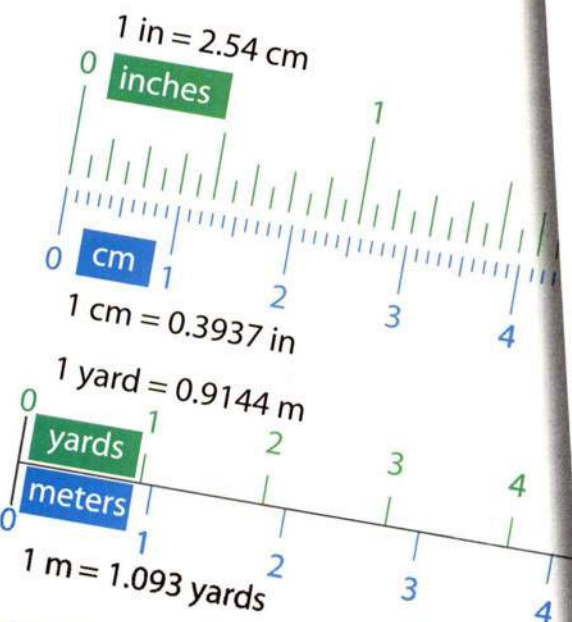
- 9 Use the conversation from Task 8 to fill out the deposit slip correctly.



SPRINGDALE BANK AND TRUST Deposit Slip

Date: April 3
 Bills: _____
 Coins: _____
 Number of Checks: _____
 Amount of each Check: _____

 Total Deposit: _____



Do-It-Yourself Monthly

Issue 12

Know Your Measurements

Fasteners and tools use **imperial** measurements or **metric**, and knowing the difference is important. It prevents you from **rounding off** a fastener, damaging tools, or causing injury. If you don't know an item's size, use a **micrometer** or other **caliper** to measure it. Check **centimeters** or **millimeters** for metric tools. Look at **inches** for imperial tools.

You will also need to know larger measurements, such as **feet**, **yards**, and **meters**. These measurements are often used in building plans.

Temperature measurements are also important to know. Some countries measure **degrees** using the **Fahrenheit** scale and others use the **Celsius** scale. You may need to **convert** from one scale to the other.

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What kinds of measurements are used by electricians?
- 2 What can happen if measurements aren't accurate?

Reading

2 Read the magazine article about measurements. Then, mark the following statements as true (T) or false (F).

- 1 Millimeters are often used in building plans.
- 2 Inches are used for imperial tools.
- 3 Using the wrong size tool can cause injury.

Vocabulary

3 Match the words (1-8) with the definitions (A-H).

- | | |
|--------------------------------------|---------------------------------------|
| 1 <input type="checkbox"/> degree | 5 <input type="checkbox"/> convert |
| 2 <input type="checkbox"/> yard | 6 <input type="checkbox"/> Celsius |
| 3 <input type="checkbox"/> imperial | 7 <input type="checkbox"/> centimeter |
| 4 <input type="checkbox"/> round off | 8 <input type="checkbox"/> micrometer |

- A to change from one system into another
 B a metric measure of length or distance
 C a unit used to measure temperature
 D to damage a screw or bolt
 E a tool that measures small distances
 F the system that uses inches
 G a measurement equaling three feet
 H the metric temperature scale

4 Write a word that is similar in meaning to the underlined part.

- 1 Jack needs two units equaling twelve inches of steel gauge wire. _ e _ t
- 2 I have imperial wrenches, but I need one that is part of the system based on the meter.
_ e _ _ i c
- 3 The board measured three units of measurement equal to 39 inches across. m _ _ e _ _
- 4 The size of the screw was eight units equal to 1/10 of a centimeter. _ _ l l _ m _ _ _ r s
- 5 The thermometer measures both non-metric temperature scale and Celsius.
_ _ h _ _ n _ _ _ t
- 6 How many units of imperial length is that cable?
i _ _ _ e s

- 5 Listen and read the magazine article about measurements again. What are some reasons you should make sure you have the right size tool for a job?

Listening

- 6 Listen to a conversation between two electricians. Choose the correct answers.

- What is the conversation mostly about?
 - why metric tools are better than imperial
 - the reason why a tool is not working right
 - what size wrench to use on certain jobs
 - types of tools to keep in a tool kit
- What is the problem?
 - The wrench and bolt are different sizes.
 - The man forgot his wrenches in the tool kit.
 - The man cannot tighten the bolt enough.
 - The wrench is slippery in the man's hand.

- 7 Listen again and complete the conversation.

- Electrician 1: Keith, are you 1 _____ over there?
- Electrician 2: Yeah. My wrench keeps 2 _____ this bolt on the panel box.
- Electrician 1: Let's see. I'm pretty sure that's the wrong size wrench.
- Electrician 2: Really? It seemed like the 3 _____.
- Electrician 1: No, 4 _____ . You can't use a metric wrench with an imperial bolt.
- Electrician 2: I didn't realize I had 5 _____.
- Electrician 1: I have some imperial wrenches 6 _____ . I'll go get them.
- Electrician 2: Thanks, Jackie. I appreciate it.

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

My wrench keeps slipping ...

I'm pretty sure ...

You can't use a ... with a ...

Student A: You are an electrician. Talk to Student B about:

- a problem repairing a panel box
- using the correct tool
- making sure of the correct measurement system

Student B: You are an electrician. Talk to Student A about using proper size tools.

Writing

- 9 Use the conversation from Task 8 to fill out the work order.

Job: 8776

What is being repaired?

Which tools are required?

What is the required measurements system?



Fahrenheit



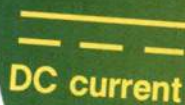
Celsius

Spring Class Catalog

Electricity 101



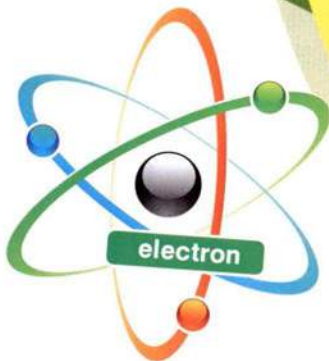
AC current



DC current

 Ω Ohm

Elements of Electricity



voltage



Do you want to be an electrician?
Do you want to have a
high **voltage** summer?

Then take this class!

In this course, students learn the basics of electricity. They start by learning about **electrons**, the source of electricity. Then, they study electric **currents**. For instance, they learn the differences between **AC** and **DC**. Students also learn the different units of measurement. They will be able to calculate **amperes**, **volts** and **watts** in a circuit. The class will even use **ohms** to calculate **resistance**. By the end, students will have all the basics. They will be on their way to being great electricians!

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some of the different ways to measure electricity?
- 2 Why must electricians understand how to calculate ohms?

Reading

2 Read the college course catalog describing an electricity class. Then, mark the following statements as true (T) or false (F).

- 1 Students will learn how to calculate measurements for electricity.
- 2 The class is for anyone who works as an electrician.
- 3 Students should understand currents before they enter the class.

Vocabulary

3 Match the words (1-6) with the definitions (A-F).

- | | |
|-------------|-------------|
| 1 — voltage | 4 — ohm |
| 2 — AC | 5 — current |
| 3 — DC | 6 — volt |

- A a measurement of the force of electricity
B a current that flows in two directions
C a measurement showing resistance
D the quantity of electricity in a wire
E the strength of moving electricity
F a current that flows in one direction

4 Fill in the blanks with the words from the word bank.

Word BANK

electron resistance watt amperes

- 1 A(n) _____ is too small to see without a powerful microscope.
- 2 Many wires are made out of copper because of its low _____.
- 3 A(n) _____ measures how much electrical power is being used.
- 4 A common way to measure electric current is _____.

5 Listen and read the college course catalog describing an electricity class again. What kinds of calculations will students learn to do?

Listening

6 Listen to a class about electricity. Mark the following statements as true (T) or false (F).

- 1 ___ The woman doesn't understand the difference between two types of currents.
- 2 ___ Remembering what the letters stand for helps the woman.
- 3 ___ The woman is learning about AC and DC for the first time.

7 Listen again and complete the conversation.

Instructor: Yesterday, we discussed AC and DC. Now, let's move on to ...

Student: Excuse me, Mr. Green. I still don't understand 1 _____ AC and DC. Can you explain that again?

Instructor: Sure, do you remember what the letters 2 _____?

Student: Yes. AC is alternating 3 _____. DC is direct current.

Instructor: Good! Now, simply remember this: the difference is in the 4 _____.

Student: What do you mean?

Instructor: Alternating current alternates 5 _____. It goes back and forth. Direct current does not.

Student: Oh, 6 _____! Thanks!

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

I still don't understand ...

Do you remember ...

What do you mean?

Student A: You are a teacher. Talk to Student B about:

- the topic of the lesson
- what the letters AC and DC stand for
- the difference between AC and DC

Student B: You are a student. Talk to Student A about what you don't understand about the types of currents.

Writing

9 Use the conversation from Task 8 to complete the quiz.

101 Quiz

Electricity

- 1 What does AC stand for? (5 points)

- 2 What does DC stand for? (5 points)

- 3 How are they different? (5 points)

ELECTRICAL SAFETY

Although electricity is a part of everyday life, it still has many **hazards**. Following a few simple safety rules can save your life.

Electricity **shocks** people when their bodies become part of an electrical path between

- A **live wire** and the ground
or
- Two live wires with opposite charges

Being shocked can cause serious **burns**. It can also **paralyze** muscles.

Electrocution is also a major **risk** when working with electricity.

To reduce electrical safety hazards always

- **De-energize** power sources before working with electrical equipment
- Follow **lockout/tagout procedures**

Remember: all electricity, including **static electricity**, can be dangerous. Never take risks.



shock

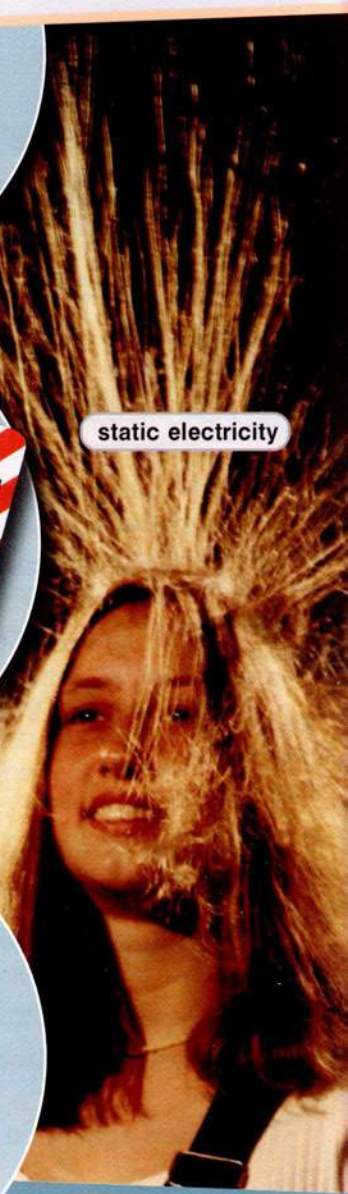
lockout/tagout procedure



static electricity



de-energize



Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some of the hazards of working with electricity?
- 2 What are some of the risks people may take when doing electrical repairs?

Reading

2 Read the safety pamphlet. Then, mark the following statements as true (T) or false (F).

- 1 ___ Static electricity is not dangerous.
- 2 ___ Lockout/tagout procedures cause electrocution.
- 3 ___ Electric shocks can paralyze muscles.

Vocabulary

3 Read the sentence pair. Choose where the words best fit the blanks.

1 burn / live wire

- A Touching a _____ is very dangerous.
B A serious _____ should be seen by a doctor.

2 de-energize / electrocution

- A Electricians _____ sockets before they work on them.
B _____ can be prevented by following safety rules.

3 risk / static electricity

- A _____ often builds up on door knobs.
B There is always a _____ of getting hurt at work.

4 Match the words (1-4) with the definitions (A-D).

- 1 ___ shock 3 ___ lockout/tagout procedure
2 ___ paralyze 4 ___ hazard

- A something that is not safe
B to make the muscles stop moving
C to pass electricity through the body
D a rule to lock energy sources and label electrical equipment when it's being repaired

5 Listen and read the safety pamphlet again. What are some safety rules that reduce electrical hazards?

Listening

6 Listen to a conversation between two electricians. Choose the correct answers.

- 1 Why is the man working with the woman?
A to learn how to work with electricity
B to learn safety procedures on the job
C to learn which safety equipment to wear
D to learn how to turn off electricity
- 2 What is the last step in the procedure?
A turn off the electricity
B lock the electrical box
C turn on the power again
D put a tag on the equipment

7 Listen again and complete the conversation.

Electrician 1: Thanks for letting me 1 _____ this week.

Electrician 2: No problem. This job has a lot of 2 _____. It's important to learn safety procedures.

Electrician 1: So yesterday you were telling me about the 3 _____.

Electrician 2: Right. Basically, never start working on electrical equipment until you know the 4 _____.

Electrician 1: Okay, that makes sense. Is that all?

Electrician 2: No. Then you 5 _____ so that no one can turn it on again.

Electrician 1: Got it.

Electrician 2: Finally, 6 _____ being repaired.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

Make sure to ...
It's important that ...
Never ...

Student A: You are an electrician. Talk to Student B about:

- why safety is important
- a specific safety procedure to be described
- what rules can keep people safe

Student B: You are an electrician. Talk to Student A about safety.

Writing

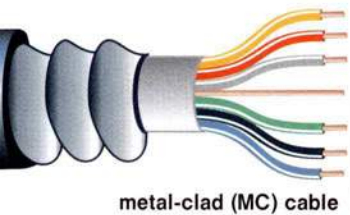
9 Use the conversation from Task 8 to fill out a safety checklist.

Safety Checklist

Name of safety procedure: _____

What are the steps of the procedure?

Why is the procedure important?



metal-clad (MC) cable



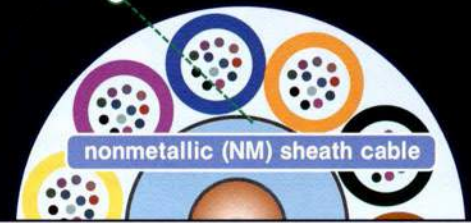
underground feeder (UF) cable



service entrance (SE) cable

Home Wiring

Tips and Types:



nonmetallic (NM) sheath cable

There are many different types of electrical wire and cable. **Knob and tube (K&T) wiring** is one of the oldest types of wiring. Older types of cable are **armored cable (AC)** and **metal-clad (MC) cable**. Both of these are **insulated** by steel. These were **replaced** in newer construction by **nonmetallic (NM) sheath cable**. However, replacement is not required if the wire or cable **jacket** is still good. Check them to make sure there is no bare **conductor** or wire showing. **Underground feeder (UF) cable** and **service entrance (SE) cable** are used outdoors. However, SE cable is only approved for above-ground use.

Get ready!

- 1 Before you read the passage, talk about these questions.

- 1 Why might an electrician need to know the types of wires?
- 2 What are some different types of wire?

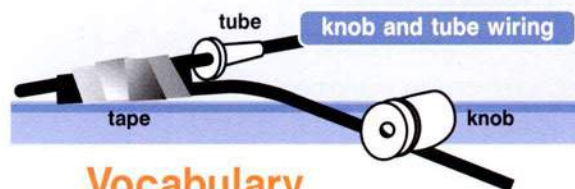
Reading

- 2 Read the excerpt from a magazine article. Then, choose the correct answers.

- 1 What is the main idea of the article?
 - A Wiring in older houses is dangerous.
 - B Metal-clad cable is not recommended in homes.
 - C Several types of wires and cables can be found in buildings.
 - D Indoor and outdoor wires vary from each other.
- 2 Which of the following is NOT true according to the article?
 - A Armored cable is a newer kind of wire.
 - B NM cable is found in newer buildings.
 - C Wires are unsafe in old buildings
 - D SE cable is not used underground.
- 3 When do older wires need to be replaced?
 - A when they are found in older homes
 - B when NM cable is available for use
 - C when bare wires or conductors are seen
 - D when they are used for service entrances



armored cable (AC)



knob and tube wiring

Vocabulary

- 3 Match the words (1-6) with the definitions (A-F).

- | | |
|-------------------|----------------------|
| 1 — SE cable | 4 — NM sheath cable |
| 2 — knob and tube | 5 — UF cable |
| 3 — armored cable | 6 — metal-clad cable |

- A a cable with an insulating material like thermoplastic
- B wires that run through porcelain covers found in old homes
- C wires for above ground use encased in a PVC jacket
- D wires in steel insulation with a grounding wire
- E wires for underground, wet areas in a thermoplastic jacket
- F wires encased in spiraled steel or aluminum

4 Read the sentence pair. Choose where the words best fit the blanks.

1 conductor / jacket

A It looks like the _____ is bare.

B The _____ is cracked.

2 required / insulated

A Modern wires should always be _____.

B UF or SE cable are _____ for outdoor wiring.

5 Listen and read the excerpt from the magazine article again. When do you not need to replace older types of wiring?

Listening

6 Listen to a conversation between a homeowner and an electrician. Mark the following statements as true (T) or false (F).

1 ___ The homeowner has lived in the house for many years.

2 ___ The wiring is nonmetallic sheath cable.

3 ___ The electrician will replace the wiring tomorrow.

7 Listen again and complete the conversation.

Homeowner: Thanks for 1 _____ so quickly. We just bought this house ... it's about 150 years old.

Electrician: It looks like it's still in 2 _____.

Homeowner: Yes, but we're worried whether or not the wiring is safe.

Electrician: 3 _____ . It looks like you've got knob and tube wiring.

Homeowner: Is that good or bad?

Electrician: It depends on the condition of the 4 _____, if you know what I mean?

Homeowner: Sure. Well, what does 5 _____ ?

Electrician: No cracks or 6 _____ . That's good news.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

We're worried whether or not ...

It looks like you've got ...

It depends on ...

Student A: You are an electrician. Talk to Student B about:

- what Student B is worried about
- what type of wiring he or she has
- the condition of the wiring

Student B: You are a new homeowner. Talk to the electrician about your wiring.

Writing

9 Use the conversation from Task 8 to fill out the customer feedback form.

Eddie's Electric

Customer Feedback Form

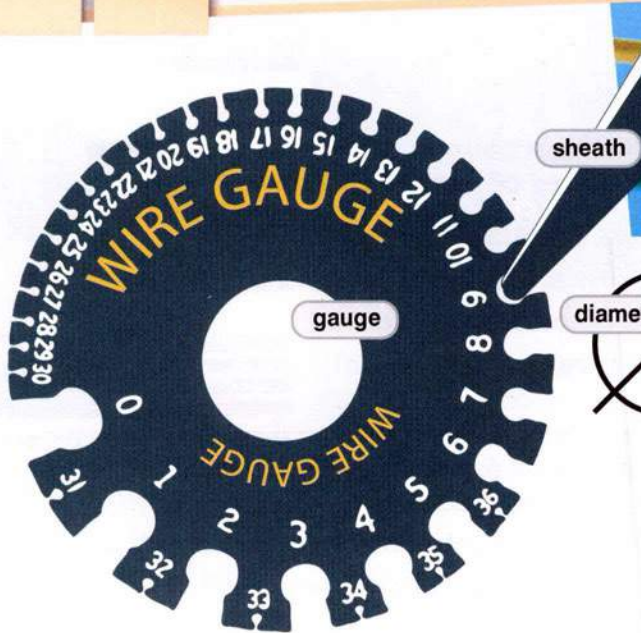
What type of service did we provide today?

___ consultation

___ repair / rewiring

Was our electrician on time? Y / N

Was he or she helpful? If so, please explain.



Wilson Wire Co.

Reading Wire Codes

Wiring **codes** are complicated. Here are some tips to make your job simpler:

1

Before installing any wire, read the **gauge**. Each wire has a number **embossed** on its **sheath**. The number refers to the **diameter** of the wire.

2

Know the **rating** for wire gauges. Wires with larger numbers are lesser in diameter. So, zero, or **ought** gauge wire has a bigger diameter than a 14 gauge.

3

Remember that different kinds of wires go in different **locations**. An 'H' on a wire means the **maximum** amount of heat it can stand is 165° Fahrenheit. A 'W' means you can put it in a damp area. It is water **resistant**.



Vocabulary

3 Match the words (1-6) with the definitions (A-F).

1 — diameter 3 — ought 5 — gauge
2 — rating 4 — sheath 6 — code

A set of letters or numbers that give information
B a device that shows the measurement of an object

C a list that rates an object on its worth
D nothing or zero

E a protective covering

F a line that shows the width of a circle

Get ready!

1 Before you read the passage, talk about these questions.

- Why do electricians need to know wire codes?
- Why do you think codes are printed on wire jackets?

Reading

2 Read the cheat sheet about wiring codes. Then, choose the correct answers.

- What is the purpose of the cheat sheet?
 - to help electricians choose the right wires
 - to explain why wiring codes are complicated
 - to give advice about the best kind of wire
 - to give an example of why following the codes is important
- What is NOT a tip given on the cheat sheet?
 - Large gauge wires are wider in diameter.
 - Certain wires are used for specific locations.
 - Wires are marked on the protective casing.
 - Wires are rated depending on thickness.
- What should electricians do before installing a wire?
 - find a good location
 - read the wire's heat marking
 - determine the wire gauge
 - inspect the water resistant marking

- 4 Fill in the blanks with the words from the word bank.

Word BANK

resistant maximum
embossed location

- I want to keep the _____ of the party a secret.
- The _____ amount of weight for the ride is 250 pounds.
- The wires are heat _____ up to 200 degrees.
- I had the watch _____ with her name.

- 5 Listen and read the cheat sheet about wiring codes again. What does it mean if a wire is embossed with an 'H' or a 'W'?

Listening

- 6 Listen to a conversation between two electricians. Mark the following statements as true (T) or false (F).

- ___ The wire the electricians are installing needs to be protected from rain.
- ___ The electricians disagree about the right wire gauge.
- ___ The wire is going to be buried.

- 7 Listen again and complete the conversation.

Electrician 1: What kind of wire should we put in the 1 _____?

Electrician 2: I think a 2 _____ will work.

Electrician 1: I missed that 3 _____. Do you mind repeating it?

Electrician 2: I said I think we can use a 12-gauge.

Electrician 1: Oh! This area gets a lot of rain. We probably need a wire with a 'W' 4 _____ on it, right?

Electrician 2: Sorry, I didn't catch what you said.

Electrician 1: I asked if we need a wire with a 'W'?

Electrician 2: Yes. That would be a 5 _____.

Electrician 1: Okay. I found the 6 _____.

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

What kind of ...
I think ...
We probably need ...

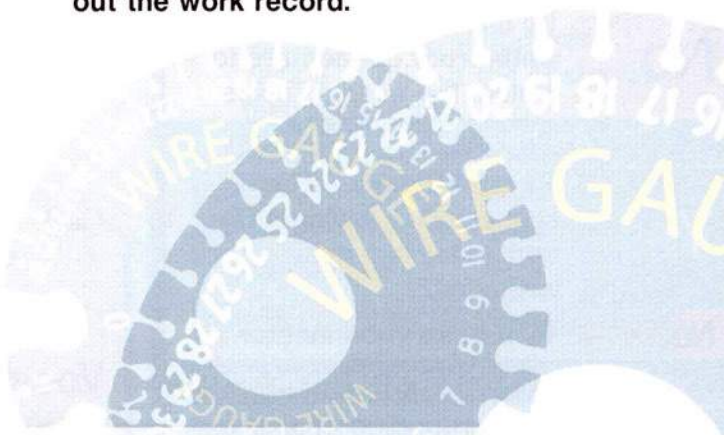
Student A: You are an electrician. Talk to Student B about:

- where the wire will go
- what is the best wire gauge
- what special markings the wire should have

Student B: You are an electrician. Talk to Student A about why a certain kind of wire is best for the location.

Writing

- 9 Use the conversation from Task 8 to fill out the work record.



Work Order Record

Location of Wiring Job: _____

Wire Gauge Used: _____

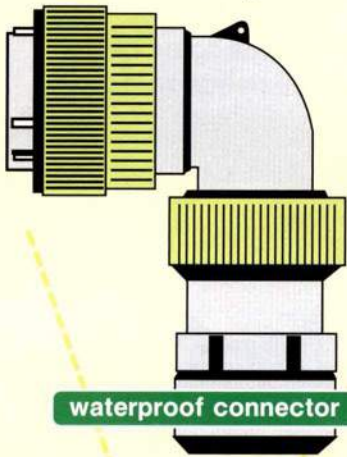
Special Considerations: _____

HOME

ABOUT US

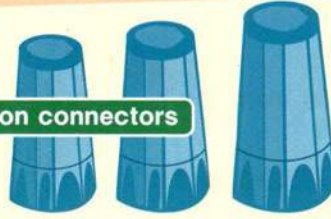
SERVICES

CONTACT



waterproof connector

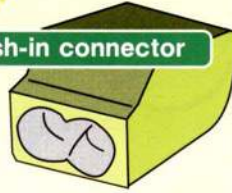
twist-on connectors



winged connector



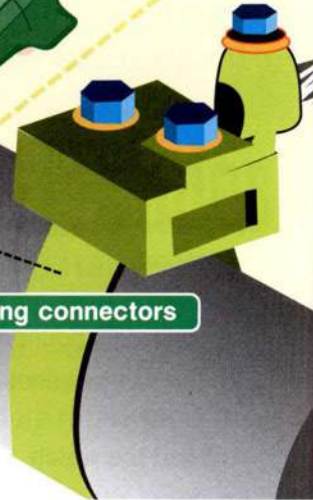
push-in connector



strap type

adjustable type

grounding connectors



Most wire connectors have a **thermoplastic shell** and a **spring** inside. The color depends on the gauge of the wire.

Which Wire Connector is Right for You?

Ask these questions:

Is the wire indoors?

Yes

Try ordinary **twist-on** or **crimp-on connectors**.

No

Try **underground** or **waterproof connectors** to protect the wires outdoors.

Can you twist the wires?

Yes

Try an ordinary twist-on connector, or a **winged connector** for extra leverage.

No

Try a **push-in connector**.

Are you making a ground connection?

Yes

Try a **grounding connector**.

No

Try a twist-on connector.

Reading

2 Read the store webpage on wire connectors. Then, choose the correct answers.

- What is the main purpose of the webpage?
 - to explain how a wire connector works
 - to help someone choose the right wire connector
 - to show that waterproof connectors protect the wires
 - to show how a wire connector is used
- Which of the following is NOT true according to the webpage?
 - Use push-in connectors when you can't twist the wires.
 - Underground connectors protect wires outdoors.
 - Crimp-on and twist-on connectors are both used indoors.
 - Make a grounding connection with an underground connector.
- What does the color of a wire connector depend on?
 - the voltage of the wire
 - the number of wires
 - the gauge of the wire
 - the type of shell

Vocabulary

3 Match the words (1-6) with the definitions (A-F).

- | | |
|--------------------------|--------------------------|
| 1 ___ spring | 4 ___ push-in connector |
| 2 ___ thermoplastic | 5 ___ crimp-on connector |
| 3 ___ twist-on connector | 6 ___ shell |

- a fire-resistant material
- the outer part of the connector that protects wires
- a connector that uses holes instead of twisting to splice wires
- a connector that is put into place with a special tool
- a connector that splices wires together by twisting
- the part of the connector that creates pressure to tightly splice wires

Get ready!

1 Before you read the passage, talk about these questions.

- What are some different kinds of wire connectors?
- Why is it important to use the right kind of wire connector?

4 Read the sentence pair. Choose where the words best fit the blanks.

1 **waterproof connector / underground connector**

A He needed a(n) _____ for the wires he planned to bury.

B It is best to use a _____ when there's a possibility wires may get wet.

2 **grounding connector / winged connector**

A Using a _____ is a good way to prevent shocks.

B A _____ is easier to tighten than other types.

5 Listen and read the store webpage on wire connectors again. Why is it best to use an underground connector or a waterproof connector when a wire is outside?

Listening

6 Listen to a conversation between a store clerk and customer. Mark the following statements as true (T) or false (F).

- ___ The customer wants to wire the lights on her deck.
- ___ The salesperson says the customer needs a twist-on connector.
- ___ The salesperson will show the customer where to find the right connector.

7 Listen again and complete the conversation.

Clerk: Welcome to Home Improvement Plus! How can I help you today?

Customer: Thanks. Actually I'm looking for a 1 _____ . I need to wire the lights on my deck.

Clerk: An 2 _____ deck? You should check out our underground or 3 _____ connectors.

Customer: Oh, really? I thought I could use a twist-on connector. I used to have some at home, but I must have 4 _____ .

Clerk: Normally those are great. But for outdoor wiring, the waterproof connectors are the best choice. They help 5 _____ .

Customer: Okay, that makes sense.

Clerk: I could 6 _____ where those are.

Customer: Thanks, that would be great!

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

Welcome to ...

I'm looking for a ...

I thought ...

Student A: You are a store clerk. Talk to Student B about:

- what he or she needs
- your recommendation
- why another product is not needed

Student B: You are a customer. Talk to Student A about what product you should buy.

Writing

9 Use the conversation from Task 8 to fill out the customer feedback form.

Home Improvement Plus

Customer Feedback Form

What did you purchase? _____

Did you get help from an employee?
Y / N

Was he or she helpful? If so, please explain.

Glossary

AC [N-UNCOUNT-U11] **AC**, or alternating current, is a type of electric current that constantly flows back and forth in different directions.

add [V-T-U9] To **add** numbers is to combine them.

allen wrench [N-COUNT-U2] An **allen wrench** is an L-shaped piece of metal with a six-sided head used to tighten screws and bolts.

ampere [N-COUNT-U11] An **ampere** is a unit of measurement for electricity.

and [CONJ-U9] **And** is used when combining or adding numbers. For example, one and one equals two.

arc flash blanket [N-COUNT-U6] An **arc flash blanket** is a blanket electricians use to protect themselves from electrical blasts and fires.

arc flash clothing [N-UNCOUNT-U6] **Arc flash clothing** is pants, shirts, jackets, and shoes designed to protect electricians from electric shock.

arc shield [N-COUNT-U6] An **arc shield** is a protective plastic shield for the eyes and face that fits onto a hard hat.

armored cable (AC) [N-COUNT-U13] An **armored cable (AC)** is a wire encased in a spiraled steel insulation with no grounding wires.

auger bit [N-COUNT-U3] An **auger bit** is a bit that cuts into wood. These bits are usually from 17 to 25 centimeters long.

bind [V-T-U8] To **bind** is to put two things together with rope or tape.

block [N-COUNT-U5] A **block** is a piece of stone, wood or other material that is solid with flat surfaces on each side.

brick [N-COUNT-U5] A **brick** is a block of clay that is baked until it is hard and used for building.

burn [N-COUNT-U12] A **burn** is a painful injury to the body caused by heat.

caliper [N-COUNT-U10] A **caliper** is a small measuring device.

Celsius [N-UNCOUNT-U10] **Celsius** is the metric temperature scale where water freezes at 0 degrees and boils at 100 degrees.

cement [N-UNCOUNT-U5] **Cement** is a mixture of ground limestone and clay.

centimeter [N-COUNT-U10] A **centimeter** is a metric unit that measures length or distance, equal to ten millimeters.

circular saw [N-COUNT-U3] A **circular saw** is an electric or gas-operated saw with a round blade.

climb [V-T-U7] To **climb** is to ascend or move up towards the top of something.

code [N-COUNT-U14] A **code** is a set of numbers or letters that gives information about something.

come to [V PHRASE-U9] To **come to** a number is to equal that number.

concrete [N-UNCOUNT-U5] **Concrete** is a hard material made by combining cement, small stones, sand and water.

conductor [N-COUNT-U13] A **conductor** is a wire. It is the metal part of a cable that carries electricity.

conduit bender [N-COUNT-U4] A **conduit bender** is an instrument that twists objects made of metal.

connect [V-T-U8] To **connect** is to plug in or turn on electricity or power.

convert [V-T-U10] To **convert** something is to change it from one state or mode into another.

copper [N-UNCOUNT-U5] **Copper** is a reddish brown metal that is often used for pipes or wires.

crimper [N-COUNT-U2] A **crimper** is a tool used for pushing connectors around bare wires.

crimp-on connector [N-COUNT-U15] A **crimp-on connector** is a type of connector that is fixed in place by using a crimping tool.

current [N-COUNT-U11] A **current** is the quantity of electricity that is flowing in a wire at a specific time.

DC [N-UNCOUNT-U11] **DC**, or direct current, is a type of electricity that goes in one direction, not two.

de-energize [V-T-U12] To **de-energize** is to prevent power from reaching an object, especially electrical equipment.

degree [N-COUNT-U10] A **degree** is a unit that is used to measure temperature.

diagonal cutters [N-PLURAL-U1] **Diagonal cutters** are pliers that are only used for cutting wire and do not grip.

diameter [N-COUNT-U14] The **diameter** of a circle is an imaginary line that runs through it showing its width.

divided by [V PHRASE-U9] If a number is **divided by** a second number, you calculate how many times the second number goes into it.

drill [N-COUNT-U3] A **drill** is a machine used to make holes in different kinds of material.

drill bit [N-COUNT-U3] A **drill bit** is the sharp end of a drill used to cut into objects to make holes.

drywall [N-UNCOUNT-U5] **Drywall** is a board made of plaster and covered in paper that is used in building.

duct tape [N-UNCOUNT-U2] **Duct tape** is a kind of tape made of mesh that is used to seal air ducts.

electric shock [N-COUNT-U6] An **electric shock** is a shock of electricity to the body.

electrical hot gloves [N-PLURAL-U6] **Electrical hot gloves** are gloves made of rubber that protect electricians from electric shock.

electrical tape [N-UNCOUNT-U2] **Electrical tape** is a kind of tape made of plastic or vinyl that is used to insulate electrical wires.

electrocution [N-UNCOUNT-U12] **Electrocution** is death or injury caused by electricity running through the body.

electron [N-COUNT-U11] An **electron** is a small part of an atom that contains a negative charge.

embossed [ADJ-U14] If an object is **embossed**, it has a pattern, number or design engraved on it.

end cutting pliers [N-PLURAL-U1] **End cutting pliers** are pliers used for pulling out staples etc.

equal [V-T-U9] If the answer to a mathematical problem **equals** a number, it is that number.

Fahrenheit [N-UNCOUNT-U10] **Fahrenheit** is the non-metric temperature scale where water freezes at 32 degrees and water boils at 212 degrees.

fish tape [N-COUNT-U4] A **fish tape** is a long, metal instrument that electricians use to put electrical wires in walls.

flashlight [N-COUNT-U1] A **flashlight** is a small, battery operated light that can be carried around.

foot [N-COUNT-U10] A **foot** is a unit of length that equals 12 inches.

gauge [N-COUNT-U14] A **gauge** is a device which calculates and shows the amount or degree of what is inside an object, such as a gas tank or wire.

grab [V-T-U7] To **grab** something is to take hold of it suddenly.

grounding connector [N-COUNT-U15] A **grounding connector** is for making ground connections. It is used for splicing wires that need to be grounded.

hacksaw [N-COUNT-U2] A **hacksaw** is a saw with a thin blade used to cut through metal.

hammer [N-COUNT-U2] A **hammer** is a tool with a metal top used for hitting nails or other objects.

hammer drill [N-COUNT-U4] A **hammer drill** is a machine which hits a hard substance (like cement) repeatedly to break it apart.

hard hat [N-COUNT-U6] A **hard hat** is a protective hat made of strong plastic.

hazard [N-COUNT-U12] A **hazard** is a known danger.

hole saw bit [N-COUNT-U3] A **hole saw bit** is a metal tube-shaped drill bit with sharp edges used to cut rings into objects.

Glossary

- hot stick** [N-COUNT-U6] A **hot stick** is a fiberglass rod that electricians use to protect themselves from shocks when they are working with wires.
- hundred** [N-COUNT-U9] A **hundred** is combined with another number to express numbers in the thousands. For example, the number 2,300 could be stated twenty-three hundred.
- imperial** [ADJ-U10] If something is **imperial**, it involves the system of measurement based on the inch and the pound.
- inch** [N-COUNT-U10] An **inch** is an imperial unit that measures length or distance.
- inspect** [V-T-U8] To **inspect** is to look at or analyze something carefully.
- install** [V-T-U8] To **install** is to arrange, connect or put something in a certain place so you can use it.
- insulated** [ADJ-U13] If a wire is **insulated**, then it is protected from touching other wires. This helps prevent fires and short circuiting.
- is** [V-T-U9] If something **is** something else, they are equal.
- jacket** [N-COUNT-U13] A **jacket** is the insulated sheath that protects the wires from touching each other or getting too hot.
- jigsaw** [N-COUNT-U3] A **jigsaw** is an electric or gas-operated saw with a thin blade, which cuts straight and rounded edges into objects.
- kneel** [V-I-U7] To **kneel** is to support oneself on one or both knees.
- knob and tube (K&T) wiring** [N-UNCOUNT-U13] **Knob and tube (K&T) wiring** is wires encased in porcelain knobs and tubes. It is usually found in older homes.
- labeling machine** [N-COUNT-U4] A **labeling machine** is an instrument electricians use to make labels for different objects.
- leather gloves** [N-PLURAL-U6] **Leather gloves** are gloves that are made of leather and used to protect the hands.
- less** [PREP-U9] **Less** is used when taking a number away from another.
- level** [N-COUNT-U4] A **level** is a tool electricians use to ensure they install things in a straight line.
- lift** [V-T-U7] To **lift** something is to move it to a higher position.
- lineman's pliers** [N-PLURAL-U4] **Lineman's pliers** are tools workers use to twist and slice wires.
- live wire** [N-COUNT-U12] A **live wire** is a wire with electrical energy running through it.
- location** [N-COUNT-U14] A **location** is a place or site.
- lockout/tagout procedure** [N-COUNT-U12] A **lockout/tagout procedure** is when a lock is placed on a power source after it has been turned off and a label is placed on the equipment to show that it has been locked.
- long nose (needle nose) pliers** [N-PLURAL-U1] **Long nose pliers** are pliers with long blades able to grip or cut through wires.
- masonry drill bit** [N-COUNT-U4] A **masonry drill bit** is a bit that is made to drill through hard surfaces like stone or concrete. It is usually used with a hammer drill.
- maximum** [ADJ-U14] **Maximum** is the most of something that is achievable.
- measuring tape** [N-COUNT-U1] A **measuring tape** is a tool with a long piece of thin metal, paper or plastic with numbers on it.
- metal-clad (MC) cable** [N-UNCOUNT-U13] **Metal-clad (MC) cable** is wires encased in steel insulation, and it has a green ground wire inside the metal jacket.
- meter** [N-COUNT-U10] A **meter** is a unit of length that measures 100 centimetres or 39 inches.
- metric** [ADJ-U10] If something is **metric**, it involves the system of measurement based on the meter and the kilogram.

micrometer [N-COUNT-U10] A **micrometer** is a type of caliper with a calibrated screw used to measure small distances.

millimeter [N-COUNT-U10] A **millimeter** is a metric unit that measures length or distance, equal to 1/10 of a centimeter.

minus [PREP-U9] **Minus** is used when taking away a number from another.

mortar [N-UNCOUNT-U5] **Mortar** is a mixture of sand, water and lime used to hold bricks or stones in place.

multimeter [N-COUNT-U4] A **multimeter** is a device used to determine a wire's amount of voltage and power.

multiplied by [V PHRASE-U9] If a number is **multiplied by** another, it is added onto itself that number of times.

nonmetallic (NM) sheath cable [N-UNCOUNT-U13] **Nonmetallic (NM) sheath cable** is wires in a non-metal jacket.
The jacket is made of a material like thermoplastic.

nut driver [N-COUNT-U2] A **nut driver** is a tool used for tightening nuts.

ohm [N-COUNT-U11] An **ohm** is a unit of measurement showing electrical resistance.

ought [N-UNCOUNT-U14] **Ought** is nothing or nil.

over [PREP-U9] If one number **over** another number, it is divided by that number.

paralyze [V-T-U12] To **paralyze** is to freeze the muscles so they cannot move.

Phillips screwdriver [N-COUNT-U2] A **Phillips screwdriver** is a tool used to tighten screws that have a cross-shaped head.

plaster [N-UNCOUNT-U5] **Plaster** is a mixture of lime, sand and water used in buildings to cover walls and ceilings.

plug-in analyzer [N-COUNT-U4] A **plug-in analyzer** is a machine used to check circuits to make sure they are correctly installed and safe.

plus [PREP-U9] **Plus** is used when adding numbers.

plywood [N-UNCOUNT-U5] **Plywood** is a board made of thin layers of wood that are glued together.

pull [V-T-U8] To **pull** is to put force on an object in order to move it closer to you.

push [V-T-U8] To **push** is to put force on an object in order to move it away from you.

push-in connector [N-COUNT-U15] Instead of twisting, wires are pushed in through holes in the **push-in connector**.

rating [N-COUNT-U14] A **rating** is a list grading and comparing objects on their worth, usefulness or value.

reciprocating saw [N-COUNT-U3] A **reciprocating saw** is an electric or gas-operated saw that has a few different blades which can be switched.

release [V-T-U7] To **release** something is to let it free or let it go.

replace [V-T-U13] To **replace** is to take away an old wire and put a new wire in its place.

resistance [N-UNCOUNT-U11] Electrical **resistance** is the way certain substances work against electricity.

resistant [ADJ-U14] If an object is **resistant**, it is not affected by certain things such as heat or water.

risk [N-COUNT-U12] A **risk** is a chance that something bad will happen.

rotary drill [N-COUNT-U5] A **rotary drill** is a drill that moves in circles to cut something.

rotary hammer [N-COUNT-U5] A **rotary hammer** hits things hard, while turning, to drill into something.

round off [V PHRASE-U10] To **round off** a screw or bolt is to damage it so that it cannot be moved properly with normal tools.

rubber mat [N-COUNT-U6] A **rubber mat** is a mat made of rubber that electricians stand on to protect themselves from electric shock.

Glossary

- safety glasses** [N-UNCOUNT-U6] **Safety glasses** are clear glasses made of thick plastic that protect electricians' eyes from flashes and dangerous materials.
- screwdriver** [N-COUNT-U1] A **screwdriver** is a tool used to tighten or loosen screws.
- service entrance (SE) cable** [N-COUNT-U13] A **service entrance (SE) cable** is used for wiring outside and above ground.
- sheath** [N-COUNT-U14] A **sheath** is a plastic casing that protects wires.
- shell** [N-COUNT-U15] A **shell** is a covering used on connectors to protect wires. It is usually made of fire resistant thermoplastic.
- shock** [V-T-U12] To **shock** is to pass electricity through the body.
- side cutters** [N-PLURAL-U1] **Side cutters** are a type of pliers used for cutting, twisting or pulling wires.
- socket wrench** [N-COUNT-U2] A **socket wrench** is a tool used to tighten bolts.
- spade bit** [N-COUNT-U3] A **spade bit** is a narrow bit with a sharp tip and edges.
- splice** [V-T-U8] To **splice** is to join two wires by twisting them and connecting the ends.
- split** [V-T-U7] To **split** something is to separate it or divide it into more than two parts.
- spring** [N-COUNT-U15] A **spring** is a device inside the shell of a connector. The spring creates pressure which tightly splices the wires together.
- stand** [V-T-U7] To **stand** is to be in a vertical position.
- static electricity** [N-UNCOUNT-U12] **Static electricity** is an electrical charge made by friction.
- steel** [N-UNCOUNT-U5] **Steel** is a metal that is made from combining iron and carbon.
- steel toe boots** [N-PLURAL-U6] **Steel toe boots** are boots with a layer of steel in the front so that workers' feet won't be hurt by objects that fall.
- stepped drill bit** [N-COUNT-U4] A **stepped drill bit** is a drill bit that is used to drill through metal, plastic or wood.
- stone** [N-UNCOUNT-U5] **Stone** is the hard substance rocks are made from, and is often used in buildings.
- stoop** [V-I-U7] To **stoop** is to stand with the top half of the body bent forward.
- strip** [V-T-U8] To **strip** is to take the plastic covering off wires so that only the metal is left.
- stud punch** [N-COUNT-U4] A **stud punch** is a device that cuts holes for wires to go through.
- subtract** [V-T-U9] To **subtract** a number is to take it away from another number.
- test** [V-T-U8] To **test** is to turn something on or try something to see if it works.
- eighth** [N-COUNT-U9] An **eighth** is one of eight equal parts of something.
- thermoplastic** [ADJ-U15] **Thermoplastic** describes the fire resistant material that is used to make connector shells.
- times** [PREP-U9] **Times** is used when multiplying numbers.
- tool belt** [N-COUNT-U2] A **tool belt** is a belt with loops for carrying tools while working on a job.
- tool kit** [N-COUNT-U1] A **tool kit** is a bag or box used to hold a set of tools.
- torque wrench** [N-COUNT-U2] A **torque wrench** is a tool that can be adjusted to create different amounts of force when turning a bolt.
- turn off** [V PHRASE-T-U7] To **turn** something **off** is to make it cease operating or stop working.
- turn on** [V PHRASE-T-U7] To **turn** something **on** is to make it operate or start working.
- twist** [V-T-U8] To **twist** something is to turn it or bend it.

twist bit [N-COUNT-U3] A **twist bit** is a drill bit with a spiral or coil-shaped cutting part.

twist-on connector [N-COUNT-U15] A **twist-on connector** is a wire connector that is twisted on. It connects or splices one or more wires.

underground connector [N-COUNT-U15] When a connection may be exposed to water, moisture, and the elements, or buried underground, an **underground connector** is used.

underground feeder (UF) cable [N-COUNT-U13] An **underground feeder (UF) cable** is used outdoors and can be buried directly underground. It can be used in wet areas.

utility knife [N-COUNT-U1] A **utility knife** is a tool with a thin, sharp slanted blade used to cut things.

volt [N-COUNT-U11] A **volt** measures the strength of the force moving electricity.

voltage [N-UNCOUNT-U11] **Voltage** is the force of moving electricity.

waterproof connector [N-COUNT-U15] A **waterproof connector** is designed to protect wires from water.

watt [N-COUNT-U11] A **watt** is a unit of measurement for electrical power.

winged connector [N-COUNT-U15] A **winged connector** is a twist-on connector with extra plastic wings. This makes it easier to tighten.

wire strippers [N-PLURAL-U1] A **wire stripper** is a tool used for pulling the covering off wires.

wood [N-UNCOUNT-U5] **Wood** is a substance that comes from trees and is used for building.

wood auger [N-COUNT-U3] A **wood auger** is a big drill bit which smooths the rough parts of holes in wood.

yard [N-COUNT-U10] A **yard** is a unit of length that equals 3 feet.

**CAREER
PATHS**

Electrician

Book
2

Virginia Evans
Jenny Dooley
Tres O'Dell



Express Publishing

vk.com/englishlibrary

Scope and sequence

Unit	Topic	Reading context	Vocabulary	Function
1	Electrical connectors	Store webpage	connector, terminal block connector, post connector, insulation displacement connector, plug and socket connector, blade connector, ring terminal, spade terminal, split bolt connector, clamp connector, offset connector, solderless connector	Repeating something back
2	Conduit systems	Newspaper advertisement	conduit, non-metallic tubing, electrical metallic tubing, moisture tight fitting, installation, protection, grounded, flexible, non-corrosive, building code, route	Making an appointment
3	Buried and aerial service entrances	Textbook excerpt	service entrance (SE), utility transformer, buried service, aerial service, service drop, service cable, clearance, right-of-way, utility pole, service lateral, drip loop	Giving advice
4	Panels	Magazine article	main service panel, main switch, branch circuit, overcurrent, accommodate, gadget, hot bus, neutral bus, function, cut off, manually, capacity, safeguard	Offering choices
5	Subpanels	DIY web article	subpanel, secondary, short circuit, hot conductor, neutral return conductor, grounding conductor, bond, feeder cable, continuous, remote, malfunction, safety precaution, component	Giving praise
6	Fuses and circuit breakers	Manufacturer's guide	fuse, circuit breaker, overload, ground fault, cartridge fuse, plug fuse, trip, single pole breaker, double pole breaker, blown fuse, replacement	Describing an object
7	Balancing the load	DIY magazine article	electrical load, balance, analyze, stability, consumption, amperage, parity, appliance, corresponding, owner's manual, transfer, draw, snap	Describing a process
8	Receptacle boxes	Textbook excerpt	outlet box, volume, overcrowded, short, deep, handy box, cut-in box, shallow, pancake box, integral nail box, weatherproof, mount	Giving feedback
9	Receptacles	Web forum	outlet, duplex outlet, single outlet, outlet cap, polarity, grounding pin, plug, grounding slot, narrow slot, wide slot, immediate turn plug, cheater plug, hook up	Giving assurances
10	Switch boxes	DIY webpage	single gang box, two gang box, three gang box, four gang box, grounding screw, coverplate, wall cavity, flush, box extender, bracket, control	Declining something
11	Types of switches	Web forum	residential grade switch, open circuit, commercial grade switch, single pole switch, double pole switch, three-way switch, four-way switch, toggle switch, pilot light switch, timer switch, keyed switch, dimmer switch	Asking for an opinion
12	Grounding systems	Advertisement	equipment grounding conductor, earth grounding system, ground, grounding electrode conductor, ground fault, fault current, surge arrester, stray voltage, ground rod, clamp, estimate	Finding out cost
13	Installing a grounding system	Installation pamphlet	drive, resistance, footer, sphere of influence, ground wire, parallel, panel bond, ditch, soil condition, bonding wire	Agreeing with an assessment
14	Electrical fires	Government fact sheet	electrical fire, combustible, faulty, frayed, ignite, precaution, overheat, flicker, evaluate, fixed wiring, maintenance	Pointing things out
15	Electrical safety at home	Website article	prevention, safety cover, traffic, baseboard, zip cord, temporary, permanent, securely, flammable, fail, worn out, adapter, breaker box	Saying something is dangerous

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www.donselectricalsupply.com

Don's Electrical Supply

Don's Electrical Supply has all the **connectors** you need at great prices. Whatever the connection, we have the connector! Are you looking to connect wires to equipment? We have many connectors to serve your needs. We carry **post connectors**, **blade connectors**, **ring terminals**, and **spade terminals**.

Or perhaps you need to connect wires to other wires. If this is the case, we can provide you with a variety of **solderless connectors**. We have **terminal block connectors**, **plug and socket connectors**, and **clamp connectors**.

We also have some other items for more specific types of connections:

Insulation displacement connectors are available if you don't want to strip wires.

For connecting larger size wire, we have **split bolt connectors**. For changing the wiring on your electrical box, **offset connectors** are available.

You can place an order online anytime at www.donselectricalsupply.com. You can also call us at 1-800-376-8532 between 8:00 a.m. and 8:00 p.m.



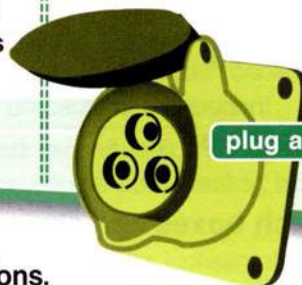
split bolt connector



post connector



clamp connector



plug and socket connector

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some different kinds of wire connectors?
- 2 When is it acceptable for electricians to substitute one kind of connector for another?

Reading

2 Read the store webpage about connectors. Then, mark the following statements as true (T) or false (F).

- 1 Split bolt connectors are used for changing wires on electrical boxes.
- 2 Insulation displacement connectors make stripping wires unnecessary.
- 3 Post connectors splice two different wires.

Vocabulary

3 Match the words (1-4) with the definitions (A-D).

- | | |
|---|--|
| 1 <input type="checkbox"/> offset connector | 3 <input type="checkbox"/> split bolt connector |
| 2 <input type="checkbox"/> clamp connector | 4 <input type="checkbox"/> insulation displacement connector |

- A connects wires without stripping them
- B uses a V-shaped ring to connect wires
- C changes the direction of a wire
- D used for taps and splices in building wiring

4 Place the words and phrases from the word bank under the correct headings.

word BANK

- terminal block connector
- post connector
- clamp connector
- blade connector
- ring terminal
- spade terminal
- plug and socket connector

Connects Wires to Equipment
Connects Wires Together

- 5 Listen and read the store webpage about connectors again. Why are there so many different types of connectors?

Listening

- 6 Listen to a conversation between an electrician and a supplier. Choose the correct answers.

- What is the purpose of the conversation?
 - to place an order for different connectors
 - to find out which connectors are in stock
 - to learn how to use each kind of connector
 - to compare the prices of connectors
- Why does the man order a post connector?
 - to connect two different kinds of wires
 - to connect a wire to some speakers
 - to cap off the end of a spliced wire
 - to connect a large wire

- 7 Listen again and complete the conversation.

Electrician: I have 1 _____ that I need to order.

Supplier: Okay. We have all types of connectors.

Electrician: Good. First of all, I need something to 2 _____ to some large speakers. What about a post connector?

Supplier: That would work. I'll just check availability. You said 3 _____, right? Okay, I do have those 4 _____ right now.

Electrician: Great. I'll take a pack of those. I also need to connect some wires. Do you have any 5 _____?

Supplier: We sure do. What kind do you need?

Electrician: I'll take two packs of 6 _____ please, and four packs of socket connectors.

solderless connector

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

First of all ...
What about ...
I'll take ...

Student A: You are an electrician. Talk to Student B about:

- why you need connectors
- what kinds of connectors you need
- the price of the connectors

Student B: You are a supplier. Talk to Student A about the different kinds of connectors.

Writing

- 9 Use the conversation from Task 8 to fill out the purchase order.



blade terminals

Purchase Order Form

Item: _____

Quantity: _____

Item: _____

Quantity: _____

Total price: _____

Reason for Order: _____

Additional Information: _____

Need CONDUIT installation?

Look no further! My name is Gary Parsons and I am a highly qualified electrician.

First off, I have all types of conduit tubing. Choose **non-metallic tubing** or **electrical metallic tubing** for your home or business. I will give recommendations based on your needs.

What's most important is that I have the know-how to do any type of job. For those tough **routes**, I have **flexible** conduits. For homes with complicated

building codes, I can use **grounded** connectors. Have corrosion, fire, or water issues in your home? No problem! Many of my conduits have **protection** against these. For example, **moisture tight fittings** are especially made to keep water out. I also have a variety of **non-corrosive** conduits.

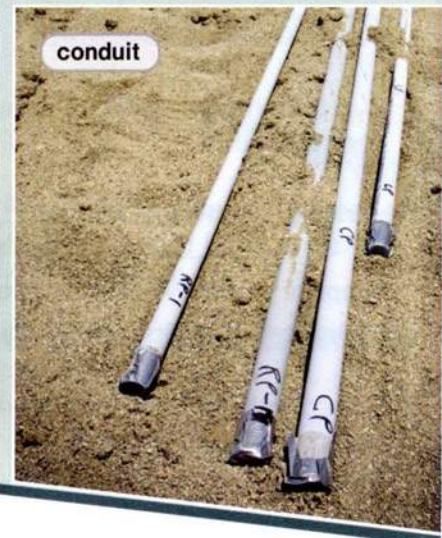
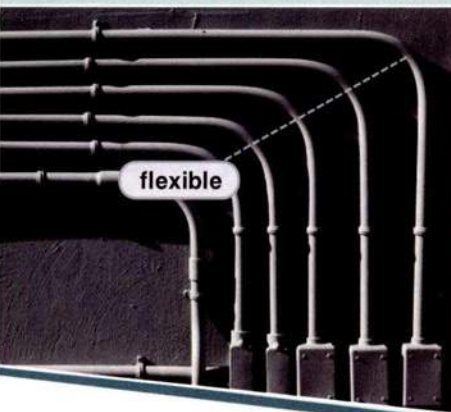
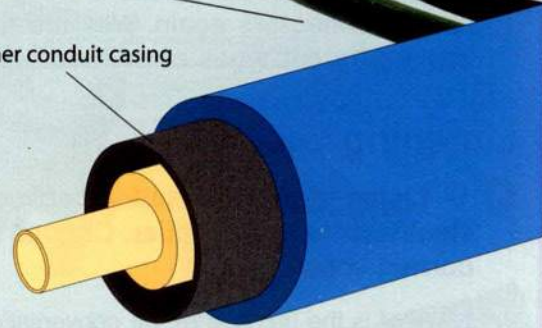
The bottom line is that I understand the needs of your specific **installation**. And if you're not happy with my work, I'll give you your money back!

GND
symbol



grounded

Inner conduit casing



Get ready!

1 Before you read the passage, talk about these questions.

- 1 Why do electricians use conduits?
- 2 How are different types of conduits used?

Reading

2 Read the newspaper advertisement for conduit installation. Then, mark the following statements as true (T) or false (F).

- 1 ___ The electrician recommends non-metallic tubing instead of metallic tubing.
- 2 ___ Flexible conduits are needed in homes with complicated building codes.
- 3 ___ Moisture tight fittings offer extra protection.

Vocabulary

3 Match the words (1-6) with the definitions (A-F).

- | | |
|------------------|----------------------------------|
| 1 ___ route | 4 ___ non-corrosive |
| 2 ___ grounded | 5 ___ moisture tight fitting |
| 3 ___ protection | 6 ___ electrical metallic tubing |

- A the ability to keep out dangers
 B a conduit made of steel or aluminum
 C a specified course or path
 D not damageable by chemicals
 E a conduit designed to keep water out
 F connected to the earth

4 Read the sentence and choose the correct word.

- 1 We need a **flexible / noncorrosive** conduit to run the wire around that corner.
- 2 This wiring job violates the city's **protection / building code**.
- 3 The electrician chose **non-metallic tubing / electrical metallic tubing** because she prefers working with plastic.
- 4 You should install a **route / conduit** to protect those wires.

5 Listen and read the newspaper advertisement for conduit installation again. Why would an electrician use flexible conduits?

Listening

6 Listen to a conversation between an electrician and a building owner. Choose the correct answers.

- 1 What is the purpose of the conversation?
 - A to determine if conduits are necessary
 - B to compare different types of conduits
 - C to set up a conduit installation
 - D to describe the advantages of a conduit
- 2 Why is the man bringing moisture tight fittings?
 - A Some areas are exposed to water.
 - B They work best with non-metallic tubing.
 - C The conduits must fit around corners.
 - D They work better than flexible conduits.

7 Listen again and complete the conversation.

Electrician: 1 _____ - _____ works well most of the time. Do you have any areas with heavy exposure to chemicals or water?

Building Owner: Not too many. We may need some 2 _____, but not a lot.

Electrician: Okay. I'll bring some of those and also some 3 _____ in case we need to get around any corners.

Building Owner: Sounds good. When would be a good time for you 4 _____?

Electrician: How about Wednesday morning? I have a job in the 5 _____, but I could come by around 11:00.

Building Owner: 11:00 in the morning isn't a good time. What about 3:00 on Wednesday afternoon?

Electrician: 3:00 in the afternoon 6 _____. I'll see you then!

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

What kind of ...
I think ... would be fine.
I'll bring some ... and also some ...

Student A: You are an electrician. Talk to Student B about:

- conduit installation and site conditions
- types of conduits needed
- when you can arrive at the jobsite

Student B: You are a building owner. Talk to Student A about a conduit installation.

Writing

9 Use the conversation from Task 8 to fill out the electrician's work order.

Gary Parsons

ELECTRIC

Work Order
 Account #: 7759

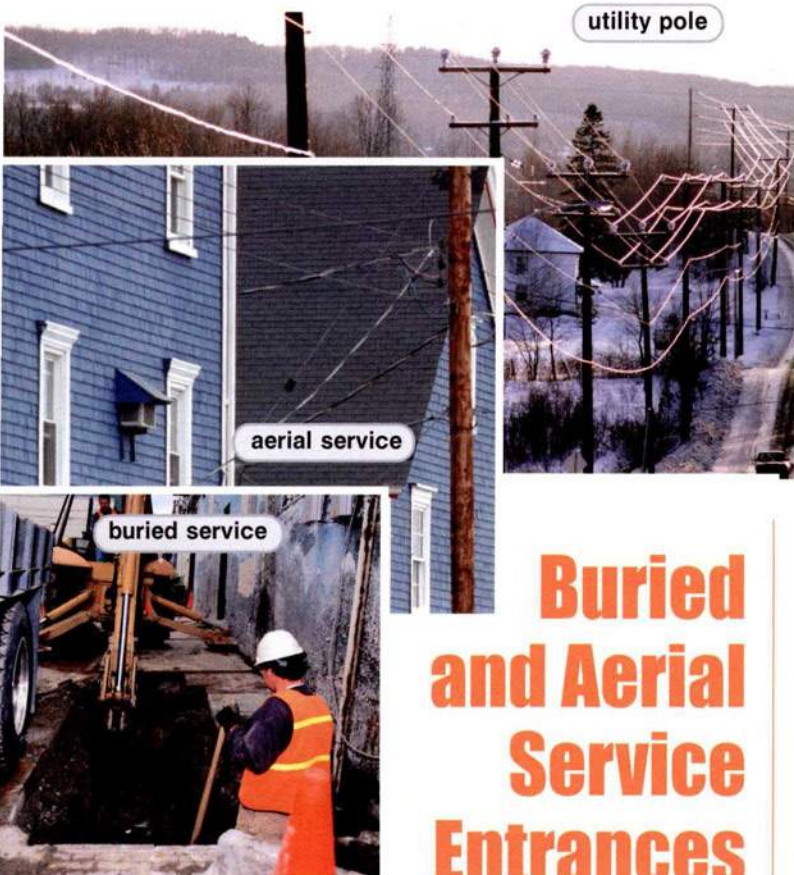
Job Start Time: _____

Building Conditions: _____

Products Needed: _____

Get ready!

- ① Before you read the passage, talk about these questions.
- 1 What are the advantages and disadvantages of a buried service entrance?
 - 2 What are the advantages and disadvantages of an aerial service entrance?



Buried and Aerial Service Entrances

Buried service and **aerial service** entrances both have advantages and disadvantages. Buried service entrances are preferred by some customers. This is because **right-of-way** requirements are smaller. There are also no **clearance** problems with buried services. **Utility poles** are not necessary. There are no **service cables** crossing the roof of the building. Also, there is no visible **service drop**. Fewer trees have to be cut down for a buried service entrance.

Some customers prefer aerial service entrances instead. Problems with the **service entrance (SE)** are easier to see with an aerial service. Also, installing aerial services does not damage landscaping. There is little risk of cutting through aerial utilities and they are cheaper.

Aerial service entrances require a **drip loop** for incoming wires. A **utility transformer** and a **service lateral** are required for buried service.

Reading

- ② Read the textbook excerpt on buried and aerial service entrances. Then, complete the table using information from the excerpt.

Service Entrance	Advantages
Buried	_____
Aerial	_____

Vocabulary

- ③ Match the words (1-5) with the definitions (A-E).

- | | |
|--------------------|---------------------------|
| 1 ___ drip loop | 4 ___ service entrance |
| 2 ___ utility pole | 5 ___ utility transformer |
| 3 ___ service drop | |

- A a place where electricity enters a building
 B a line that carries electricity to a building
 C a post that supports overhead wires
 D a bend in electrical wires to a building
 E a device that converts voltage from high to low

- ④ Fill in the blanks with the correct words and phrases from the word bank.

Word BANK

buried service aerial service
 clearance service lateral
 right-of-way

- 1 The _____ provides power to the underground service entrance.
- 2 We installed _____ to avoid digging up the landscaping.
- 3 The power company has a(n) _____ across my property.
- 4 The truck did not have enough _____ to pass under the wires.
- 5 Some people prefer _____ because they don't like seeing electrical cables.

- 5 Listen and read the textbook excerpt on buried and aerial service entrances again. What is one reason someone might choose a buried instead of an aerial service entrance?

Listening

- 6 Listen to a conversation between a customer and an electrician. Choose the correct answers.

- What is the purpose of the conversation?
 - to discuss the cost of a service entrance
 - to explain how to install a service entrance
 - to describe the purpose of a service entrance
 - to compare different types of service entrances
- What will the woman likely do next?
 - She will decide to take the cheapest option.
 - She will consult another electrician.
 - She will choose a buried service entrance.
 - She will ask for the man's advice.

- 7 Listen again and complete the conversation.

Customer: I'm not sure what kind of electrical 1 _____ I want installed at my home.

Electrician: Well, there are two types of services: buried and aerial.

Customer: What's the 2 _____ those two?

Electrician: A buried service goes under the ground. An aerial service is above ground and 3 _____.

Customer: Is there a difference in the cost?

Electrician: Yes. It costs more to install a 4 _____ because more work is required.

Customer: Which one would 5 _____?

Electrician: In my experience, the buried service is 6 _____ because there are fewer wires around your home.

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

There are two types ...

Is there a difference in ...

The ... is more popular because ...

Student A: You are a customer. Talk to Student B about:

- types of service entrances
- a cost comparison
- advantages of a type of service entrance

Student B: You are an electrician. Talk to Student A about types of service entrances.

Writing

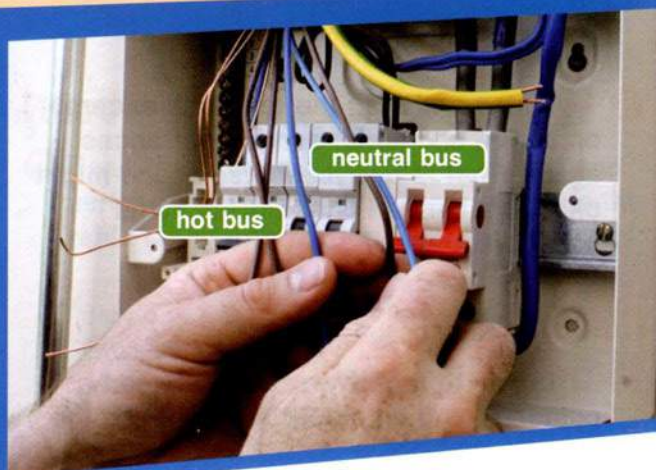
- 9 Use the conversation from Task 8 to fill out the customer's memo to the electrician.

Service Entrances

I would prefer the _____ service entrance

because _____

even though it _____.



Smart Improvements Monthly No.9

GET POWERED!

Electricity in Your New Home

Today's increased use of high-powered appliances and **gadgets** means you can't risk installing a substandard electrical system.

Before starting installation, you should understand electrical safety **functions**. The **main service panel** is what **safeguards** your system from dangerous malfunctions. This panel houses the **main switch**, where you can **manually** stop the flow of electricity. More importantly, it **cuts off** power to all **branch circuits** automatically when it detects hazardous power levels.

When choosing electrical components, parts with high **capacity** are nearly always better. If you can install a circuit with higher amperage, or two **hot bus** bars instead of one, then go ahead. Having higher capacity than you need poses no dangers. If the capacity is too low, however, you risk **overcurrent**, which can lead to fire or electric shock. You should also make sure your **neutral bus** can safely **accommodate** the spent current as it returns to the service entrance conductor.

Get ready!

1 Before you read the passage, talk about these questions.

- 1 In your country, how does today's technology affect the need for electricity?
- 2 What is a safety concern when installing an electrical system?

Reading

2 Read the magazine article on service panels. Then, mark the following statements as true (T) or false (F).

- 1 The main switch must be switched manually.
- 2 Two neutral bus bars are better than one.
- 3 An electrical system with higher capacity carries increased risk of overcurrent.

Vocabulary

3 Match the words (1-5) with the definitions (A-E).

- | | |
|---|--|
| 1 <input type="checkbox"/> cut off | 4 <input type="checkbox"/> manually |
| 2 <input type="checkbox"/> function | 5 <input type="checkbox"/> overcurrent |
| 3 <input type="checkbox"/> main service panel | |

- A controlled by a person directly
- B a part that controls power distribution
- C a purpose or intended use
- D an excessive surge of power
- E to stop something abruptly

4 Place the words and phrases from the word bank under the correct headings.

Word BANK

main switch branch circuit
hot bus neutral bus

Carries Current	Stops Current
_____	_____
_____	_____
_____	_____

- 5 🎧 Listen and read the magazine article on service panels again. Why might someone choose to have more electrical capacity than needed?

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

We need to decide ...

I definitely want ...

There is ... but it's probably ...

Student A: You are an electrician. Talk to Student B about:

- new service panel options
- available capacity
- his or her decision and reason(s)

Student B: You are a homeowner. Talk to Student A about new service panel options.

Writing

- 9 Use the conversation from Task 8 to fill out the electrician's work order.

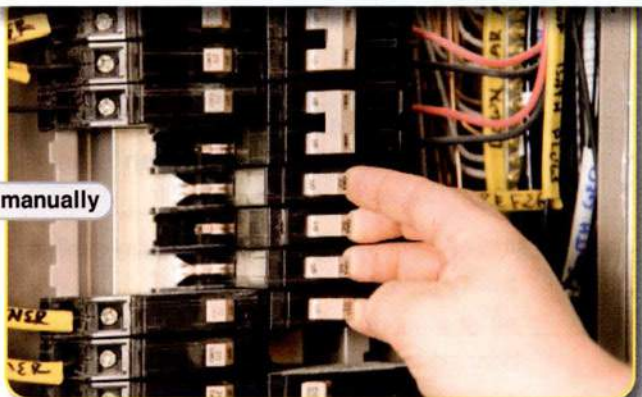
WORK ORDER

Customer: Ms. Larson

Product to Install: _____

Customer's Preference: _____

Reason for Preference: _____



manually

Listening

- 6 🎧 Listen to a conversation between an electrician and a homeowner. Choose the correct answers.

- 1 What is the purpose of the conversation?
- A to discuss the advantages of lower capacity
 B to determine the capacity of a certain panel
 C to choose the proper amperage for a panel
 D to review the cost of a new installation
- 2 Why does the woman want a particular type of panel?
- A It is the same panel she had before.
 B It is the most popular type of panel.
 C It is cheaper than the other panels.
 D It is the best panel for her family's needs.

- 7 🎧 Listen again and complete the conversation.

Electrician: We need to decide what kind of 1 _____ you need for your main service panel.

Homeowner: Okay. What are my options?

Electrician: Well, you have a couple of choices. For a 2 _____, we usually install a 100-amp electrical panel, but there's also a 150-amp available.

Homeowner: I definitely want 3 _____. Is 150-amp the highest?

Electrician: There is a 200-amp, but it's probably 4 _____. Also, it'll be a little more expensive.

Homeowner: That's fine. My family uses a lot of 5 _____. In our old house, the main breaker kept cutting off our power because we were using too much.

Electrician: Okay, Ms. Larson, 200-amp it is. I'll 6 _____ and give you an estimate this afternoon.

HOME

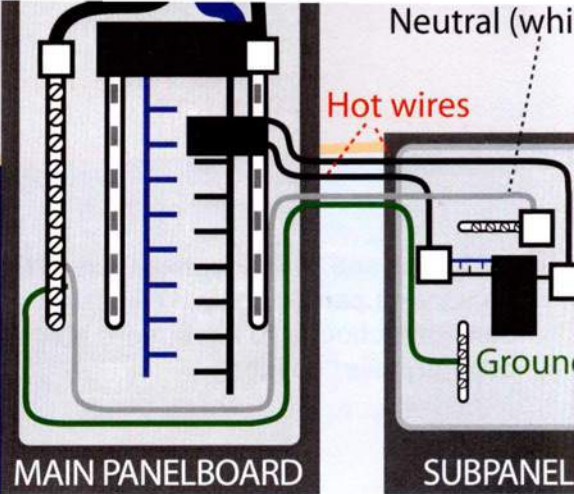
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DO IT!



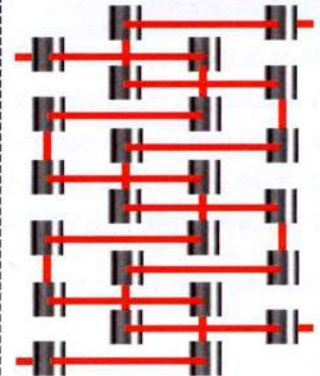
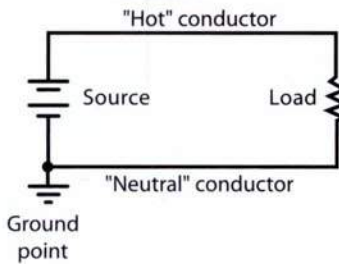
www.do-it-yourself.com

Home Installations > Electrical > Subpanel Overview

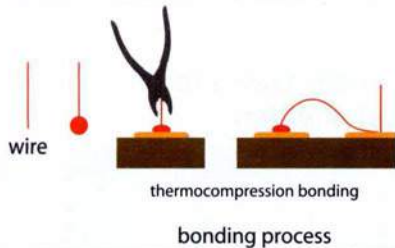
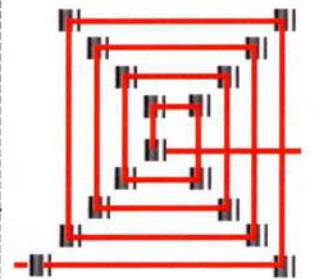
You should install a **subpanel** when you need electricity in a shed or other **remote** unit away from the electrical meter. While these panels are **secondary**, they require the same **safety precautions** as a main panel.

The subpanel needs the same basic **components** as a main panel, but is wired a little differently. Do not **bond** the **neutral return conductor** to the **grounding conductor**. This ensures that spent currents traveling back to the panel do not get carried through the grounding conductor and cause a **short circuit**. Also to avoid **malfunctions**, the **hot conductor** must be **continuous**.

When all the conductors are properly wired, you will install a **feeder cable** to bring electricity from the main panel. You can also install a dedicated main breaker for the subpanel. This isn't necessary though, since its overcurrent protection is in the main panel.



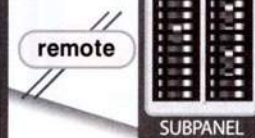
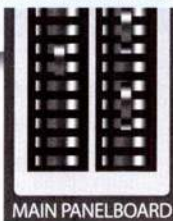
bond



Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some reasons to install a secondary electrical panel?
- 2 What are some elements of a secondary electrical panel?



Vocabulary

3 Match the words (1-5) with the definitions (A-E).

- | | |
|------------------------------|------------------|
| 1 — bond | 4 — feeder cable |
| 2 — subpanel | 5 — grounding |
| 3 — neutral return conductor | |

- A a wire that carries spent electrical current
 B a secondary panel that delivers electricity to a particular area
 C a wire that delivers electricity to a panel
 D a wire that maintains connection with the earth
 E to fasten two parts together

Reading

2 Read the DIY web article on subpanels. Then, mark the following statements as true (T) or false (F).

- 1 — A subpanel and main panel require similar safety measures.
- 2 — All of a subpanel's conductors should be bonded together.
- 3 — A subpanel must have its own main breaker.

- 4 Fill in the blanks with the correct words and phrases from the word bank.

Word BANK

short circuit remote hot conductor
secondary continuous

- The light receives electricity from the _____.
 - The conductors must have _____ connections to maintain electrical flow.
 - A _____ panel is called a subpanel.
 - A disrupted electrical connection causes a _____.
 - Jim installed a subpanel in the _____ shed behind the house.
- 5 Listen and read the DIY web article on subpanels again. Where does a subpanel get its electricity?

Listening

- 6 Listen to a conversation between two electricians. Choose the correct answers.

- What is the purpose of the conversation?
 - to decide whether to install a main breaker
 - to correct an installation error
 - to discuss why a part was not installed
 - to find out the homeowner's preferences
- Which part does NOT need to be installed?

A subpanel	C main breaker
B main panel	D cutoff panel

- 7 Listen again and complete the conversation.

- Electrician 2:** Let me see ... It looks fine to me. You did a 1 _____!
- Electrician 1:** But when we wired the main panel yesterday, we installed a 2 _____. Don't we have to do the same thing here?
- Electrician 2:** No, but that's a good question. A main breaker is 3 _____ for a subpanel. In this case, the homeowner didn't need one.
- Electrician 1:** But isn't that unsafe? What if there's an 4 _____?
- Electrician 2:** Remember, 5 _____ gets its electricity from the main panel.
- Electrician 1:** Oh, so if the power is 6 _____ at the main panel, it will be cut off here, too.

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

Can you take a look ...
Don't we have to ...
Remember, the ... gets its ...

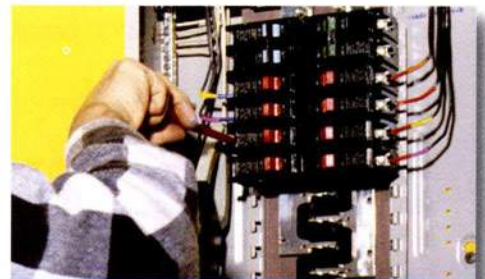
Student A: You are an electrician. Talk to Student B about:

- installing a subpanel
- requirements for subpanels
- what happens during electrical surges

Student B: You are an electrician. Talk to Student A about installing a subpanel.

Writing

- 9 Use the conversation from Task 8 to complete the electrician's notes about subpanels.



Electrician's Notes

Subpanels

When installing a subpanel, it is NOT necessary to install a ...

In case of a power surge, ...

Get ready!

1 Before you read the passage, talk about these questions.

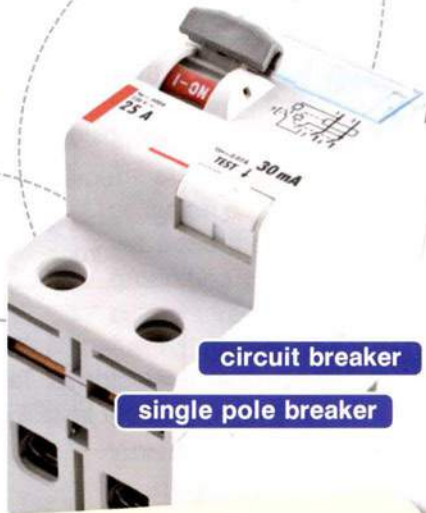
- 1 Why are fuses and circuit breakers important?
- 2 What are some different types of fuses?



cartridge fuse



plug fuse



circuit breaker

single pole breaker

ZYX Electrical Supply

Electrical **overload** can result from various factors, such as a short circuit from a **ground fault**. Your **fuses** or **circuit breakers** protect your system from these excessive currents. If you need a new fuse or circuit breaker for your ZYX panel, use our handy replacement guide.

Fuses

ZYX no longer makes panels with fuses, but we carry replacement fuses for our older models. If your fuse is encased in a tube with metal end caps, check out our **cartridge fuses**. If you can unscrew the fuse from its socket, you need a **plug fuse**. All **blown fuses** must be replaced since they cannot be reused.

Circuit Breakers

Newer ZYX panels have circuit breakers instead of fuses. Unlike fuses, circuit breakers do not need **replacement** every time they are **tripped**. But broken or worn out breakers occasionally require replacement. Our breaker diagrams will help you determine if you need a **single pole** or **double pole breaker**.

Reading

2 Read the manufacturer's guide on fuses and circuit breakers. Then, complete the table using information from the guide.

Part	When to replace or not to replace
Fuse	_____
Circuit Breaker	_____

Vocabulary

3 Write a word that is similar in meaning to the underlined part.

- 1 An electrical surge might trigger the circuit breaker. _ r i _
- 2 Make sure to get a new type of fuse that screws into a socket. _ l _ g _ _ _ e
- 3 After the power went out, I discovered a fuse with a melted metal strip.
b _ _ w _ f _ _ _
- 4 A breaker connected to two hot bus bars supplies 240-volt power to a circuit.
_ o u _ _ e _ o l _ b _ _ a k _ _

4 Read the sentence pair. Choose where the words best fit the blanks.

- 1 **circuit breaker / cartridge fuse**
 - A _____ is usually made out of glass and metal.
 - B You don't need to replace a _____ every time there is a power surge.
- 2 **ground fault / single pole breaker**
 - A The _____ can only handle 120-volts.
 - B The short circuit was caused by a _____.
- 3 **overload / fuse**
 - A The power went out because of an electrical _____.
 - B You need to replace the _____ as soon as it is blown.

- 5 Listen and read the manufacture's guide on fuses and circuit breakers again. Why would someone prefer to use circuit breakers instead of fuses?

Listening

- 6 Listen to a conversation between a company representative and a customer. Mark the following statements as true (T) or false (F).
- 1 ___ The man needs to replace a circuit breaker.
 - 2 ___ Parts are no longer available for the man's older panel.
 - 3 ___ The woman does not think the man needs a replacement.

- 7 Listen again and complete the conversation.

Representative: Thanks for calling ZYX. How
1 _____
_____?

Customer: Hello. I think I need to order a
2 _____ for my
electrical panel.

Representative: I can certainly help you with that.
3 _____ is your
panel?

Customer: Let's see ... It's number 717-TF.

Representative: Okay ... That's a 4 _____
_____, so it shouldn't have
fuses. Are you sure you don't
need a circuit breaker?

Customer: What's the difference?

Representative: A fuse has a metal strip that
melts and 5 _____
_____. Is that what you have?

Customer: Not really. It looks like a little
6 _____ that flips
back and forth.

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

I need to order ...
That's a(n) ... so it shouldn't have ...
It looks like ...

Student A: You are a company representative. Talk to Student B about:

- a replacement part
- the type of part needed
- what is wrong with the part

Student B: You are a customer. Talk to Student A about a replacement part.

Writing

- 9 Use the conversation from Task 8 to fill out the representative's call record.

Customer: **Charles Johnson**

Reason for Call: _____

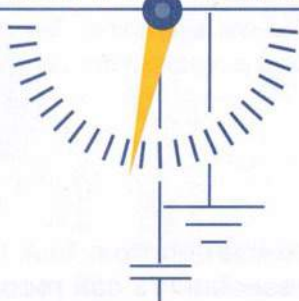
New Part Ordered? Y / N

If Yes, why was a new part needed? _____





A HEALTHY BALANCE



Installing your own electrical system can be tricky. While circuit breakers stop overload from harming your system, it is best to avoid overload in the first place. To maintain **stability**, you must **balance** your **electrical load**. This will prevent too much electricity from flowing through a single circuit at one time.

First, you should **analyze** your electrical **consumption**. Are you using more electricity on one side of your main panel than the other? To check this, add up how much power each side **draws**. If you don't know how much electricity a household **appliance** uses, consult the **owner's manual**.

If one side's **amperage** is more than ten percent greater than the other, balancing is required. To achieve **parity**, you must **transfer** some of the load to the **corresponding** breaker on the lower side. You may need a screwdriver to remove the breakers, but most will simply **snap** back into place.



Get ready!

1 Before you read the passage, talk about these questions.

- 1 What happens when too many appliances draw power from the same source?
- 2 How does balancing a load improve an electrical system?

Reading

2 Read the DIY magazine article on balancing a load. Then, complete the table using information from the article.

Step	Description
Calculating Total Amperage	_____
Determining if Balance Needed	_____
Balancing the Load	_____

Vocabulary

3 Match the words (1-7) with the definitions (A-G).

- | | |
|----------------------|-----------------------|
| 1 ___ parity | 5 ___ appliance |
| 2 ___ balance | 6 ___ corresponding |
| 3 ___ amperage | 7 ___ electrical load |
| 4 ___ owner's manual | |

- A an electric machine used in a household
 B related or connected to something
 C total power drawn by an electrical panel
 D a condition of being equal
 E to make sides equal
 F measurement of electrical current
 G a booklet including product information

4 Read the sentence pair. Choose where the words best fit the blanks.

1 draw / snap

- A The two sides of the panel _____ the same amount of power.
B The circuit breaker should _____ right into place.

2 transfer / analyze

- A The electrician is coming to _____ the problem with the service panel.
B We have to _____ some of the breakers to avoid another power outage.

3 stability / consumption

- A The family's power _____ has increased in recent months.
B To maintain _____, you should balance the load.

5 Listen and read the DIY magazine article on balancing a load again. How does an electrician determine if an electrical load needs balancing?

Listening

6 Listen to a conversation between two electricians. Mark the following statements as true (T) or false (F).

- 1 ___ The dishwasher needs to be disconnected from the panel.
2 ___ The woman believes that the electrical load needs balancing.
3 ___ Breakers may need to be transferred from the high side to the low side.

7 Listen again and complete the conversation.

Electrician 1: First, you'll need to find out the amperage of all the appliances and fixtures. Do you have the 1 _____?

Electrician 2: Yes, they're right here.

Electrician 1: Good. Next, you're going to 2 _____ on each side of the main panel.

Electrician 2: Okay. So 3 _____ tell us?

Electrician 1: Well, the totals on each side should 4 _____, at least roughly.

Electrician 2: So I might need to transfer some of the breakers from the high side 5 _____?

Electrician 1: 6 _____. Try that and then run the dishwasher again.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

As soon as I ... then the ...
First, you need to find out ...
So I might need to ...

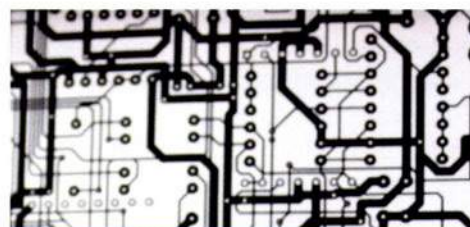
Student A: You are an electrician. Talk to Student B about:

- what is causing a power outage
- calculating amperage
- balancing an electrical load

Student B: You are an electrician. Talk to Student A about balancing an electrical load.

Writing

9 Use the conversation from Task 8 to complete the instructions for balancing a load.



Instructions for Balancing a load

Use the appliance owner's manuals to calculate ...

Compare the amperage of each side to determine ...

Transfer circuit breakers to ...



Learning to be an Electrician

Receptacle Boxes

Receptacle boxes are containers that hold electric wire connections. They vary in shape, size, material make-up, and function. Box choices include **outlet boxes**, **pancake boxes**, **cut-in boxes**, and others. Electricians choose boxes based on the installation they are doing. For example, some electricians use **handy boxes** for temporary installations. But handy boxes are unreliable for long-term usage. **Integral nail boxes**, or something similar, work better for permanent installations.

Size and material also influence which receptacle box electricians use. The box needs to have the right **volume** to be safe. A **shallow** box can overcrowd the wires. **Overcrowded** wires can easily **short out**. The box needs to be **deep** enough to comfortably hold all the wires. The box's material make-up also affects its safety. For example, an outside box must be **weatherproof**. An electrician must always check this when **mounting** a box outside.

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some different kinds of receptacle boxes?
- 2 What should electricians try to avoid in receptacle boxes?

Reading

2 Read the textbook excerpt about receptacle boxes. Then, choose the correct answers.

- 1 What is the main idea of the excerpt?
 - A to explain the different kinds of receptacle boxes
 - B to discuss why volume is important
 - C to compare handy boxes and outlet boxes
 - D to describe how to install a receptacle box
- 2 What can you infer about installing receptacle boxes outdoors?
 - A They are too shallow to comfortably hold a lot of wires.
 - B They are more difficult to install than indoor installations.
 - C They can be unsafe if they aren't protected from the weather.
 - D They work best when used for temporary purposes.
- 3 Why do electricians use handy boxes?
 - A to mount a temporary installation
 - B to make sure outdoor wires are protected
 - C to keep wires from getting overcrowded
 - D to mount a permanent installation

Vocabulary

3 Match the words (1-6) with the definitions (A-F).

- | | |
|-------------------|-------------------------|
| 1 ___ pancake box | 4 ___ overcrowded |
| 2 ___ handy box | 5 ___ volume |
| 3 ___ deep | 6 ___ integral nail box |

- A a receptacle box that already has nail holes drilled into it
- B describing the space from the front of something to the back of it
- C a metal box sometimes used as a substitute receptacle box
- D containing too many items
- E a thin, round receptacle box
- F the amount of space inside something measured in cubic units

4 Read the sentence pair. Choose where the words best fit the blanks.

1 short / mount

- A If there is a _____, someone could be shocked.
B She needed tools to _____ the receptacle box.

2 cut-in box / weatherproof box

- A A _____ protects wires from rain and heat.
B A _____ was used in the wall in the hallway.

3 outlet box / shallow

- A They wanted another _____ installed in their home.
B If a receptacle box is too _____, it can be unsafe.

5 Listen and read the textbook excerpt about receptacle boxes again. How do electricians choose the right receptacle box?

Listening

6 Listen to a conversation between a teacher and a student. Mark the following statements as true (T) or false (F).

- 1 ___ The teacher is explaining how to insulate wires.
2 ___ The teacher thinks the handy box is too shallow.
3 ___ The student is learning how to install a receptacle box.

7 Listen again and complete the conversation.

- Teacher: Okay, today you're going to install a 1 _____ into a wall.
Student: So, first I need to figure out what kind of box to use. A 2 _____ would work.
Teacher: No. You'll want to use a box that is 3 _____.
Student: Okay. So what you're saying is that I need a different box. Hmm ... what about a cut-in box?
Teacher: Right. A cut-in box is 4 _____.
And why is that?
Student: Because cut-in boxes work well in walls that are 5 _____.
Teacher: Good. Now, what's the first thing you need to check?
Student: 6 _____ of the cut-in box. That way, the wires aren't overcrowded.
Teacher: Excellent. What's the second thing you need to check?
Student: That the wires are insulated properly

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

I need to figure out ...
You'll want to ...
... is your best option

Student A: You are a teacher. Talk to Student B about:

- what kind of receptacle box to use
- steps to install a receptacle box
- how to make sure the installation is safe

Student B: You are a student. Talk to Student A about how to install a receptacle box.

Writing

9 Use the conversation from Task 8 and the textbook excerpt to complete the quiz.

Quiz

Receptacle Box

What is the best kind of box to use in a wall that is already built? (10 points)

What is the first thing to check before you install the box? (10 points)

What is the second thing you need to check before you install the box? (10 points)

Why? (5 points)

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grounding plug

single outlet

grounding slot

www.homehelp.com

HomeHelp Forums

Q: I have a dead **outlet** in my kitchen. The problem started when I **hooked up** my washing machine. The **plug** has a **grounding pin**, but the outlet does not have a **grounding slot**. I also wanted to plug in a lamp, but the outlet is only a **single outlet**. I used a **cheater plug** to make a **duplex outlet** that takes a grounding pin. What went wrong?

A: Check your service panel for tripped breakers. The problem was likely caused by a short circuit. Since the grounding pin was only connected to the cheater plug, you had limited protection against electrical surges. Consider having an electrician install an outlet with a grounding slot. If the washing machine has an **immediate turn plug**, ensure the new outlet is not installed upside down.

In general, always make sure outlets maintain proper **polarity**. A problem with the **narrow slot** might prevent electricity from getting through to a device. A problem with the **wide slot** could cause the device not to work. **Outlet caps** keep outlets clean when not in use.

Get ready!

1 Before you read the passage, talk about these questions.

- In your country, what kinds of outlets are most common?
- What is a danger of using a damaged outlet?

Reading

2 Read the web forum about a problem with a receptacle. Then, choose the correct answers.

- What is the main point in the web forum?
 - suggesting ways to avoid dead outlets
 - describing different types of receptacles
 - giving instructions for installing a plug
 - explaining the functions of plugs and outlets
- Which is NOT a recommendation made on the web page?
 - Use outlet caps for unused outlets.
 - Avoid using immediate turn plugs.
 - Install an outlet with a grounding slot.
 - Check for tripped circuit breakers.
- Which part was not properly connected?

A immediate turn plug	C grounding pin
B grounding slot	D cheater plug

Vocabulary

3 Match the words (1-6) with the definitions (A-F).

- | | |
|---------------------|---------------------------|
| 1 ___ plug | 4 ___ grounding pin |
| 2 ___ narrow slot | 5 ___ grounding slot |
| 3 ___ single outlet | 6 ___ immediate turn plug |

- a prong on some plugs that prevents surges
- a part that provides a hot current to a plug
- a part with two or more prongs
- a plug with a cord that lies against a wall
- one plug receptacle
- a receptacle that receives a grounding pin

4 Fill in the blanks with the correct words and phrases from the word bank.

word BANK

duplex outlet cheater plug
wide slot outlet cap
outlet polarity

- 1 You need a(n) _____ to use a three-pronged plug with a two-slot outlet.
- 2 Without a(n) _____, dirt might get into the outlet slots.
- 3 I need a(n) _____ to hook up both the toaster and the coffee maker.
- 4 The _____ is connected to a neutral wire.
- 5 Hot and neutral slots are both needed to maintain _____.
- 6 The surge occurred when one _____ received an excessive electrical load.

5 Listen and read the web forum about a problem with a receptacle again. What should be considered when installing an outlet for an immediate turn plug?

Listening

6 Listen to a conversation between an electrician and a homeowner. Mark the following statements as true (T) or false (F).

- 1 ___ The woman is concerned because there was severe damage to the electrical system.
- 2 ___ The woman will install a new immediate turn plug.
- 3 ___ The outlet's grounding slot should be towards the bottom.

7 Listen again and complete the conversation.

Electrician: Your refrigerator has an 1 _____, and it's plugged in upside down.

Homeowner: Is that dangerous?

Electrician: It can be. You see, the 2 _____ pulls down on the plug and dislodges the grounding pin.

Homeowner: I'm sorry, I don't know much about this stuff. What 3 _____?

Electrician: It means you have 4 _____ against surges and electrical shock.

Homeowner: Can you 5 _____?

Electrician: Don't worry, I'll take care of it. I just need to reinstall the outlet with the grounding slot 6 _____.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

It means you have ... against ...
I just need to reinstall ...

Student A: You are an electrician. Talk to Student B about:

- a problem with a plug
- the cause of the problem
- how to fix the problem

Student B: You are a homeowner. Talk to Student A about a problem with a plug.

Writing

9 Use the conversation from Task 8 to fill out the electrician's work summary.

Work Summary

Customer: **Mr. Owens**

Problem: _____

Cause of Problem: _____

Describe Solution: _____

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Do It Yourself Do It Right

Home Installations > Electrical > Switch Boxes

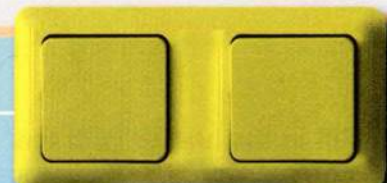
Different switch box sizes serve different purposes. For a typical room with one light, a **single gang box** will do. This is the easiest box to install in a narrow space beside a door. To **control** two switches from the same place, use a **two gang box**. A room with a light and a ceiling fan might require two switches. For more switches, **three gang boxes** and **four gang boxes** are available. But make sure you have enough room for larger boxes before attempting installation. Large boxes may also require additional **brackets** to ensure they are mounted securely.

Your box should be positioned so that the **coverplate** is **flush** with the wall. If this is not possible, use a **box extender** to seal the **wall cavity**. This safety measure prevents flammable materials from coming in contact with the electricity.

We recommend using plastic boxes to reduce the risk of electrical malfunction. But if you must use a metal box, always ground it with a metal **grounding screw**.



single gang box



two gang box



three gang box



four gang box

Vocabulary

3 Match the words (1-5) with the definitions (A-E).

- | | |
|--------------------|---------------------|
| 1 — flush | 4 — bracket |
| 2 — control | 5 — single gang box |
| 3 — three gang box | |

- A a box that provides power to one switch
 B to have power over something
 C an attachment that secures to a wall
 D having a surface level with another surface
 E a box that provides power to three switches

4 Read the sentence pair. Choose where the words best fit the blanks.

1 coverplate / wall cavity

- A The electrician installed a box inside the _____.
- B A properly fitted _____ prevents fire from breaching a wall.

2 four gang box / two gang box

- A A _____ can accommodate several appliances or fixtures.
- B For a room with a light and a ceiling fan, a _____ is appropriate.

3 box extender / grounding screw

- A Use a _____ if the switch is not flush with the wall.
- B Use a _____ if the switch box is made out of metal.

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some different types of switch boxes?
- 2 What situations might require different switch boxes?

Reading

2 Read the DIY webpage on switch boxes. Then, mark the following statements as true (T) or false (F).

- 1 — A room with a light and a ceiling fan most likely needs a single gang box.
- 2 — A grounding screw ensures the wall cavity is sealed.
- 3 — A coverplate should be flush with the wall as a safety measure.

- 5 Listen and read the DIY webpage on switch boxes again. Why might someone need a box for multiple switches?

Listening

- 6 Listen to a conversation between a store clerk and a homeowner. Choose the correct answers.

- 1 What is the purpose of the conversation?
 A to determine if a box extender is needed
 B to compare different types of switches
 C to find the right switch box for a project
 D to learn how to install a switch box
- 2 What will the man likely do next?
 A charge the woman for the purchase
 B find an appropriate switch box
 C show the woman a coverplate
 D recommend a good box extender

- 7 Listen again and complete the conversation.

Homeowner: I'm looking for a 1 _____
 _____. I'm not sure which one
 to get.

Store clerk: Well, let's 2 _____
 _____ for you. Where
 are you putting the box?

Homeowner: I need it for the switches next to my
 3 _____.

Store clerk: And how many switches do you
 need to control?

Homeowner: Let's see ... There's the 4 _____
 _____, and another
 light for the entryway inside. Oh, and
 the ceiling fan in the entryway.

Store clerk: It sounds like you need a
 5 _____ . Do
 you need anything else?

Homeowner: I'm not sure. Do you have
 6 _____ ?

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

Where are you putting ...
There's a light ... and another light ...
Let me show you ...

Student A: You are a store clerk. Talk to Student B about:

- the switch box he or she needs
- where the switch box will be installed
- other products needed

Student B: You are a homeowner. Talk to Student A about the switch box you need.

Writing

- 9 Use the conversation from Task 8 to fill out the clerk's product recommendation.

LEON'S Electrical Supply

Product Type: **Switch box**

Product Recommended and Why: _____

Additional Products Needed: _____

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some types of switches?
- 2 What is a reason for installing a dimmer switch?



residential grade switch

NewGuy: I'm wiring my own switches for the first time. I know about **single pole switches**. I know about **three-way switches** and **four-way switches** too, but each location only needs one switch. Does anyone have any other suggestions?

HandyGal: You could also use a **toggle switch**.

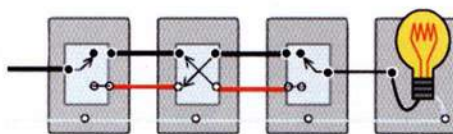
ElectricalGuy: You could use a **timer switch** if you need lights to go on and off at certain times. Or maybe a **dimmer switch** would suit your needs if you need varying levels of brightness.

WiredUp: It depends on the type of building you're wiring. A **residential grade switch** is good for a home. Use a **commercial grade switch** for bigger buildings.

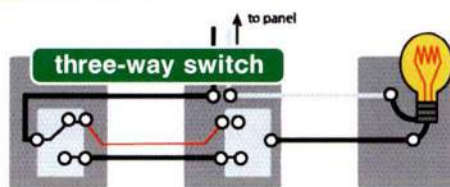
ElectricalGuy: I installed a **keyed switch** for extra security. It was easier than I thought it would be.

HandyGal: I tried installing a **pilot light switch** last month. I had trouble with an **open circuit** though.

HandyGal: A **double pole switch** is an option for higher-voltage fixtures.



four-way switch



Reading

2 Read the web forum on switches. Then, choose the correct answers.

- 1 What is the purpose of the web page?
 - A to suggest different types of switches
 - B to explain why to use one particular switch
 - C to compare three- and four-way switches
 - D to describe installation methods for several switches
- 2 Which of the following is NOT suggested by members of the forum?
 - A toggle switch
 - B double pole switch
 - C dimmer switch
 - D four-way switch
- 3 What advice does ElectricalGuy give?
 - A use a dimmer switch to control brightness
 - B avoid an open circuit whenever possible
 - C install a commercial grade switch
 - D get a switch that controls multiple locations

Vocabulary

3 Match the words (1-8) with the definitions (A-H).

- 1 — timer switch
 - 2 — toggle switch
 - 3 — four-way switch
 - 4 — pilot light switch
 - 5 — three-way switch
 - 6 — single pole switch
 - 7 — double pole switch
 - 8 — residential grade switch
- A a switch used mostly in homes
 - B a switch that controls two circuits
 - C a switch that allows control at two locations
 - D a switch that controls one circuit
 - E a switch with a light that indicates it is on
 - F a switch that goes on and off at certain times
 - G a switch with an up-and-down lever
 - H a switch that allows control at more than two locations

4 Read the sentence pair. Choose where the words best fit the blanks.

1 open circuit / commercial grade switch

A All the wires must be properly connected to avoid a(n) _____.

B We installed a new _____ on the factory's main floor.

2 dimmer switch / keyed switch

A A _____ is useful in areas that need extra security.

B I want to turn down the brightness, but we don't have a _____.

5 Listen and read the web forum on switches again. Why might someone use a three-way switch?

Listening

6 Listen to a conversation between a contractor and an electrician. Mark the following statements as true (T) or false (F).

1 ___ The man and woman disagree about using a single pole switch.

2 ___ The light needs to be controlled from two places.

3 ___ The man plans to install a three-way switch.

7 Listen again and complete the conversation.

Electrician: The other rooms have 1 _____ . I don't think that's a good choice for this room.

Contractor: 2 _____ . So what else are you thinking of using?

Electrician: Well, the room has 3 _____ .

Contractor: People will go 4 _____ of the room using both doors.

Electrician: Exactly. A switch at 5 _____ seems like a good idea.

Contractor: I think that would be the best thing to do.

Electrician: I'm sure a 6 _____ - _____ would be a good choice.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

This room has ...

A switch at ... seems like ...

A ... would be a good choice.

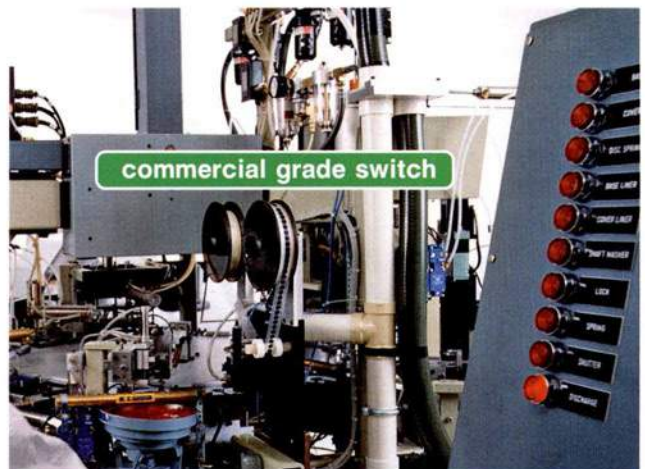
Student A: You are a contractor. Talk to Student B about:

- installing a switch
- the features of a particular room
- the type of switch needed

Student B: You are an electrician. Talk to Student A about installing a switch.

Writing

9 Use the conversation from Task 8 to fill out the electrician's notes.



Type of installation

Light Switch

Describe Area of Installation: _____

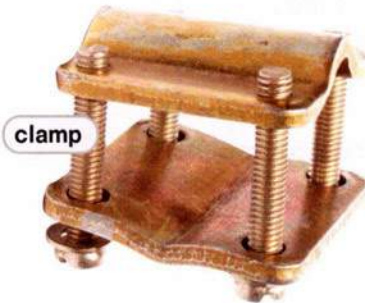
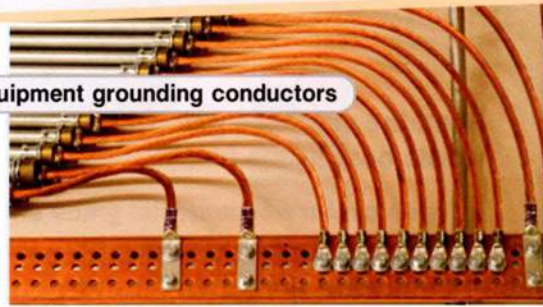
Product Needed: _____

WEM

Wilton Electrical Manufacturers



equipment grounding conductors



clamp

ground rod

Wilton Electrical Manufacturers specializes in protecting your property from lightning strikes. We have a wide range of products that keep you and your possessions safe. We also offer free installation of our **earth grounding systems**. Our professional electricians are experts at **grounding** electrical systems. A grounding system protects your home from **fault currents, stray voltage** and **ground faults**. Currently, we are running a special on our grounding system packages. Each package includes **equipment grounding conductors, ground rods, and grounding electrode conductors**. Additional equipment such as **surge arresters** and **clamps** are also included.

Call us at 1-800-345-7298 today to schedule a free **estimate**. One of our electricians will come out to your property. He or she will determine what size kit you need. The electrician will also explain how a grounding system works. If you have any questions, he or she will answer them.

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some parts of a grounding system?
- 2 What kinds of businesses in your area offer free estimates? Why do you think so many businesses offer them?

Reading

2 Read the advertisement for earth grounding systems. Then, mark the following statements as true (T) or false (F).

- 1 The company charges a fee for estimates.
- 2 A grounding system protects homes from lightning strikes.
- 3 Surge arresters are used to complete a grounding system.

Vocabulary

3 Match the words (1-6) with the definitions (A-G).

- | | |
|--|--|
| 1 <input type="checkbox"/> fault current | 4 <input type="checkbox"/> grounding electrode conductor |
| 2 <input type="checkbox"/> ground rod | 5 <input type="checkbox"/> ground fault |
| 3 <input type="checkbox"/> equipment grounding conductor | 6 <input type="checkbox"/> grounding |

- A the flow of electricity in a ground line
 B an irregular electrical current
 C connects part of a system of electricity to other conductors
 D a conductor joining a piece of metal to a grounding electrode conductor
 E a pole that is put in the earth so electricity flows into it
 F linking a circuit to the earth
 G the flow of electricity in a ground line

4 Fill in the blanks with the correct words and phrases from the word bank.

Word BANK

clamp earth grounding system
 estimate stray voltage surge arrester

- 1 Coming into contact with _____ could cause serious injury.
- 2 Businesses use a(n) _____ to measure the electrical capability of the ground against conductors.
- 3 A(n) _____ protects electrical systems from lightning strikes.
- 4 The electrician wrote a(n) _____ for the customer.
- 5 He used a(n) _____ to put the wires together.

- 5 Listen and read the advertisement for earth grounding systems again. Why is it important to install an earth grounding system?

Listening

- 6 Listen to a conversation between a customer service rep and a customer. Choose the correct answers.

- 1 What is the purpose of the conversation?
 A to learn what is covered under a warranty
 B to complain about a company's services
 C to discuss the price of an installation
 D to find out how to install a grounding system
- 2 Which item is NOT free of charge?
 A a warranty C installation
 B the package D an estimate

- 7 Listen again and complete the conversation.

Customer: I just saw your advertisement for 1 _____. I was wondering how much a system costs.

Cust Serv Rep: Well, we have 2 _____. That's why we offer a free estimate. So one of our electricians can come out to your property and see which package will work best for you.

Customer: What is the 3 _____ for the packages?

Cust Serv Rep: Would the system be for a 4 _____ property?

Customer: Oh, residential.

Cust Serv Rep: Let's see ... residential packages 5 _____ \$400 to \$800.

Customer: And those prices include installation, right?

Cust Serv Rep: Yes, ma'am.

Customer: Is there any 6 _____ with those prices, or is at additional cost?

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

I was wondering ...

What is the price range for ...

And those prices include ... right?

Student A: You are a customer service representative. Talk to Student B about:

- the different packages offered for grounding systems
- a price range for the package
- what is included in the price

Student B: You are a customer. Talk to Student A about installing a grounding system.

Writing

- 9 Use the conversation from Task 8 to complete the advertisement.



Wilton Electrical Manufacturers

Do you need

to?

Then call ... today!

We offer ... so call today so ...

Our prices include ...



When installing a grounding system, keep the basic components in mind. Consider the **soil condition** where the system will be installed. You will have to create a **ditch** to install the system. The condition of the soil will determine how you proceed with this step.

Consider the types of materials you will use for the installation. A **ground wire** is a typical part of the system. Also, **bonding wire** and a **footer** are important elements. A **panel bond** is necessary to connect the grounding system to the electrical panel.

You must be aware of **resistance** between terminals. The continuous current of electricity must also be kept in mind. You should know the current level that will **drive** through a wire.

Remember to avoid interference by keeping certain wires **parallel** to each other. Also, certain components must not be placed within its **sphere of influence**.

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What is the importance of ground wires?
- 2 What are some safety considerations when installing grounding systems?

Reading

2 Read the pamphlet on installing a grounding system. Then, mark the following statements as true (T) or false (F).

- 1 Ground installation is unnecessary with the right soil conditions.
- 2 It is important to know a wire's expected level of current.
- 3 Wires should never be installed parallel to each other.

Vocabulary

3 Write a word that is similar in meaning to the underlined part.

- 1 The electrician measured the amount of current that moves by force through the wire.
d _ _ v _ s
- 2 An electrical system is not stable without a neutral wire connected to the earth.
_ r _ u _ d _ i r _
- 3 The wires should be running in the same direction but not crossing to avoid short circuits.
_ a _ _ l l _ l
- 4 We need to replace the part that connects the service panel to the grounding system.
p _ _ e l _ o n _

4 Read the sentence pair. Choose where the words best fit the blanks.

1 ditch / footer

- A We must dig a _____ to install the grounding system.
 B This _____ should be connected to the grounding system with rebar.

2 sphere of influence / bonding wire

- A The short circuit occurred because the _____ was not installed correctly.
 B Make sure this ground system is outside the _____ of the other system.

3 soil condition / resistance

- A Do you know how strong the _____ of this electrical terminal is?
 B Check the _____ before you start digging.

5 Listen and read the pamphlet on installing a grounding system again. How does soil condition affect grounding installation?

Listening

6 Listen to a conversation between two electricians. Check (✓) the items that need to be installed.

- 1 ground wire 3 bonding wire
 2 footer 4 panel bond

7 Listen again and complete the conversation.

Electrician 1: Did you check the 1 _____ in the installation area?
Electrician 2: I did. The soil isn't full of rocks and it's not dry either. It's wet, but 2 _____.
Electrician 1: Do you think we can 3 _____ without a problem?
Electrician 2: I do. It's a 4 _____ for the installation.
Electrician 1: Have we got 5 _____ to get started?
Electrician 2: I think so. We've got the ground wire and the 6 _____.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

- Did you check ...*
We've got the ... and the ...
What about the ...

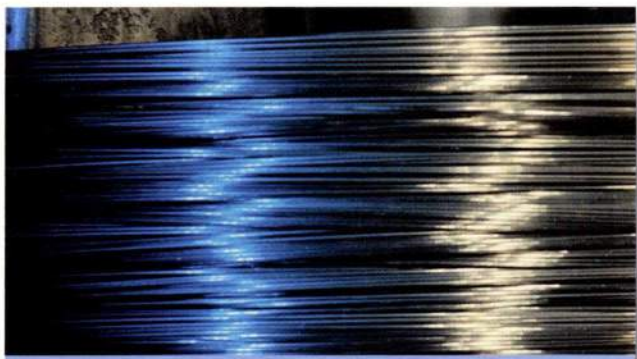
Student A: You are an electrician. Talk to Student B about:

- a grounding system installation
- soil condition
- parts needed for installation

Student B: You are an electrician. Talk to Student A about a grounding system installation.

Writing

9 Use the conversation from Task 8 to fill out the electrician's work report.



Riley Electrical
Work Report

Type of Installation: _____

Describe Soil Condition: _____

Parts to be Installed: _____



ignite

SPONTANEOUSLY
COMBUSTIBLE

frayed



evaluate

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some causes of electrical fires?
- 2 What are some ways to prevent electrical fires?

Reading

2 Read the government fact sheet on electrical fires. Then, mark the following statements as true (T) or false (F).

- 1 Electrical fires can be caused by faulty wiring.
- 2 Replacing light bulbs that flicker is not necessary.
- 3 Electrical fires are more frequent during summer months.

Vocabulary

3 Match the words (1-5) with the definitions (A-E).

- | | |
|---|-------------------------------------|
| 1 <input type="checkbox"/> fixed wiring | 4 <input type="checkbox"/> evaluate |
| 2 <input type="checkbox"/> combustibles | 5 <input type="checkbox"/> ignite |
| 3 <input type="checkbox"/> faulty | |

- A not working properly
 B wiring secured to a wall
 C to set fire to something
 D objects that can quickly catch on fire
 E to decide on an object's usefulness

Thousands of **electrical fires** happen every year. Last year alone, there were around 28,000 electrical fires. These fires caused about one billion dollars in damages. These fires are caused by different things:

- 1 **Faulty** wiring causes electrical fires.
- 2 **Frayed** wires often **ignite** other objects.
- 3 Sometimes people place **combustibles** too close to electrical appliances. This also causes fires.

However, electrical fires can be prevented. As an electrician, you must take appropriate **precautions**. In every building:

- 1 Proper **maintenance** for wiring is important. Always **evaluate** all wires. Make sure they are not frayed or damaged.
- 2 If possible, install **fixed wiring**. Make sure wiring is in areas where it will not **overheat**.
- 3 Replace any light bulbs that **flicker**.

The winter months are the most dangerous for electrical fires. People are indoors more, which means an increase in electrical use. People use their heaters, lights and appliances more during the winter season.

4 Read the sentence pair. Choose where the words best fit the blanks.

1 maintenance / electrical fires

- A _____ are caused by faulty wiring.
 B It is important for wires to have proper _____.

2 overheat / flicker

- A Do not place wiring in an area where it can _____.
 B Bulbs that _____ should be replaced immediately.

3 combustibles / fixed wiring

- A Whenever possible, it is best to install _____.
 B People sometimes place _____ too close to appliances.

5 Listen and read the government fact sheet on electrical fires again. What are the most common causes of electrical fires?

Listening

6 Listen to a conversation between an electrician and an inspector. Choose the correct answers.

- What is the purpose of the conversation?
 - to determine what bulbs need replacing
 - to check for combustibles
 - to do a safety inspection of the building
 - to replace any frayed wires
- What will the electrician likely do next?
 - remove all combustibles from the building
 - contact the previous owner of the building
 - make the changes that the inspector wants
 - replace every light bulb in the building

7 Listen again and complete the conversation.

Electrician: Hello, Inspector Cane. I'm ready to get started.
Inspector: Great. Let's begin in the boiler room. I already saw some 1 _____ there.
Electrician: That's 2 _____. We'll fix it right away.
Inspector: Wonderful. It also looks like some 3 _____
 _____.
Electrician: 4 _____. The apartment building needs to 5 _____.
Inspector: Do you see 6 _____ here?

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

- Let's begin in ...*
Can you install ...
Do you see ...

Student A: You are an electrician. Talk to Student B about the changes you will make to a room in a building.

Student B: You are an inspector. Talk to Student A about:

- the bulbs that need changing
- installing fixed wiring
- fixing frayed wires

Writing

9 Use the conversation from Task 8 to fill out the changes recommended by the inspector.

Inspector's recommendations
Building Inspection Summary

Room Inspected: _____

Inspector Recommendations:

- _____
- _____
- _____

flammable

baseboard

www.homesafety.org

HOME

HOME SAFETY

SERVICES

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worn out

Electrical safety is an important part of fire **prevention**. Unused outlets within reach of small children need to have **safety covers**. These prevent kids from putting fingers or objects in the outlets. Areas with lots of **traffic** need extra attention. **Flammable** items near wires increase the risk. Be sure that any wires are **securely** out of the way. Do not nail or staple them to the wall or **baseboard**. Also, do not use three-prong **adapters** to plug appliances into two-prong plugs. Look for **temporary** repairs that previous residents may have done. Sometimes people use **zip cord** to replace wire. Cheap repairs like this can lead to fires. A heavier wire is required for a safe, **permanent** repair. Also check for **worn out** wires or electrical devices. Breaker boxes also need checking regularly. In the event of an electrical short or overcurrent, a breaker should trip and cut off the power supply. If it fails to do so, it could get overheated and cause a fire. A professional electrician will find anything that is likely to **fail**. And he or she will replace it with the correct equipment.

adapter

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some ways to practice electrical safety?
- 2 What types of electrical hazards can occur at home?

Reading

2 Read the website article on electrical safety. Then, mark the following statements as true (T) or false (F).

- 1 ___ Wires can be nailed or stapled to a baseboard.
- 2 ___ Placing flammable items near wires increases the risk of fire.
- 3 ___ Replacing wires with zip cord is not dangerous.

Vocabulary

3 Match the words (1-5) with the definitions (A-E).

- | | |
|-----------------|----------------|
| 1 ___ flammable | 4 ___ zip cord |
| 2 ___ temporary | 5 ___ fail |
| 3 ___ permanent | |

- A works over a long period of time
 B will burst into flames when heated
 C to not work correctly
 D for a short period of time
 E two attached wires that can be pulled apart

4 Read the sentence pair. Choose where the words best fit the blanks.

1 **securely / worn out**

- A _____ wires should be replaced.
 B The outlet cover was _____ fastened to the wall.

2 **baseboard / safety covers**

- A Protect children by covering unused outlets with _____.
 B Wires should not be nailed to the _____ or wall.

3 **traffic / adapters**

- A Extra attention should be given to an area with a lot of _____.
 B Using the wrong kind of _____ can be dangerous.

5 🎧 Listen and read the website article on electrical safety again. What are some ways to decrease the risk of an electrical fire?

Listening

6 🎧 Listen to a conversation between an electrician and an owner. Choose the correct answers.

- 1 What is the purpose of the conversation?
 - A to look for loose wires
 - B to locate and remove all fire hazards
 - C to test the breaker box
 - D to carry out a full electrical inspection
- 2 What will the owner likely do next?
 - A install fire extinguishers
 - B take the electrician's advice
 - C hire another electrician
 - D make temporary repairs to the wiring

7 🎧 Listen again and complete the conversation.

Electrician: You know, 1 _____ like this often have many fire hazards.

Owner: Yes, I've noticed a few 2 _____ in the lobby.

Electrician: That's bad news. There are inflammable curtains nearby. I'll 3 _____ on that first thing after the inspection.

Owner: Do you see any problems?

Electrician: It looks like somebody made a 4 _____ with zip cord here. This could lead to trouble.

Owner: What's wrong with that?

Electrician: If you plug something into this outlet, it might start a fire.

Owner: Oh, that would be bad. What else do we need to look at?

Electrician: Let's see the 5 _____. I'll need to test each breaker.

Owner: What happens if they don't work?

Electrician: A breaker that 6 _____ will get very hot. It may start a fire.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

- I've noticed some ...*
- Can you install ...*
- I'll need to ...*

Student A: You are an electrician. Talk to Student B about:

- removing flammable objects near exposed wires
- the problem with zip cords
- why a failed breaker is a hazard

Student B: You are an owner. Talk to Student A about the changes you will make to the building.

Writing

9 Use the conversation from Task 8 to fill out the suggestions given by the electrician.

Potential Hazards

1 _____

2 _____

3 _____

Glossary

accommodate [V-T-U4] If something can **accommodate** something else, it has enough capacity.

adapter [N-COUNT-U15] An **adapter** is a device that allows devices with different types of connectors to be linked together.

aerial service [N-COUNT-U3] An **aerial service** refers to a service entrance that is installed outside a building.

amperage [N-UNCOUNT-U7] **Amperage** is the measurement of electrical current, expressed in amperes or amps.

analyze [V-T-U7] To **analyze** something is to carefully examine the nature of something.

appliance [N-COUNT-U7] An **appliance** is an electric machine that is used for a particular household purpose.

balance [V-T-U7] To **balance** something is to make each side of something equal.

baseboard [N-COUNT-U15] A **baseboard** covers the gap between the wall and the floor.

blade connector [N-COUNT-U1] A **blade connector** is a single wire connection in which a blade is inserted into the blade's holder.

blown fuse [N-COUNT-U6] A **blown fuse** is a fuse in which the metal strip has melted to stop the flow of electricity. A blown fuse cannot be reused and must be replaced to restore the current.

bond [V-T-U5] To **bond** something is to fasten two or more parts together.

bonding wire [N-COUNT-U13] A **bonding wire** is a wire connected to the ground system. It is used to help form an electrically conductive path that allows an electrical current to flow uninterrupted.

box extender [N-COUNT-U10] A **box extender** is a part that fits around a switch if the switch is not flush with the wall.

bracket [N-COUNT-U10] A **bracket** is an attachment that is used to secure something to a wall.

branch circuit [N-COUNT-U4] A **branch circuit** is a part of an electrical system that carries electricity from the main service panel to a particular area or fixture.

breaker box [N-COUNT-U14] A **breaker box** is an electrical box that distributes electricity through a house or building after passing through protective circuit breakers within the box.

building code [N-COUNT-U2] A **building code** is a set of rules used for the structural safety of buildings.

buried service [N-COUNT-U3] A **buried service** refers to a service entrance that is installed underground.

capacity [N-UNCOUNT-U4] **Capacity** is the maximum amount of electricity that can flow through an appliance.

cartridge fuse [N-COUNT-U6] A **cartridge fuse** is a fuse encased in a cylinder with metal caps on each end.

cheater plug [N-COUNT-U9] A **cheater plug** is an adapter that connects a plug with a grounding pin to an outlet without a grounding slot.

circuit breaker [N-COUNT-U6] A **circuit breaker** is a switch that is tripped to stop electrical flow when it detects an excessive current.

clamp [N-COUNT-U12] A **clamp** is a tool used to grasp two wires in order to conduct electricity through them.

clamp connector [N-COUNT-U1] A **clamp connector** uses a V-shaped ring to attach a connector to a cable.

clearance [N-UNCOUNT-U3] **Clearance** is the required distance that must be maintained between a building and a utility.

combustible [N-COUNT-U14] A **combustible** is an object that can catch on fire easily.

commercial grade switch [N-COUNT-U11] A **commercial grade switch** is a heavy duty switch. It is used in large buildings and is higher in price.

component [N-COUNT-U5] A **component** is a small part of an electrical appliance.

conduit [N-COUNT-U2] A **conduit** is a tube put around electrical wiring for protection and routing.

connector [N-COUNT-U1] A **connector** is something that links two pieces of electrical equipment.

consumption [N-UNCOUNT-U7] **Consumption** is the amount of something used.

continuous [ADJ-U5] If something is **continuous**, it exists without stopping or being broken.

control [V-T-U10] To **control** something is to have power over the action or occurrence of something.

corresponding [ADJ-U7] If something is **corresponding**, it is related to or connected to something else.

coverplate [N-COUNT-U10] A **coverplate** is a flat piece that fits around a switch to cover the wall cavity and switch box.

cut off [V PHRASE-T-U4] To **cut off** something is to stop or take away something abruptly.

cut-in box [N-COUNT-U8] A **cut-in box** is a receptacle box that is used in a wall that has already been built.

deep [ADJ-U8] **Deep** describes the space of something from the front of it to the back of it.

dimmer switch [N-COUNT-U11] A **dimmer switch** allows for more control over a light setting. It changes the brightness of a light instead of simply turning it off or on.

ditch [N-COUNT-U13] A **ditch** is a narrow trench that is made in the ground through digging.

double pole breaker [N-COUNT-U6] A **double pole breaker** is a circuit breaker that is connected to two hot bus bars and supplies 240-volt power to a circuit.

double pole switch [N-COUNT-U11] A **double pole switch** is used to turn two independent circuits on or off at the same time.

draw [V-T-U7] To **draw** something is to bring something towards something else.

drip loop [N-COUNT-U3] A **drip loop** is a loop formed by incoming electrical wires that connect to a customer's building.

drive [V-I-U13] To **drive** is to cause movement through some sort of force.

duplex outlet [N-COUNT-U9] A **duplex outlet** is an outlet that can receive two plug receptacles.

earth grounding system [N-COUNT-U12] An **earth grounding system** is an electrical system that measures the electrical capability of conductors against the electrical capability of the ground.

electrical fire [N-COUNT-U14] An **electrical fire** is a fire that starts from an electrical source.

electrical load [N-COUNT-U7] An **electrical load** is the total amount of power, or amperage, being drawn by an electrical panel.

electrical metallic tubing [N-UNCOUNT-U2] **Electrical metallic tubing** is a type of conduit tubing made of coated steel or aluminum.

equipment grounding conductor [N-COUNT-U12] An **equipment grounding conductor** is a conductor joining a piece of metal that does not conduct electricity to a grounding electrode conductor.

estimate [N-COUNT-U12] An **estimate** is a statement that tells someone how much money will be charged for someone else to do a certain amount of work.

evaluate [V-T-U14] To **evaluate** is to assess the state, usefulness or value of something.

fail [V-I-U15] To **fail** is for a device to not operate or not operate properly.

fault current [N-COUNT-U12] A **fault current** is an electrical current that is irregular in any way. For example, it may become disrupted at one point.

faulty [ADJ-U14] If an object or machine is **faulty**, it is not working properly.

feeder cable [N-COUNT-U5] A **feeder cable** is a wire that delivers electricity to a panel.

fixed wiring [N-UNCOUNT-U14] **Fixed wiring** is wiring that is fastened or connected to a wall or another object so that it will not move.

flammable [ADJ-U15] If something is **flammable**, it will burst into flames when it gets very hot.

flexible [ADJ-U2] If a conduit is **flexible**, it can be bent in different directions.

flicker [V-I-U14] To **flicker** is to shine in a shaky way, or to change in brilliance.

flush [ADJ-U10] If something is **flush**, its surface is level with the surface of something else.

footer [N-COUNT-U13] A **footer** is connected to the grounding system using rebar. It is a low-resistance ground.

four gang box [N-COUNT-U10] A **four gang box** is an electrical box installed in a wall that delivers power to four switches.

four-way switch [N-COUNT-U11] A **four-way switch** allows a circuit to be controlled at three or more different locations.

Glossary

- frayed** [ADJ-U14] If an object is **frayed**, the end or edge of it is tattered or damaged so that the inside of the object is uncovered.
- function** [N-COUNT-U4] A **function** is a purpose or intended use for something.
- fuse** [N-COUNT-U6] A **fuse** is a device with a small metal strip that melts and stops electrical flow when an excessive current passes through it.
- gadget** [N-COUNT-U4] A **gadget** is a small electronic or electrical device.
- ground** [V-T-U12] To **ground** is to link a circuit to the earth.
- ground fault** [N-COUNT-U12] A **ground fault** is the flow of electricity in a ground line because the electrical system has been damaged by a thunderstorm or something else.
- ground fault** [N-COUNT-U6] A **ground fault** is an electrical malfunction in which a current gets into a ground conductor and often causes a short circuit.
- ground rod** [N-COUNT-U12] A **ground rod** is a pole that is put in the earth so that electricity will flow there.
- ground wire** [N-COUNT-U13] A **ground wire** is grounded and completes a circuit if a neutral wire fails.
- grounded** [ADJ-U2] If a conduit is **grounded**, it is connected with the ground.
- grounding conductor** [N-COUNT-U5] A **grounding conductor** is a wire that keeps an electrical current stable by maintaining an electrical connection with the earth.
- grounding electrode conductor** [N-COUNT-U12] A **grounding electrode conductor** joins part of a system of electricity to other conductors, or electrodes.
- grounding pin** [N-COUNT-U9] A **grounding pin** is a prong on some plugs that prevents electrical surges by maintaining a connection with the earth through a neutral wire.
- grounding screw** [N-COUNT-U10] A **grounding screw** is a metal piece that grounds a metal coverplate.
- grounding slot** [N-COUNT-U9] A **grounding slot** is a receptacle on some outlets that receives the grounding pin.
- handy box** [N-COUNT-U8] A **handy box** is a metal box that is sometimes used as a substitute receptacle box.
- hook up** [V PHRASE-U9] To **hook up** something is to install it.
- hot bus** [N-COUNT-U4] A **hot bus** is the part of an electrical system that receives electricity from an electrical meter and delivers it to the service panel.
- hot conductor** [N-COUNT-U5] A **hot conductor** is a wire that carries electricity to a fixture or appliance.
- ignite** [V-T-U14] To **ignite** something is to set it on fire.
- immediate turn plug** [N-COUNT-U9] An **immediate turn plug** is a plug with an electrical cord that lies against a wall instead of sticking straight out from the wall. It should be plugged in so that the cord hangs.
- installation** [N-COUNT-U2] An **installation** is the act of fitting an electrical appliance for use.
- insulation displacement connector** [N-COUNT-U1] An **insulation displacement connector** allows for a wire to not be stripped before connecting.
- integral nail box** [N-COUNT-U8] An **integral nail box** is a lower-priced receptacle box that already has nail holes drilled into it.
- keyed switch** [N-COUNT-U11] A **keyed switch** is an on/off switch that is controlled with a removable key.
- main service panel** [N-COUNT-U4] A **main service panel** is the part of an electrical system that controls the distribution of power to a particular house or building.
- main switch** [N-COUNT-U4] A **main switch** is the part of a service panel that can cut off electricity to an entire house or building.
- maintenance** [N-UNCOUNT-U14] **Maintenance** is the care and protecting of an object in order to keep it working in good condition.
- malfunction** [N-COUNT-U5] A **malfunction** is when an electrical appliance does not work properly.
- manually** [ADV-U4] If something is done **manually**, it is controlled by a person directly.

moisture tight fitting [N-COUNT-U2] A **moisture tight fitting** is a conduit made specifically to keep water out.

mount [V-T-U8] To **mount** an object is to attach it to another object.

narrow slot [N-COUNT-U9] A **narrow slot** is the smaller of the two rectangular slots in an electrical outlet. It connects to the prong that delivers a hot electrical current to the plug.

neutral bus [N-COUNT-U4] A **neutral bus** is the part of an electrical system that carries a current back to the service panel after the power has been spent.

neutral return conductor [N-COUNT-U5] A **neutral return conductor** is a wire that carries spent electrical current back to the electrical panel or subpanel.

non-corrosive [ADJ-U2] If a conduit is **non-corrosive**, it cannot be damaged by chemicals.

non-metallic tubing [N-UNCOUNT-U2] **Non-metallic tubing** is a type of conduit tubing made of plastic.

offset connector [N-COUNT-U1] An **offset connector** is used to change the direction of a wire entering an electrical box.

open circuit [N-COUNT-U11] An **open circuit** is one with a missing connection (meaning no current flows).

outlet [N-COUNT-U9] An **outlet** is a device installed in a wall that carries electricity to devices that are plugged into it.

outlet box [N-COUNT-U8] An **outlet box** is a container that holds the plug-in for electrical connections.

outlet cap [N-COUNT-U9] An **outlet cap** is a plastic cover that prevents unwanted materials from entering the openings of an unused outlet.

overcrowded [ADJ-U8] If something is **overcrowded**, it contains too many people or objects.

overcurrent [N-UNCOUNT-U4] **Overcurrent** is a surge of power that occurs when an electrical current exceeds a circuit's amperage capacity.

overheat [V-I-U14] If something **overheats** it, becomes too hot.

overload [N-COUNT-U6] **Overload** occurs when an electrical current is too high for a particular electrical system.

owner's manual [N-COUNT-U7] An **owner's manual** is a booklet that provides manufacturer details and instructions for using a particular product.

pancake box [N-COUNT-U8] A **pancake box** is a thin, round receptacle box.

panel bond [N-COUNT-U13] A **panel bond** is a wire that connects the panel to the grounding system.

parallel [ADJ-U13] If two things are **parallel**, they run in the same direction but do not cross paths.

parity [N-UNCOUNT-U7] **Parity** is the condition of being equal or balanced.

permanent [ADJ-U15] If something is **permanent**, it is meant to stay in place and work over a long period of time.

pilot light switch [N-COUNT-U11] A **pilot light switch** has a small light built in. The light indicates that the switch is turned on.

plug [N-COUNT-U9] A **plug** is a part with two or more prongs that connects an electrical cord to an outlet.

plug and socket connector [N-COUNT-U1] A **plug and socket connector** has one plug with prongs that is inserted into the openings of a receptor plug.

plug fuse [N-COUNT-U6] A **plug fuse** is a fuse with a threaded end that screws into a socket.

polarity [N-UNCOUNT-U9] **Polarity** is the state of having positive and negative electrical charges.

post connector [N-COUNT-U1] A **post connector** is a connector used to attach a single wire to a piece of equipment.

precaution [N-COUNT-U14] A **precaution** is a safety measure that workers take in order to avoid a hazardous situation.

prevention [N-UNCOUNT-U15] **Prevention** is the act of stopping something from happening.

protection [N-UNCOUNT-U2] **Protection** is the ability of a conduit to keep out certain dangers, such as a fire.

replacement [N-COUNT-U6] A **replacement** is when a broken thing is changed for a new one.

remote [ADJ-U5] If something is **remote**, it is set apart from something else that it is connected to.

Glossary

- residential grade switch** [N-COUNT-U11] A **residential grade switch** is a light duty switch. It is used in homes and is cheaper in price.
- resistance** [N-UNCOUNT-U13] **Resistance** is the amount of voltage applied on two resistor terminals compared to the current that circulates between them.
- right-of-way** [N-COUNT-U3] A **right-of-way** is a strip of land that is used by a utility company to construct and operate transmission lines.
- ring terminal** [N-COUNT-U1] A **ring terminal** is a single wire connection in which a screw or bolt is inserted to make electrical contact.
- route** [N-COUNT-U2] A **route** is the specified course that a conduit goes along.
- safety cover** [N-COUNT-U15] A **safety cover** is a plastic plug that goes into an unused electrical outlet to prevent children from injuring themselves.
- safeguard** [V-T-U4] If something **safeguards** something else, it protects it.
- safety precaution** [N PHRASE-U5] A **safety precaution** is something done to prevent something dangerous from happening.
- secondary** [ADJ-U5] If something is **secondary**, it serves a lesser purpose than something else.
- securely** [ADV-U15] If you fasten something **securely**, it is tied down or attached so it will not move easily or by accident.
- service cable** [N-COUNT-U3] A **service cable** is a wire that provides a customer's property with electricity. It can be buried or aerial.
- service drop** [N-COUNT-U3] A **service drop** is the electrical line that runs from a buried service or an aerial service to a customer's building.
- service entrance (SE)** [N-COUNT-U3] A **service entrance (SE)** is the place where electricity enters a building.
- service lateral** [N-COUNT-U3] A **service lateral** is a power supply that is located underground.
- shallow** [ADJ-U8] If a box is **shallow**, it does not have much space for wires.
- short** [V-I-U8] To **short** is to create an electrical connection that was not meant to happen.
- short circuit** [N-COUNT-U5] A **short circuit** is an electrical failure caused by improper or damaged electrical connections.
- single gang box** [N-COUNT-U10] A **single gang box** is an electrical box installed in a wall that delivers power to one switch.
- single outlet** [N-COUNT-U9] A **single outlet** is an outlet that can receive one plug receptacle.
- single pole breaker** [N-COUNT-U6] A **single pole breaker** is a circuit breaker that is connected to one hot bus bar and supplies 120-volt power to a circuit.
- single pole switch** [N-COUNT-U11] A **single pole switch** is a basic on/off switch. It allows only one contact to open at a given time.
- snap** [V-I-U7] To **snap** is to fit quickly and snugly into a particular place, often causing a clicking noise.
- soil condition** [N PHRASE-U13] **Soil condition** refers to the texture of the soil, such as dry, rocky, or wet.
- solderless connector** [N-COUNT-U1] A **solderless connector** connects wires by using mechanical pressure instead of solder.
- spade terminal** [N-COUNT-U1] A **spade terminal** is the same as a ring terminal except that the metal part doesn't make a full ring.
- sphere of influence** [N PHRASE-U13] A **sphere of influence** is an electrical current that flows from the ground rod and into the soil that surrounds it. The current moves away from the ground rod in waves.
- split bolt connector** [N-COUNT-U1] A **split bolt connector** is used for taps and splices in building wiring.
- stability** [N-UNCOUNT-U7] **Stability** is the condition of being not easily changed or disrupted.
- stray voltage** [N-UNCOUNT-U12] **Stray voltage** is electrical energy flowing through something that it should not be flowing through, such as a lamp post.

subpanel [N-COUNT-U5] A **subpanel** is the part of an electrical system that controls the delivery of power from the main service panel to all or part of a house or building.

surge arrester [N-COUNT-U12] A **surge arrester** is a piece of equipment which saves electrical systems from being negatively affected by lightning.

temporary [ADJ-U15] If something is **temporary**, it is meant to last or be used for a short period of time.

terminal block connector [N-COUNT-U1] A **terminal block connector** is used to connect individual electrical wires.

three gang box [N-COUNT-U10] A **three gang box** is an electrical box installed in a wall that delivers power to three switches.

three-way switch [N-COUNT-U11] A **three-way switch** is used for circuits with two different locations.

timer switch [N-COUNT-U11] A **timer switch** is a switch that is set to turn on or off at a desired time.

toggle switch [N-COUNT-U11] A **toggle switch** is an electrical switch with a lever. The lever moves up and down to control the switch.

traffic [N-UNCOUNT-U15] **Traffic** is the movement of people or objects through an area.

transfer [V-T-U7] To **transfer** something is to move or redirect something.

trip [V-T-U6] To **trip** something is to trigger or release a switch to set something into operative mode.

two gang box [N-COUNT-U10] A **two gang box** is an electrical box installed in a wall that delivers power to two switches.

utility pole [N-COUNT-U3] A **utility pole** is a large pole that is used to support overhead wires such as power lines and telephone wires.

utility transformer [N-COUNT-U3] A **utility transformer** is a device that changes electricity from high to low voltage.

volume [N-UNCOUNT-U8] **Volume** is the amount of space inside something measured in cubic units.

wall cavity [N-COUNT-U10] A **wall cavity** is an opening in a wall where a fixture, such as a switch box, is mounted.

weatherproof [ADJ-U8] If something is **weatherproof**, it can endure any kind of weather.

wide slot [N-COUNT-U9] A **wide slot** is the larger of the two rectangular slots in an electrical outlet. It connects to the neutral prong that receives a spent electrical current from the plug.

worn out [ADJ PHRASE-U15] When something is **worn out**, it has outlived its optimal usefulness or durability and should be replaced.

zip cord [N-UNCOUNT-U15] **Zip cord** is a set of two or more attached insulated wires that may be separated by pulling them apart. It is usually used for household appliances.

**CAREER
PATHS**

Electrician

Book
3

Virginia Evans
Jenny Dooley
Tres O'Dell



Express Publishing

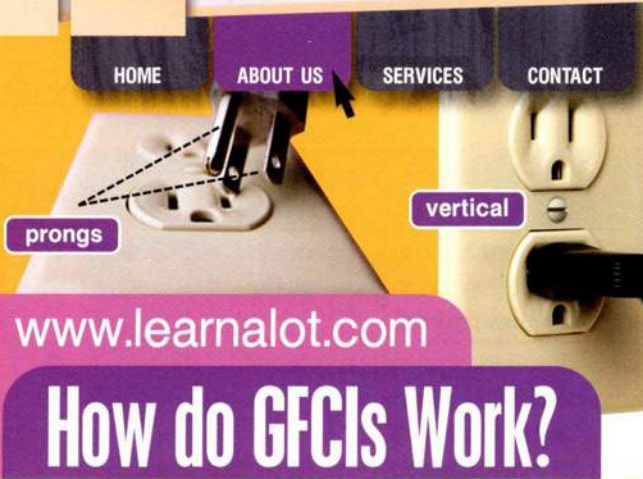
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Scope and sequence

Unit	Topic	Reading context	Vocabulary	Function
1	How GFCIs work	Webpage article	ground fault circuit interrupter (GFCI), general-purpose, exceed, nonconductive, via, compare, mild, dry board, flow out, downstream, prong, vertical, reliable	Stressing the importance of something
2	Types of GFCIs	Installation work order	receptacle ground fault circuit interrupter, circuit breaker ground fault circuit interrupter, portable ground fault circuit interrupter, cord connected ground fault circuit interrupter, standard, reset, configuration, manufacturer, convenient, max out, go with, last resort, renovated, procure	Agreeing with someone
3	Installing GFCIs	DIY website article	load connection, line connection, provide, imbalance, sensor, terminal, feature, outgoing, sticker, care, coil, reference, reverse, probe, attach	Starting a conversation
4	Testing GFCIs	Email	test button, accurate, diagnose, verify, give out, fault, rely on, indicate, throw (as in throw a switch), GFCI tester, interrupt	Comparing
5	AFCIs	Magazine article	arc fault, sustain, marking, primary, unintentional, erratic, fine print, respective, leakage, sense, exemption, mix up, monitor, national electrical code	Turning down a request
6	Lights	Textbook excerpt	light fixture, on site, base depth, ceiling box, joist, socket, incandescent, fluorescent, buzz, ballast, enclosed, bare, corrode, bulb, high output bulb, single pin bulb, dual pin bulb	Talking about schedule
7	Ceiling fans	Instruction manual	ceiling fan, circulate, clearance, wobble, swing-up, remote control, stable, cross support, follow, variable-speed, independently	Taking responsibility
8	Outdoor light fixtures	Brochure	floodlight, entry light, dusk-to-dawn light, motion detector, landscape light, coverage, anticorrosion, watertight, slant, photoelectric cell, security, sensitivity, burn out, exposed	Describing a place
9	Kitchen appliances	Installation manual	appliance, dishwasher, hard-wired, garbage disposal, electric stove, strain relief, adjacent, nameplate rating, drop-in, slide-in, whip, range hood, frame screw, derate, refrigerator	Figuring out a problem
10	Electric heaters	Work order	baseboard heater, wall thermostat, air gap, consumption, integral thermostat, short out, feed, coverplate, electric wall heater, variable-wattage unit, response time, digital	Trouble-shooting
11	Utility room appliances	Magazine article	water heater, disconnect, cutoff switch, heat pump, feed wire, air handler, electric clothes dryer, four-conductor cable, vent run, corrugated duct, rigid duct	Dividing up the work
12	Submersible pumps	Email	submersible pump, well casing, direct burial, pressure switch, pump wire, well cap, insulated crimp, condensation, pool, well, depth, horsepower	Explaining differences between things
13	Induced voltage	Pamphlet	magnetic line of force, charge, build up, discharge, jumper, electrode, induced voltage, lightning, surge, drain, shield, zap	Asking how something works
14	Direct strikes	Trade magazine article	strike, low-resistance grounding system, voltage spike, utility line, pulse, utility transformer, endanger, ground resistance, build up, coaxial cable, massive, peak, assumption	Explaining options
15	Surge protection	Company webpage	surge protector, point-of-use, point-of-entry, plug-in surge protection, hardwired surge protection, surge breaker, receptacle strip, network interface device (NID), grounding block, ground skew, accessible, recur, siding	Asking questions to get more information

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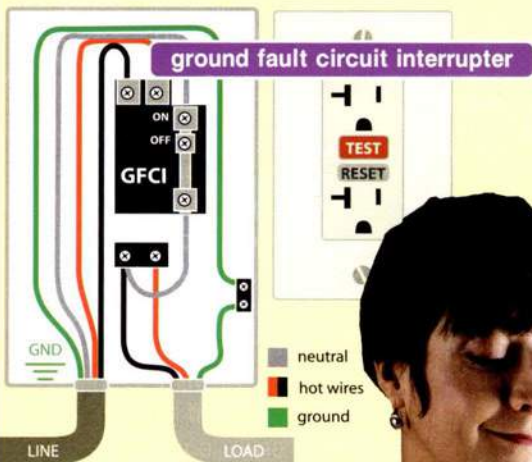
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A **ground fault circuit interrupter** (GFCI) is a type of safety outlet. It is somewhat similar to a 120-volt **general-purpose** circuit. They have **vertical** slots where the **prongs** of an electrical cord are inserted. One slot is neutral and the other is hot. That being said, a GFCI is very different than a fuse.

Understanding the way a GFCI works is not very difficult. First, power goes to the load on the black wire. It will **flow out** through the load, returning **via** the white wire. A GFCI will **compare** the two currents going to and from the load. The current is supposed to be equal at all times. If the current changes, even in a **mild** way, the circuit will open. This is what prevents electric shock from occurring.

GFCIs are generally very **reliable** devices. However, they can be fooled. For example, electricity will flow **downstream** if you trick the device. This can be done by standing on a **nonconductive** surface like a **dry board**. Doing this places your body between the black and white wires. The current can then **exceed** its usual flow. This means the GFCI will not open the circuit.



Get ready!

1 Before you read the passage, talk about these questions.

- 1 What kind of slots do GFCIs have?
- 2 What are some basic characteristics of GFCIs?

Reading

2 Read the webpage article on GFCIs. Then, choose the correct answers.

- 1 What is the main idea of the webpage?
 - A the difference between a GFCI and a fuse
 - B how to fool GFCIs into malfunctioning
 - C how GFCIs work with electrical currents
 - D why GFCIs are more reliable than other outlets
- 2 Which of the following is NOT a part of the function of a GFCI?
 - A It compares the flow of an electrical current.
 - B It replaces the use of fuses in homes.
 - C It prevents electric shocks from occurring.
 - D It opens the circuit if the current is not balanced.
- 3 Why are GFCIs important for home safety?
 - A They reduce the risk of electric shock.
 - B They cause electricity to flow downstream.
 - C They increase the electrical current.
 - D They work in wet or dry conditions.

Vocabulary

3 Match the words (1-8) with the definitions (A-H).

- | | |
|--------------|-----------------------|
| 1 ___ mild | 5 ___ general-purpose |
| 2 ___ prong | 6 ___ flow out |
| 3 ___ exceed | 7 ___ nonconductive |
| 4 ___ via | 8 ___ compare |

- A something that is pointed or projected
- B to flow or spill forth
- C to do something by way of a particular route
- D an object without the capability of conducting
- E to examine two or more items
- F able to be used in many ways
- G a substance that is not severe or extreme
- H to go beyond in quantity or quality

4 Read the sentence pair. Choose where the words best fit the blanks.

- 1 **general-purpose / compare**
 A 120-volt circuits are _____ circuits.
 B A GFCI will _____ two currents.
- 2 **prongs / flow out**
 A Power will _____ through the load.
 B GFCIs have slots where the _____ of electrical cords are inserted.
- 3 **reliable / vertical**
 A The prong slots for the outlet should be _____.
 B Baker brand power tools are more _____ than the other brand.

5 Listen and read the webpage article on GFCIs again. What are the main characteristics of GFCIs?

Listening

6 Listen to a conversation between a homeowner and an electrician. Mark the following statements as true (T) or false (F).

- 1 ___ GFCIs are not very expensive devices.
- 2 ___ GFCIs should be tested every month.
- 3 ___ GFCIs are different from regular outlets.

7 Listen again and complete the conversation.

Homeowner: Is installing GFCIs really all that important?
Electrician: It's 1 _____ because they can prevent electric shock.
Homeowner: But don't all 2 _____ do that? Why are these so special?
Electrician: GFCIs are actually different. They compare 3 _____ and will shut off if the currents change.
Homeowner: But will it cost more to install them?
Electrician: GFCIs are actually 4 _____ devices.
Homeowner: How reliable are they?
Electrician: They're 5 _____ very reliable. But you should still test all your GFCIs regularly.
Homeowner: How often is that?
Electrician: Usually it's 6 _____.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:
It's really necessary because ...
They compare ... and will ...
But will it cost more to ...

Student A: You are an electrician. Talk to Student B about:

- why installing GFCIs is important
- the cost involved
- testing the device

Student B: You are a customer. Talk to Student A about installing GFCIs in your home.

Writing

9 Use the conversation from Task 8 to fill out the electrician's work report.

O'Neill's Electrical
Electrician's Work Report

Account #: 7759

Items Installed: _____

Customer's Concerns: _____

Advice Given: _____

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What type of GFCIs should be installed in a room where water is used?
- 2 Why should electricians know about the various types of GFCIs?

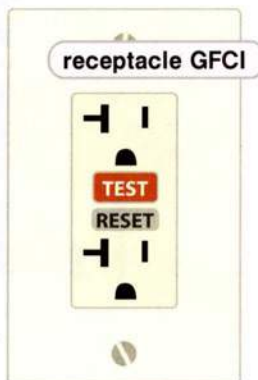


Description:

Installation of six ground fault circuit interrupters (GFCIs) in a residential building. This building was recently **renovated**.

Work Description:

- Install a **standard** type **receptacle ground fault circuit interrupter** in the bathroom. This GFCI must have a **reset** button and a test button. Install a second receptacle GFCI in the kitchen. A third receptacle GFCI must be installed in the laundry room.
- Install a **circuit breaker ground fault circuit interrupter** in the main panel box. **Go with** the model that was already **procured** from the **manufacturer**. The main panel box is located in the basement.
- Provide a **cord connected ground fault circuit interrupter**. Offer a **portable ground fault circuit interrupter** as a **last resort**.



Notes:

- The **configuration** of each type of GFCI is different. Check which specific type is ordered for each room before installing.
- The home owner is concerned about an electrical **max out** in the bathroom. Find a **convenient** time to explain the installation's safety features. Make sure the customer understands how the receptacle GFCI works.
- Explain the function of the portable and cord connected GFCIs. The customer is unsure which type she wants to use. Be sure to give a detailed explanation of each type.

Reading

2 Read the installation work order. Then, choose the correct answers.

- 1 What is the purpose of the work order?
 - A to explain the different types of GFCIs that are to be installed in a home
 - B to describe how GFCIs should be installed in a home
 - C to give instructions on explaining GFCIs to a homeowner
 - D to warn of difficulties installing GFCIs in locations around a home
- 2 Which of the following is NOT needed according to the work order?
 - A a receptacle ground fault circuit interrupter
 - B a cord connected ground fault circuit interrupter
 - C a reset button and a test button on the receptacle GFCIs
 - D a portable ground fault circuit interrupter
- 3 What is the customer worried about?
 - A the building was not renovated correctly
 - B an electrical max out might occur
 - C the different configurations of each GFCI
 - D the GFCI manufacturer is not the same as the panel's

Vocabulary

3 Match the words (1-6) with the definitions (A-F).

- | | |
|---------------------|-------------------|
| 1 ___ configuration | 4 ___ last resort |
| 2 ___ standard | 5 ___ go with |
| 3 ___ manufacturer | 6 ___ convenient |

- A to choose
- B regarded as being common or customary
- C a solution to be used after all others have been rejected
- D suitable for a particular purpose
- E the arrangement of parts of an object
- F a person or group that produces particular things



4 Read the sentence pair. Choose where the words best fit the blanks.

1 max out / go with

- A You should _____ the model you already purchased.
 B The customer was concerned about an electrical _____ in the laundry room.

2 configuration / reset

- A The _____ of the two GFCIs was different.
 B All GFCIs must have a _____ button.

3 procured / renovate

- A The electrician _____ the GFCI from an online seller.
 B James decided to buy the old house and _____ it.

5 Listen and read the installation work order again. Where do the receptacle ground fault circuit interrupters need to be installed?

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

*What kind of GFCI ...
 It isn't specified in ...
 I'm thinking we should go with ...*

Student A: You are an electrician. Talk to Student B about:

- the importance of GFCI types
- why standard GFCIs are used
- why the device should suit the installation

Student B: You are an electrician. Talk to Student A about what device should be installed and why.

Listening

6 Listen to a conversation between two electricians. Mark the following statements as true (T) or false (F).

- 1 ___ It doesn't matter what type of GFCI is installed.
 2 ___ Appliances like hairdryers will not trip a circuit.
 3 ___ A standard GFCI device can be installed in a bathroom.

7 Listen again and complete the conversation.

- Electrician 1:** The 1 _____ is the last room we have to work on.
Electrician 2: 2 _____ of GFCI are we going to go with?
Electrician 1: Let me see ... it isn't 3 _____ in the work order.
Electrician 2: Well, what's the most 4 _____ to install?
Electrician 1: Actually, I think we should install what would 5 _____ in the bathroom. It's better to be safe than sorry.
Electrician 2: I guess you're right. Do you have any 6 _____?
Electrician 1: I'm thinking we should go with a receptacle ground fault circuit interrupter.
Electrician 2: That's a standard type to use for a bathroom, right?

Writing

9 Use the conversation from Task 8 to fill out the electrician's work order.

Electrician's Work Order

Customer's Location:

Number of GFCIs Installed:

Features Needed:



- 1 Turn off power; use the "tester" feature to ensure power is off.
- 2 Unscrew receptacle box and slowly pull it away from wall.
- 3 Label the **load connection** and **line connection terminals** with a **sticker**.
- 4 Cut the insulation so 75% of the copper conductors show.
- 5 Gently tug **outgoing** wires from receptacle box so that they don't touch.
- 6 Turn power on, then touch the **probe** to the copper ground wire.
- 7 To identify the line wires, touch the red probe to all black wires. The wire that lights the tester attaches to the line brass terminal. Make sure to take special **care** that you don't **reverse** any wires.
- 8 Disconnect the power again.
- 9 **Attach** the black load hot wire to the brass line screw.
- 10 Attach the white load neutral wire to the silver line screw.
- 11 Attach the ground wire to the green ground screw.
- 12 Carefully place and screw new GFCI into existing wall box.
- 13 Turn on power and press the reset button.

If the GFCI doesn't stop current **imbalances**, the **sensors** or **coil** may be damaged. Call an electrician or use the manufacturer's instructions provided as a **reference**.

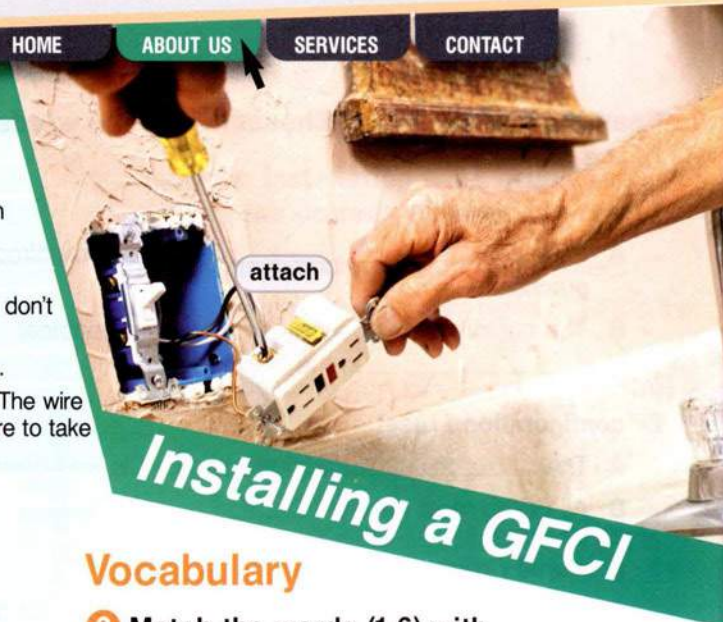
Get ready!

- 1 Before you read the passage, talk about these questions.
 - 1 When installing a GFCI, what should you do with the black load hot wire?
 - 2 Why do people try to install GFCIs themselves?

Reading

- 2 Read the DIY website article on installing GFCIs. Then, choose the correct answers.

- 1 What is the article mostly about?
 - A working with different types of wires
 - B how to install a GFCI yourself
 - C learning to identify GFCI wires
 - D removing a receptacle GFCI
- 2 How are line wires identified?
 - A by reading the manufacturer's instructions
 - B by pulling on the outgoing wires
 - C by touching a red probe to black wires
 - D by using the stickers on the wires
- 3 How do you make sure the power is off before installation?
 - A Remove the wires from the receptacle box.
 - B Use the "tester" button on the GFCI.
 - C Use a probe to detect any electrical currents.
 - D Press the reset feature on the GFCI.



Installing a GFCI

Vocabulary

- 3 Match the words (1-6) with the definitions (A-F).

- | | |
|-----------------------|-----------------------|
| 1 ___ provide | 4 ___ line connection |
| 2 ___ terminal | 5 ___ coil |
| 3 ___ load connection | 6 ___ imbalance |

- A the place used to connect two or more wires
- B occurs when there is more electric current going out than in
- C to give or supply something
- D links wires to the electrical panel and provides the power
- E links the object using electricity to the outlet and is the connection that uses power
- F a transformer that sends a warning signal

- 4 Read the sentence pair. Choose where the words best fit the blanks.

1 reference / care

- A Take special _____ to make sure the power is off before beginning work.
- B The manufacturer's instructions are meant to be a _____.

2 sensor / reversed

- A A _____ can distinguish changes in its environment.
- B The outlet did not work because Kate _____ the wires.

3 feature / probe

- A The reset button is a _____ on receptacle GFCIs.
- B The electrician used a _____ to test the voltage.

- 5 🎧 Listen and read the DIY website article on installing GFCIs again. What are some important things to remember during the installation process?

Listening

- 6 🎧 Listen to a conversation between a customer and an electrician. Mark the following statements as true (T) or false (F).

- 1 ___ Reversed wires can cause problems.
- 2 ___ The manufacturer's instructions do not show which wires are which.
- 3 ___ The man offers to come by and help the woman.

- 7 🎧 Listen again and complete the conversation.

Electrician: Deerfield Electric. This is Paul speaking. How can I help you?

Customer: Hi, Paul. This is Olivia Stanley.

Electrician: Oh, hi, Ms. Stanley. It's 1 _____. How are you?

Customer: I'm doing very well, thanks. How's business lately?

Electrician: It's doing great.

Customer: I'm glad to hear it. I'm calling because I'm having a 2 _____.

Electrician: Okay. What can I help you with?

Customer: Well, I tried to 3 _____ myself, but it's not working correctly. I'm not sure what I did wrong.

Electrician: The first thing you should check is your wiring. You may have 4 _____.

Customer: Reversed the wires?

Electrician: Yes. If you confused the 5 _____ connections, the GFCI won't work.

Customer: Oh. How do I tell which is which?

Electrician: The instructions that came with the GFCI should show you. Or if you prefer, I can 6 _____ this afternoon and look at it.

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

What can I ...
How do I tell ...
I can come by ...

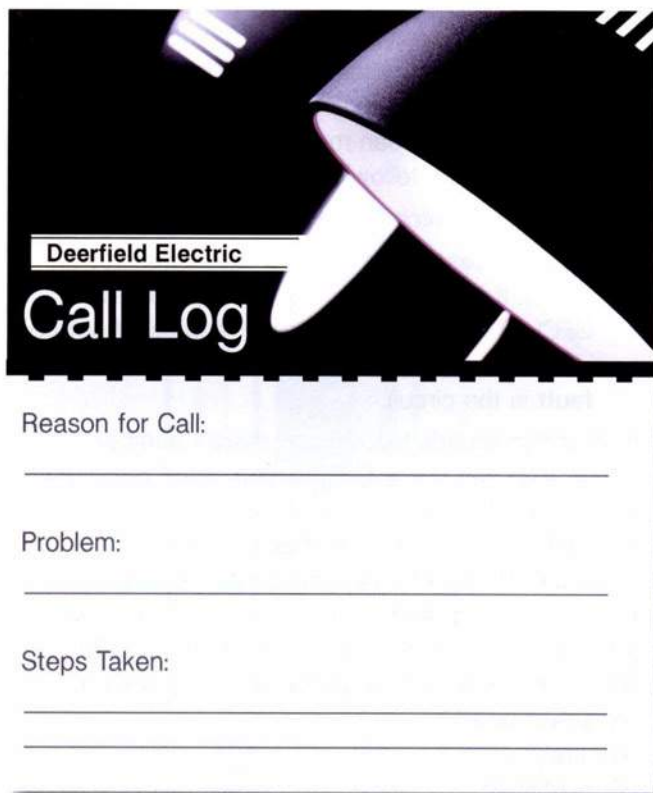
Student A: You are an electrician. Talk to the customer about:

- what the problem is
- what might be causing the problem
- how he or she can fix the problem

Student B: You are a customer. Talk to Student A about the problems you are having installing your GFCI.

Writing

- 9 Use the conversation from Task 8 to fill out the call log.



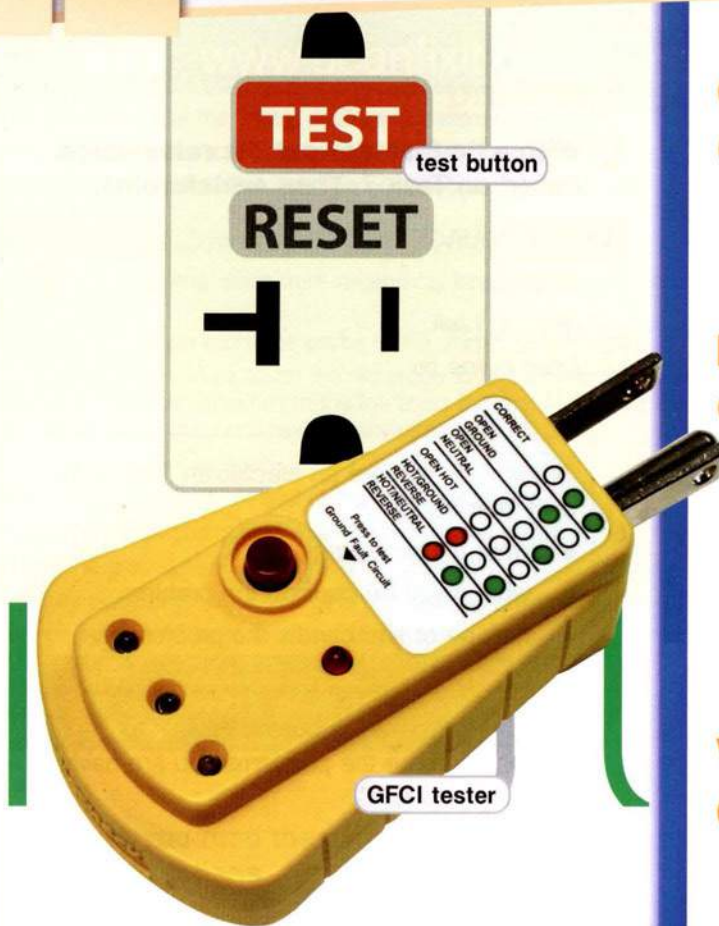
Deerfield Electric

Call Log

Reason for Call:

Problem:

Steps Taken:



Dear Mr. Haskell,

Thanks for your email regarding problems with your GFCI. A GFCI may work well for a long time. Suddenly, you can't **rely on** it anymore. Over time, a GFCI will become more sensitive to differences in currents. These differences can be caused by things like hair dryers and space heaters. If this is happening to you, it can mean your GFCI is **giving out**. To **verify** this, follow these steps:

- 1 **Throw** the switch for an appliance near the GFCI.
- 2 Push the **test button**. This should **interrupt** the power. If it stays on, you might need a new GFCI. However, it might go off. You might not be able to reset it. This **indicates** that there is a **fault** in the circuit.

If all of this sounds too difficult, there's another option. You can buy a **GFCI tester**. It will **diagnose** the problem for you. The diagnosis is usually very **accurate**. GFCI testers are available at most hardware stores. You just plug it into the outlet and it will give you a reading. It will tell you if there are wiring problems and/or the condition of the GFCI. Based on the tester's readings, you may need to replace the GFCI.

Sincerely,
Bill Buchanan

Get ready!

- 1 Before you read the passage, talk about these questions.
 - 1 How can GFCIs be tested?
 - 2 Why should GFCIs be tested on a regular basis?

Reading

- 2 Read the email about a customer's problem. Then, mark the following statements as true (T) or false (F).

- 1 Differences in currents can be caused by appliances.
- 2 The test button on a GFCI should interrupt the power.
- 3 GFCIs must be replaced often.

Vocabulary

- 3 Match the words (1-6) with the definitions (A-F).

- | | | |
|--------------------------------------|--|---------------------------------|
| 1 <input type="checkbox"/> indicate | 3 <input type="checkbox"/> test button | 5 <input type="checkbox"/> GFCI |
| 2 <input type="checkbox"/> interrupt | 4 <input type="checkbox"/> accurate | |

- A a device used to test the flow of electricity
 B a button that checks if a device is working
 C to change or stop a current
 D to point toward something
 E something that is correct

- 4 Read the sentence pair. Choose where the words best fit the blanks.

1 diagnose / fault

- A An electrician is able to _____ electrical problems.
 B If there is a(n) _____ in a current, the electricity may not work correctly.

2 throw / verify

- A The first step is to _____ its switch to see if it turns on.
 B I wanted to _____ the work order was correct.

3 rely on / give out

- A He hoped the heater wouldn't _____ during the winter.
 B I can always _____ my co-worker for good advice.

- 5 🎧 Listen and read the email about a customer's problem again. Why does the customer need a GFCI tester?

Listening

- 6 🎧 Listen to a conversation between a customer and a store employee. Mark the following statements as true (T) or false (F).

- 1 ___ The man wants to purchase a new GFCI.
- 2 ___ The red GFCI tester diagnoses problems.
- 3 ___ The man is a professional electrician.

- 7 🎧 Listen again and complete the conversation.

Employee: Are you looking for 1 _____
_____?

Customer: No, I'm looking for a tester I can just plug into the outlet so I can 2 _____
_____ what's wrong with it.

Employee: We have several different kinds to choose from. They 3 _____
_____ from \$7 to \$200 or more.

Customer: Well, I'm not a professional electrician, so I don't need a really fancy one. Let's say ... below \$20?

Employee: These two 4 _____, and they're both under \$20.

Customer: What is the 5 _____ them?

Employee: Well, the blue one only indicates there is a problem with your GFCI. The red one will 6 _____ what's wrong with it.

Customer: Are both of them accurate?

Employee: Yes, they both work well.

Customer: Okay. Which one do you recommend?

Employee: The 7 _____. It does more, and it's less expensive.

Customer: That's the one I'll buy, then. Thanks for your help.

Employee: You're welcome.

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

I've been having trouble with ...
They range in price from ... to ...
What's the difference between ...

Student A: You are an employee. Talk to Student B about:

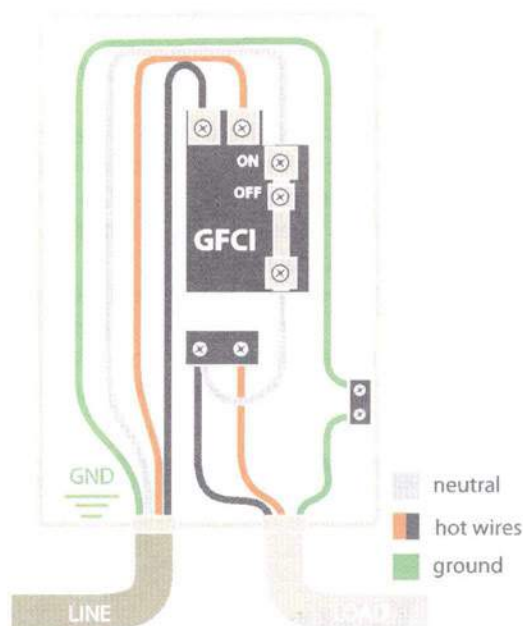
- the products available
- the price of the product
- which one you recommend

Student B: You are a customer. Talk to Student A about a GFCI problem.

Writing

- 9 Use the conversation from Task 8 to write a hardware store advertisement. Write about:

- why a customer might need a GFCI tester
- how they work
- the differences between them
- the price range of GFCI testers



Get ready!

1 Before you read the passage, talk about these questions.

- How often do you think electrical codes should be updated? Why?
- Why is it important to have an AFCI installed in your home?

Home Improvement Monthly

GFCIs

and

AFCIs:

mix up

What's the Difference?

People often **mix up** arc fault circuit interrupters (AFCIs) and ground fault circuit interrupters (GFCIs). This is **unintentional**, but it is not surprising at all. AFCIs and GFCIs have similar **markings**. Their **respective** functions are very similar as well. Both devices help to **sustain** regular electrical currents. Furthermore, both are preventive in nature.

However, these devices have very different purposes. People realize this when they read the **fine print** on the product packages. GFCIs protect people from getting shocked. However, the **primary** function of AFCIs is to stop electrical fires from happening. To do this, AFCIs **monitor** electrical currents for **arc faults**. When AFCIs **sense erratic** currents or electrical **leakage** from ground, neutral or hot wires, they interrupt the power.

Unlike GFCIs, AFCIs are relatively new devices. However, they are quickly becoming very popular. In fact, the **national electrical code** states that AFCIs need to be installed in bedrooms. There are no **exemptions**, unless the outlet powers medical machinery.

Most homes that were built in the past already have GFCIs. They do not have the advantages of AFCIs, though. This can be easily changed. Just call an electrician. Protect your home and family from electrical fires.

EXEMPT

...sustain regular electrical currents. Furthermore, both are preventive in nature. Unlike GFCIs, AFCIs are relatively new devices. However, they are quickly becoming very popular. In fact, the national electrical code states that AFCIs need to be installed in bedrooms. There are no exemptions, unless the outlet powers medical machinery. Most homes that were built in the past already have GFCIs. They do not have the advantages of AFCIs, though. This can be easily changed. Just call an electrician. Protect your home and family from electrical fires.

fine print

exemption

Reading

2 Read the magazine article about AFCIs and GFCIs. Then, choose the correct answers.

- What is the passage mostly about?
 - the changes in electrical codes over time
 - the conditions that lead to arc faults
 - the correct way to install an AFCI
 - the differences between AFCIs and GFCIs
- What is NOT true about AFCIs according to the article?
 - Older homes already have them installed.
 - Their main use is to prevent electrical fires.
 - An electrical code requires them in bathrooms.
 - They are easy for electricians to install.
- What is one reason people confuse AFCIs with GFCIs?
 - Both have similar appearances.
 - Both are used to monitor arc faults.
 - Both are new devices on the market.
 - Both can be found in older homes.

Vocabulary

3 Match the words (1-7) with the definitions (A-G).

- | | |
|-------------|-------------------|
| 1 — sense | 5 — primary |
| 2 — leakage | 6 — unintentional |
| 3 — erratic | 7 — sustain |
| 4 — marking | |

- to keep something working
- unpredictable in movement
- to feel by use of the senses
- first in level or importance
- the escape of electricity from a system
- a mark that identifies an object
- not done on purpose

leakage

4 Read the sentence pair. Choose where the words best fit the blanks.

1 **sustain / respective**

A Both girls won prizes in their _____ subjects.

B He could not _____ such a quick pace.

2 **exemption / fine print**

A He got a(n) _____ from the test because he was ill.

B Always read the _____ before you sign a contract.

3 **monitoring / mixed up**

A Alice _____ the wires, so the device did not work.

B _____ electrical systems for problems can help prevent fires.

5 Listen and read the magazine article about AFCIs and GFCIs again. How do AFCIs differ from GFCIs?

Listening

6 Listen to a conversation between an electrician and a homeowner. Mark the following statements as true (T) or false (F).

- 1 ___ The electrician recommends installing a GFCI.
- 2 ___ AFCIs are more expensive to install than GFCIs.
- 3 ___ Owners of older homes should install AFCIs in their bedrooms.

7 Listen again and complete the conversation.

Homeowner: Thank you for coming. Sparks have been coming out of 1 _____ in my bedroom.

Electrician: Okay, which outlet is it?

Homeowner: It's the one next to the dresser. Will 2 _____ here stop it from sparking?

Electrician: Maybe. But I think what you really need is to put it on 3 _____.

Homeowner: AFCIs are 4 _____, though. I want a GFCI installed here.

Electrician: I can't do that. It's not safe. You need an AFCI. 5 _____ in this wall is quite old. There are some electrical problems.

Homeowner: I didn't know that.

Electrician: It can cause an arc fault, leading to an 6 _____.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

I want a ... installed here.

I think what you really need is ...

It's recommended that ...

Student A: You are a homeowner. Talk to Student B about:

- what the problem is
- the product you would like installed
- why you want the product

Student B: You are an electrician. Talk to Student A about what product he or she should install.

Writing

9 Use the conversation from Task 8 to fill out a customer comment card.

Customer Comment Card

What work did you request?

Was the electrician helpful?

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some kinds of light fixtures that you are familiar with?
- 2 What are some things that should be considered before installing light fixtures?

Reading

2 Read the textbook excerpt on light fixtures. Then, mark the following statements as true (T) or false (F).

- 1 Incandescent fixtures are known to flicker.
- 2 Fixtures need to be installed away from joists.
- 3 Fluorescent bulbs can be bare or enclosed.



Light Fixtures

INTRODUCTION TO ELECTRICAL WORK

There is a basic process involved in the installation of a **light fixture**. To begin, the type of fixture must be selected. There are a number of different fixture types, including **incandescent** or **fluorescent**.

Planning for a fixture installation will make the job much easier. Before you begin, you can decide what type of **ceiling box** to use. Knowing the location of a **joist** is also an important part of planning. Some fixtures must be installed in the location of a joist. Also, you should keep the fixture you choose **on site**. This will allow you to make proper measurements. Fixture height and **base depth** are some important measurement types.

The type of **bulb** you choose will depend on the fixture type. Fluorescent fixtures have designs that depend on the length of the bulb. They also have designs with a bulb that is **enclosed** or **bare**. **High output bulbs** are different than **single pin** and **dual pin bulbs**. Keep in mind that some fluorescent fixtures come with problems. The bulbs are known to **buzz** or flicker. However, these problems can be fixed by changing the **ballast**. The **socket** in a fluorescent bulb is also known to **corrode**.

Vocabulary

3 Match the words (1-8) with the definitions (A-H).

- | | |
|---|--|
| 1 <input type="checkbox"/> base depth | 5 <input type="checkbox"/> incandescent |
| 2 <input type="checkbox"/> high output bulb | 6 <input type="checkbox"/> enclosed |
| 3 <input type="checkbox"/> ceiling box | 7 <input type="checkbox"/> fluorescent |
| 4 <input type="checkbox"/> light fixture | 8 <input type="checkbox"/> dual pin bulb |

- A being surrounded or closed in on all sides
 B a bulb with two pins on each side
 C the space that must be allowed for a ceiling fixture
 D a lighting unit that has one or more bulbs and a socket
 E a device used to anchor light fixtures
 F being able to emit light through radiation
 G being able to emit light when it is heated
 H a bulb that produces brighter light due to high wattage

4 Fill in the blanks with the correct words and phrases from the word bank.

word BANK

buzzing
on site

socket
ballast

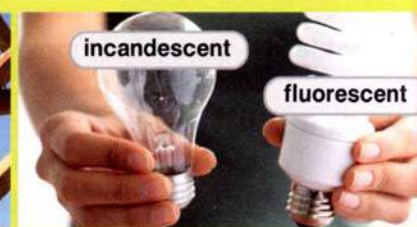
corroding
single pin bulb

bare

- 1 The light was _____ loudly and distracting the workers.
- 2 The light bulb does not fit in the _____.
- 3 We need to find a cover for the _____ bulb.
- 4 The electrician adjusted the _____ and the flickering stopped.
- 5 The fluorescent fixture has one opening so it needs a _____.
- 6 The metal at the base of the fixture was _____.
- 7 The workers left the materials _____ until the job was finished.



joist

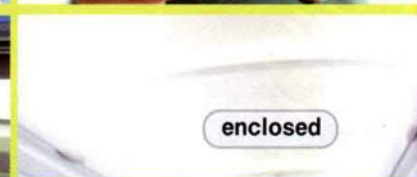


incandescent

fluorescent



bare



enclosed

- 5 Listen and read the textbook excerpt on light fixtures again. What should be left on site and why?

Listening

- 6 Listen to a conversation between a building owner and an electrician. Choose the correct answers.

- What is the purpose of the conversation?
 - to compare two different light fixtures in a building
 - to give the pros and cons of a specific light fixture
 - to discuss when the building will be ready for use
 - to explain how to fix problems with fluorescent fixtures
- What will the woman likely do next?
 - return to her office
 - place an order for the light fixtures
 - install fluorescent light fixtures
 - give the owner an estimate of the cost

- 7 Listen again and complete the conversation.

Owner: What type of 1 _____ would you recommend for the office area?

Electrician: Well, fluorescent fixtures 2 _____ offices.

Owner: Why is that?

Electrician: They usually 3 _____ than other fixtures. They also provide a lot of light.

Owner: Are they reliable fixtures?

Electrician: There are some 4 _____, but most offices use them anyway.

Owner: What kind of problems?

Electrician: Sometimes the bulbs make a 5 _____ or they flicker. It's a typical problem.

Owner: What if that happens? Can it be fixed?

Electrician: Usually the ballast just needs 6 _____. After that, the buzz and flickering goes away.

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

What type of light fixture would you recommend for ...

They usually ...

There are some ... but ...

Student A: You are a building owner. Talk to Student B about:

- what kind of light fixture he or she recommends
- why he or she recommends it
- if the recommended fixture is reliable

Student B: You are an electrician. Talk to Student A about what light fixture you recommend.

Writing

- 9 Use the conversation from Task 8 to fill out the building owner's notes on the pros and cons of a recommended light fixture.

Type of light fixture recommended: _____

Pros: _____

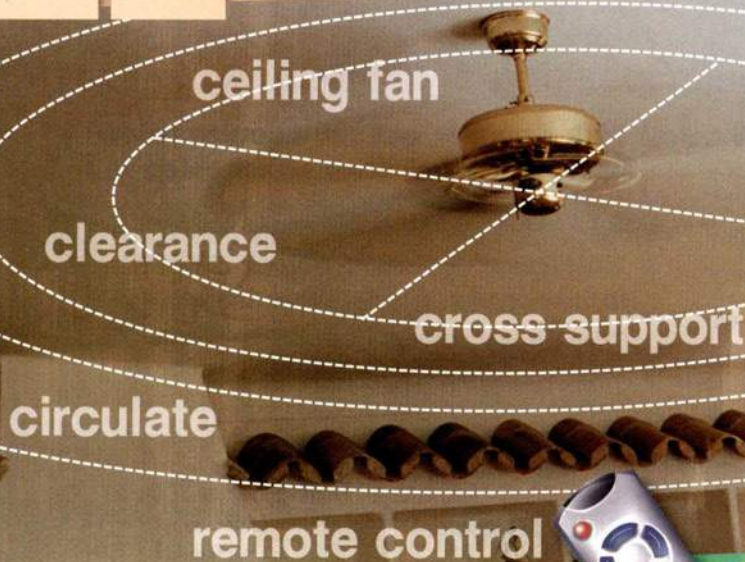
Cons: _____

Fixes: _____

Homebreeze

Installation Guide

Model: Ceiling Fan UJ790



Important: Failure to **follow** these instructions during installation may present a safety hazard.

- 1 Before you begin, make sure you have enough space to install your **ceiling fan**. Without proper **clearance**, the fan may break or cause damage to surrounding walls and fixtures when operated.
- 2 Locate an appropriate **cross support**. We recommend mounting the fan **independently** from the included ceiling box so it stays **stable**. A fan towards the middle of the room will **circulate** the air most effectively.
- 3 Hang the fan with the included metal ceiling box (see page 4 for detailed instructions). Homebreeze Model UJ790 is a **swing-up** fan, so you will be able to wire the fan easily after you hang it.
- 4 Wire the fan, or have an electrician wire it for you (see page 6 for detailed instructions).
- 5 Swing the fan into place and secure the final screws in the ceiling box.
- 6 Test the fan to make sure that it does not **wobble**. The UJ790 is a **variable-speed** fan, so use the highest speed setting to perform this test. You will need two AA batteries to operate the **remote control**.

Get ready!

- 1 Before you read the passage, talk about these questions.

- 1 How does a ceiling fan work?
- 2 What should be considered when installing a ceiling fan?

Reading

- 2 Read the instruction manual on a ceiling fan. Then, complete the table using information from the manual.

Step	Description
Before Installation	_____
Installation	_____
After Installation	_____

Vocabulary

- 3 Write a word that is similar in meaning to the underlined part.

- 1 This light fixture should be installed without relying on other parts to the ceiling beam.
_ n d _ _ _ n d _ _ t l _
- 2 If the fan moves back and forth unsteadily, it is not installed correctly. w _ _ b l _ s
- 3 We need a fan that is capable of operating fast or slow to use in the wintertime.
_ _ r i _ b l _ _ _ p _ _ d
- 4 Before installation, the electrician located the solid beam in the ceiling.
c _ _ s s _ _ u _ _ o r _
- 5 Tighten the screws to keep each fixture securely in one place. _ t _ b _ e

- 4 Fill in the blanks with the correct words and phrases from the word bank.

Word BANK

circulate remote control swing-up
follow ceiling fan clearance

- Do you have enough _____ to install a fan here?
- You must always _____ the instructions.
- The bedroom lights are operated by _____.
- The purpose of a fan is to _____ air.
- This _____ fan is easy to wire after hanging.
- The _____ makes the kitchen cooler.

- 5 Listen and read the instruction manual on a ceiling fan again. What is the final step after installation?

Listening

- 6 Listen to a conversation between two electricians. Mark the following statements as true (T) or false (F).

- ___ The wrong type of light fixture was installed.
- ___ The woman's mistake caused a serious electrical malfunction.
- ___ The woman forgot to test the fans after installation.

- 7 Listen again and complete the conversation.

Electrician 1: There seems to be something wrong with the way the 1 _____ are attached.

Electrician 2: Really? I tested the lights and they seem okay.

Electrician 1: Well, the wiring is fine, but 2 _____ when I turn on the fan at high speed.

Electrician 2: Oh, I see what you mean. The whole thing 3 _____.

Electrician 1: A fan wobbling like that won't 4 _____ properly. Or it could cause more serious problems, like electrical malfunction or damage to the fan.

Electrician 2: I know, I know. That was my fault. I should have 5 _____ right away to make sure they were stable.

Electrician 1: That's okay, Karen. Now that you've seen what happens, I'm sure you'll remember next time.

Electrician 2: I will. And I'll 6 _____ right away to tighten those light fixtures and make sure they're secure.

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

I tested the ...

The ... is fine, but look what happens ...

I should have ...

Student A: You are an electrician. Talk to Student B about:

- an error while installing fan
- possible consequences
- what action is needed

Student B: You are an electrician. Talk to Student A about a fan installation error.

Writing

- 9 Use the conversation from Task 8 to write the electrician's work report. Write about:

- item installed
- nature of installation error
- why hazardous
- steps taken to correct problem



Get ready!

1 Before you read the passage, talk about these questions.

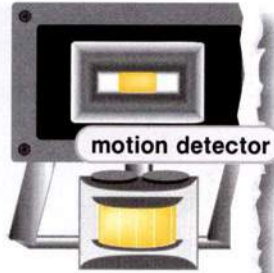
- 1 What are different reasons for installing lights outdoors?
- 2 What are some types of outdoor lights?

Lumalo OUTDOOR LIGHTING

Lumalo has been providing practical outdoor lighting for more than 30 years. Whether you're looking to beautify your surroundings or ensure safety around your home, Lumalo has the light for you. **Safety - Security** is often the primary purpose of outdoor lighting. Our ultra-bright **floodlights** create a daytime-like environment with maximum **coverage**, so you can monitor the area around your home or business 24 hours a day. To conserve energy, you may want a **dusk-to-dawn light**. Our special **photoelectric cells** respond to sunlight and automatically adjust your lighting. We also carry **motion detectors** with specialized **sensitivity** to trigger lights only when people or cars come and go.

Beauty - Who says the outdoors can only be enjoyed during the day? At Lumalo, we understand the importance of a pleasant evening outdoors. Check out our low-voltage **landscape lights** for affordable ways to liven up your yard or patio. We also have a variety of tasteful **entry lights** to help you get in and out with style.

The Lumalo Guarantee - Let Lumalo's expert technicians handle your installation needs. We make sure any **exposed** fixtures are **watertight** and treated with **anticorrosion** compounds. We also provide custom fittings to match the **slant** of surfaces where lights are installed. We'll even come back to replace bulbs when they **burn out**.



Reading

2 Read the brochure on outdoor light fixtures. Then, mark the following statements as true (T) or false (F).

- 1 Floodlights are recommended for the purpose of security.
- 2 Motion detectors automatically turn off lights during the day.
- 3 Landscape lights can improve the appearance of a yard at night.

Vocabulary

3 Match the words (1-7) with the definitions (A-G).

- | | |
|---|---|
| 1 <input type="checkbox"/> slant | 5 <input type="checkbox"/> entry light |
| 2 <input type="checkbox"/> burn out | 6 <input type="checkbox"/> motion detector |
| 3 <input type="checkbox"/> coverage | 7 <input type="checkbox"/> photoelectric cell |
| 4 <input type="checkbox"/> dusk-to-dawn light | |

- A a sensor that measures light
 B a device that senses movement
 C an angle not up and down or side to side
 D a light illuminating a door or path
 E to stop functioning
 F an area reached by something
 G a light that turns on automatically at night

4 Read the sentence pair. Choose where the words best fit the blanks.

- 1 **anticorrosion / watertight**

A The electrician used a(n) _____ product to preserve the metal fixtures.

B We need _____ floodlights since they will be out it the rain.
- 2 **sensitivity / security**

A Bright lights are better for _____ than dim lights.

B Motion detectors have special _____ to movement.
- 3 **landscape light / floodlight**

A A _____ is often low-voltage to conserve energy.

B A _____ is appropriate for illuminating a large area.



- 5 Listen and read the brochure on outdoor light fixtures again. What is the difference between a motion detector and a photoelectric cell?

Listening

- 6 Listen to a conversation between an electrician and a homeowner. Choose the correct answers.

- What is the purpose of the conversation?
 - to place an order for outdoor light fixtures
 - to explain differences between two fixtures
 - to give directions to an installation center
 - to confirm an order and installation schedule
- What product does the man need?
 - a light that responds to movement
 - a light that stays on during dark hours
 - a light that conserves energy
 - a light that illuminates a front door

- 7 Listen again and complete the conversation.

Electrician: Let's see ... It looks like we have everything here. You requested three floodlights with 1 _____ . Is that right?

Homeowner: No, the floodlights are supposed to be 2 _____ - _____ - _____ . I want the lights to stay on all night.

Electrician: Oh, I'm sorry. I was looking at the wrong box. This 3 _____ : three floodlights equipped with photoelectric cells.

Homeowner: Yes, that's it. 4 _____ this afternoon for the installation?

Electrician: Certainly. I'm available after 3:30 p.m. What is 5 _____ ?

Homeowner: I'm at 211 2nd Street. 6 _____ Highway 17, just past the high school. Look for the brick driveway on the left.

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

You requested ... Is that right?

No, I ordered ...

Can you come ...

Student A: You are an electrician. Talk to Student B about:

- an order for outdoor light fixtures
- products ordered
- his or her address

Student B: You are a homeowner. Talk to Student A about an order for outdoor light fixtures.

Writing

- 9 Use the conversation from Task 8 to fill out the call log.

Lumalo

Call Log

Reason for Call: _____

Type and Number of Lights: _____

Additional Features: _____

Location: _____



Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some different appliances found in a kitchen?
- 2 Why is it important that appliances be wired correctly?

Installation Made Easy

Kitchen Appliances



When installing kitchen appliances, it is important to note the different types. How you approach each installation is determined by the type of appliance. There are a number of possible **appliance** installations. Each comes with its own procedure and specific use of tools. The procedure for installing a **dishwasher** is different than installing a **garbage disposal**. When installing a garbage disposal, there are two different wiring types. It can be **hard-wired** through a plug and cord or simply wired.

An **electric stove** might be a **slide-in** type. Similarly, a range hood might be a **drop-in** type. This will affect the way the appliances are installed. A **range hood** is installed **adjacent** to the stove. The drop-in type of this appliance has a **whip**. You will need a splice box to connect it to the incoming power cable. Also, a **frame screw** is used for mounting the range hood.

There are a number of other factors to consider when installing appliances. Some appliances will need a **strain relief** device attached to the cord. Also, an appliance's **nameplate rating** must be taken into consideration. Be aware of any appliances that might be experiencing **derating**.

Reading

2 Read the manual on appliance installation. Then, choose the correct answers.

- 1 What is the purpose of the manual?
 - A to explain how to install different appliances
 - B to describe appliances commonly found in a kitchen
 - C to show there are various types of appliance installation methods
 - D to compare different kinds of wiring used in appliance installation
- 2 Which of the following is NOT mentioned in the manual?
 - A A range hood is installed next to a stove.
 - B There is more than one type of wiring for a garbage disposal.
 - C A strain relief device is used on appliance cords.
 - D A nameplate rating is found on the back of an appliance.
- 3 When is a splice box needed?
 - A when an appliance is undergoing derating
 - B when there is a whip for a range hood
 - C when there is a slide-in electric stove
 - D when a garbage disposal needs hard-wiring

Vocabulary

3 Match the words (1-6) with the definitions (A-F).

- | | |
|-----------------|--------------------|
| 1 __ hard-wired | 4 __ strain relief |
| 2 __ whip | 5 __ frame screw |
| 3 __ derate | 6 __ drop-in |

- A a fastener used to attach metal studs to a track
- B a device that reduces tension on an electrical cord
- C coming directly from a source and unable to be modified
- D a pigtail of wires that hangs from an appliance
- E being ready for use and only needs to be lifted into place
- F to reduce the power that flows into a device or appliance



frame screws

4 Read the sentence pair. Choose where the words best fit the blanks.

1 garbage disposal / range hood

- A There is food jammed in the _____.
- B The _____ was installed over the oven.

2 dishwasher / electric stove

- A The burners on the _____ are not heating up.
- B The water tube to the _____ is clogged.

3 nameplate rating / appliances

- A Check the _____ to see the amperage needed to power the stove.
- B The _____ for the kitchen will be delivered tomorrow afternoon.

4 adjacent / slide-in

- A We need to make sure the space is wide enough for the _____ stove.
- B The work order says the stove should be _____ to the refrigerator.

5 Listen and read the installation manual again. What should you consider when installing kitchen appliances?

Listening

6 Listen to a conversation between two electricians. Mark the following statements as true (T) or false (F).

- 1 ___ The electricians are installing a dishwasher.
- 2 ___ The woman double checked the installation.
- 3 ___ The appliance didn't turn on as it wasn't wired correctly.

7 Listen again and complete the conversation.

Electrician 1: Okay, I think the 1 _____ is installed properly now.

Electrician 2: You'd better 2 _____ to see if it works.

Electrician 1: I'll try it now.

Electrician 2: It's not turning on.

Electrician 1: I'm sure we did everything right. Did we 3 _____?

Electrician 2: I don't think so.

Electrician 1: The appliance is 4 _____ - _____. We installed it correctly, didn't we?

Electrician 2: We definitely did. I checked everything a second time anyway. The installation looked fine to me.

Electrician 1: Maybe something went wrong with the 5 _____.

Electrician 2: I checked that too. Everything is installed properly.

Electrician 1: What could possibly be wrong?

Electrician 2: Did you check the breaker 6 _____? Maybe it's turned off.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

- You'd better test it ...*
- Did we ...*
- Maybe something went wrong with ...*

Student A: You are an electrician. Talk to Student B about:

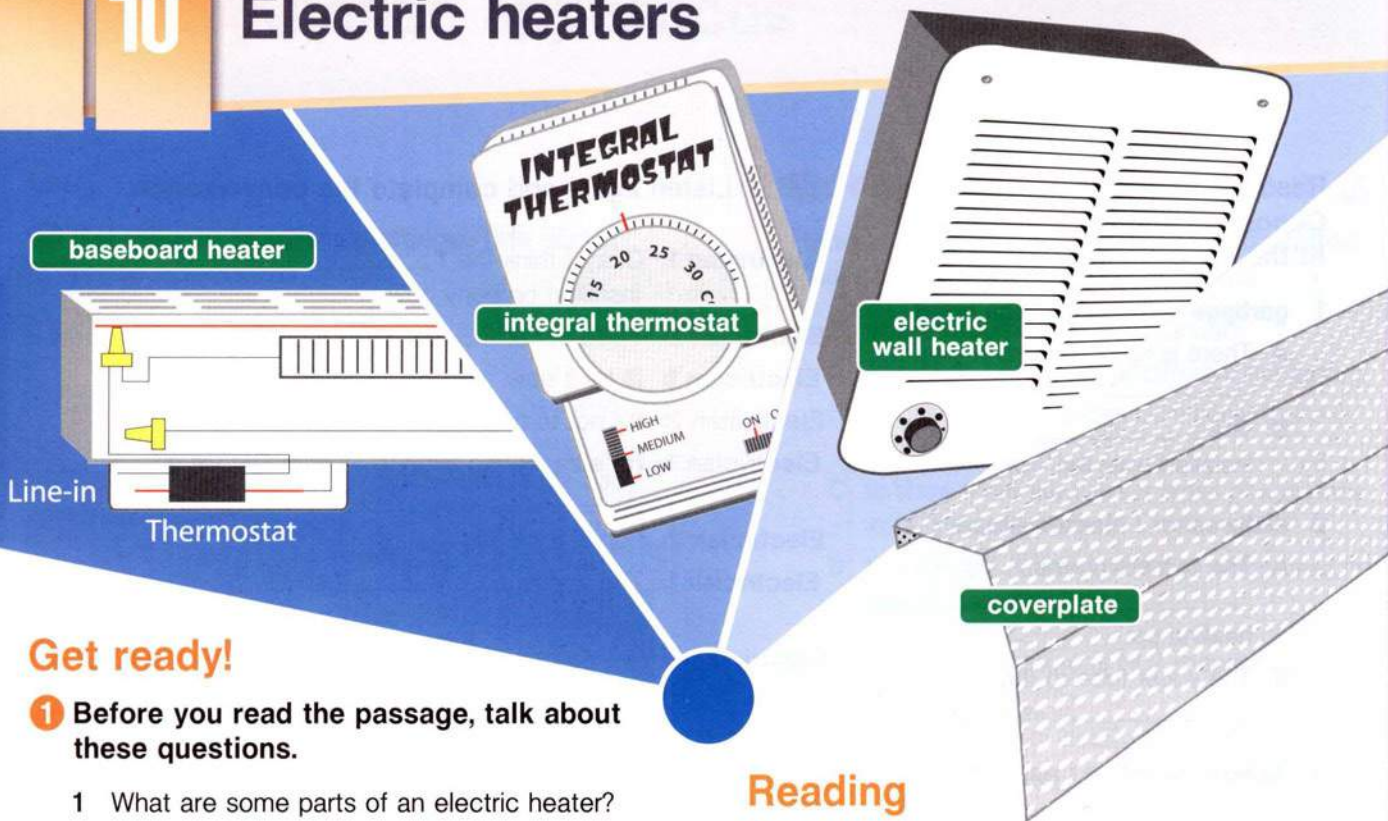
- testing the appliance
- fixing the problem
- what the problem is

Student B: You are an electrician. Talk to Student A about the appliance installation.

Writing

9 Use the conversation from Task 8 to write an electrician's work report. Write about:

- the item installed
- problems encountered after installation
- and steps taken to correct problems



Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some parts of an electric heater?
- 2 What are some different types of electric heater?

Reading

2 Read the work order for a heater installation. Then, mark the following statements as true (T) or false (F).

- 1 The customer currently has a baseboard heater.
- 2 The electrician needs to check one of the appliances.
- 3 The response time between the thermostats is different.

Work Order #4261

Company:	Cook Heating Company
Jobsite:	Harris Residence 17 Long Street, Baxter, NY 48323
Phone:	(806) 555-2341
Date Requested:	October 26
Issued by:	Bill Johnson

Job: The customer has an **electric wall heater**. However, he would like a **baseboard heater** installed in his living room. It is a large, open room, and it is connected to the kitchen. So, install a **variable-wattage unit** too. The customer has already agreed to this. He requested the **coverplate** for the heater be white so it matches the paint in the living room. He also wants our newest model of **digital wall thermostat**.

Special Instructions:

- 1 For this job, there are multiple hot wires. Be careful not to touch the **feeds**.
- 2 Remember not to obstruct the **air gap**.
- 3 One of the customer's appliances has been **shorting out**. Check that out, too.

Notes: On the phone, the customer mentioned that he is worried about his energy **consumption**. So, ask him if he'd like us to install an **integral thermostat** instead of a regular wall thermostat. Tell him there's no difference in the **response time** of the two devices. This could be an opportunity to make a big sale.

Vocabulary

3 Choose the sentence that uses the underlined part correctly.

- 1 A The cover plate will help energy consumption.
B The air gap between the heater and wall should be one inch.
- 2 A The toaster began to short out after two months.
B Jack adjusted the temperature using the feeds.
- 3 A Our energy consumption goes up during the winter.
B The variable wattage unit goes over the heater's elements.
- 4 A The baseboard heater needs to be installed near the ceiling.
B A digital thermometer displays the temperature in numbers.

4 Match the words (1-6) with the definitions (A-F).

- | | |
|----------------------------|-----------------------------|
| 1 ___ electric wall heater | 4 ___ wall thermostat |
| 2 ___ integral thermostat | 5 ___ response time |
| 3 ___ baseboard heater | 6 ___ variable wattage unit |
- A the amount of time it takes a heater to heat up after it is turned on
 B a unit on the wall that adjusts the temperature of a heating system
 C a heating system that varies the amount of wattage it uses
 D a heating unit in the wall which usually uses a fan
 E a power-saving device which automatically turns the heater on and off
 F a heating system located above the lowest part of the walls

5 Listen and read the work order for a heater installation again. What should the electrician suggest to the customer? Why?

Listening

6 Listen to a conversation between a customer service representative (CSR) and a customer. Mark the following statements as true (T) or false (F).

- ___ The man has a problem with a heater.
- ___ An electrician is going to the man's house immediately.
- ___ The man decides to get a wall thermostat.

7 Listen again and complete the conversation.

Customer: I have a complaint about the 1 _____ you installed in my house.

CSR: What seems to be the problem, sir?

Customer: Well, the system is supposed to turn on and off 2 _____, right?

CSR: Yes, as a 3 _____ - _____, it should do that.

Customer: It doesn't seem to be turning on at all. The room is always cold.

CSR: Oh, that's not good.

Customer: No, it's not. And because it's automatic, I can't 4 _____ the settings.

CSR: I'm so sorry it isn't working. We'll send someone over right away to replace it.

Customer: Thanks, but I don't want it 5 _____.

CSR: Okay. Would you like a different thermostat instead?

Customer: Yes. I'd like a regular 6 _____. I think it will be easier to manage.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

*I have a complaint about ...
 Well, the system is supposed to ...
 And because it's ... I can't ...*

Student A: You are a customer. Talk to Student B about:

- what your complaint is
- what the problem is with the device
- what you want to do about it

Student B: You are a customer service representative. Talk to Student A about the problem he or she is having.

Writing

9 Use the conversation from Task 8 to fill out the customer service representative's call log.

Cook Heating Company

Call Log

Reason for Call: _____

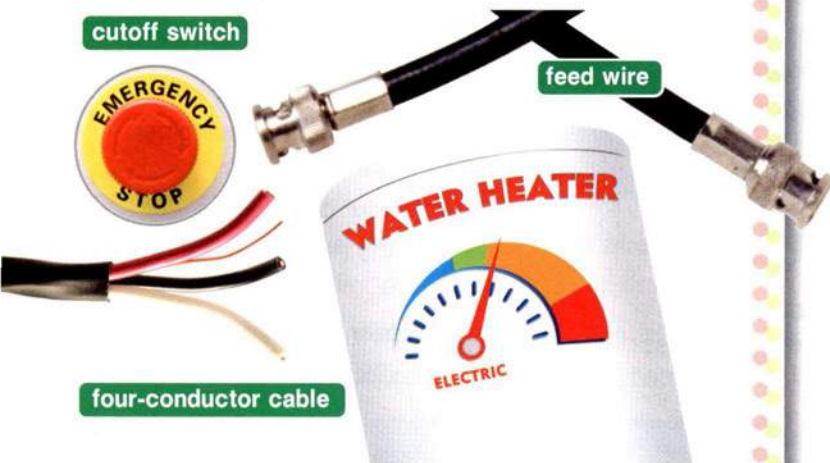
Specific Problem: _____

Steps Taken: _____

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some appliances commonly found in utility rooms?
- 2 What safety features should be fitted when installing an electric clothes dryer?



Understanding the UTILITY ROOM Installations

Installing utility room appliances requires attention to detail. Also, as with any installation, knowledge of the tools and procedures is important.

The **water heater** is one of the easiest appliances to install. A 240-volt model is usually recommended. This is because it uses half the current of the 120-volt model.

The **heat pump** will usually be wired by the installer. The pump has a main unit and also an outside unit. (The outside unit is the **air handler**.) Both units will require a **disconnect**. If the heat pump is not already wired, an electrician can help. The electrician will run a **feed wire** to both units.

The **electric clothes dryer** installation is one of the most difficult. It can be easily miswired because it is both 120 and 240 volts. The neutral and ground also adds to this confusion. This means it is important to have a **four-conductor cable**. The cable will ensure the dryer is up to code. Also, certain safety precautions should be followed during the installation process. Installing a **cutoff switch** is an important example. To minimize fire risks, ensure the **vent run** is as short as possible. The type of duct installation is also important for fire prevention. Use a **rigid duct** instead of a **corrugated duct**.

Reading

2 Read the magazine article about installing utility room appliances. Then, choose the correct answers.

- 1 What is the article mostly about?
 - A how to tell the difference between a rigid duct and a corrugated duct
 - B why certain installations should be done by an electrician
 - C how to install various utility room appliances
 - D which home appliances reduce energy costs
- 2 Which of the following is NOT a suggestion made in the article?
 - A making sure the dryer's vent run is short
 - B purchasing a 120-volt water heater
 - C installing a cutoff switch for an appliance
 - D hiring an electrician to run a feed wire
- 3 Why is it important to use a rigid duct for installing an electric clothes dryer?
 - A to use the least amount of energy
 - B to reduce the cost of installation
 - C to minimize the possibility of fires
 - D to prevent the miswiring of the appliance

Vocabulary

3 Match the words (1-7) with the definitions (A-G).

- | | | | |
|---|------------------|---|-------------------------|
| 1 | __ cutoff switch | 5 | __ corrugated duct |
| 2 | __ heat pump | 6 | __ air handler |
| 3 | __ rigid duct | 7 | __ four-conductor cable |
| 4 | __ vent run | | |

- A a device that has a blower as well as heating and cooling parts
- B has four insulated hot wires as well as a ground
- C connects an electric clothes dryer to the outside ventilation system
- D is a flexible duct that has a shape consisting of ridges and grooves
- E a smooth-walled duct that allows for thermal insulation and noise absorption
- F moves lower temperature heat from one location to another location at a higher temperature
- G a mechanism that is used to shut down a device

4 Read the sentence pair. Choose where the words best fit the blanks.

1 water heater / disconnect

- A When our _____ broke, we had to take cold showers.
B I want to _____ the TV so it won't be on all the time.

2 feed wire / electric clothes dryer

- A If the _____ is damaged, the appliance it is connected to will not work.
B My grandma dried her clothes outside because she did not have a(n) _____.

5 Listen and read the magazine article about installing utility room appliances again. Why is the electric clothes dryer installation one of the most difficult?

Listening

6 Listen to a conversation between two electricians. Mark the following statements as true (T) or false (F).

- 1 ___ The electricians will install the dryer first.
2 ___ By dividing the work, the electricians think they'll get done quicker.
3 ___ Whoever finishes first will start on the last appliance to be installed.

7 Listen again and complete the conversation.

Electrician 1: Well, we have a lot of work to get done in this room.

Electrician 2: Definitely. The 1 _____ has to be installed. So does the heat pump.

Electrician 1: We've got 2 _____ the dryer too.

Electrician 2: We should do that one last.

Electrician 1: Maybe it would be better if we 3 _____ what we'll do. We can decide what to do first.

Electrician 2: Actually, it would be even better if we divided the work 4 _____.

Electrician 1: You're right. Things will 5 _____ that way.

Electrician 2: Okay, well, I'll do the water heater and you can do the heat pump.

Electrician 1: That sounds good to me.

Electrician 2: Then we'll have 6 _____ to do last.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

*We have to install ...
Maybe it would be better if we ...
I'll do the ...*

Student A: You are an electrician. Talk to Student B about:

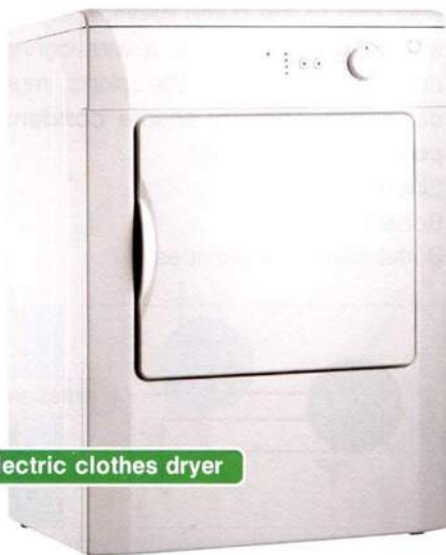
- what needs to be installed
- how to split up the work
- what will be installed last

Student B: You are an electrician. Talk to Student A about which tasks you'll do.

Writing

9 Use the conversation from Task 8 to write a work report. Write about:

- the appliances that needed to be installed
- why and how the work is divided
- what appliance was installed last

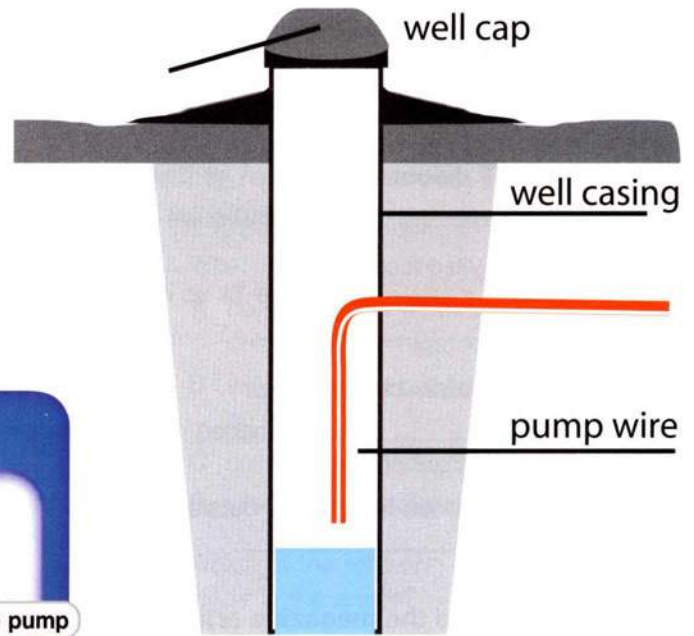


electric clothes dryer

Get ready!

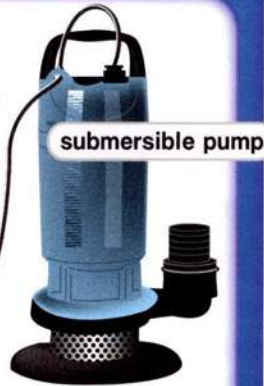
1 Before you read the passage, talk about these questions.

- 1 What are some parts of a submersible pump installation?
- 2 What kinds of customers might need a submersible pump installed?



Dear Ms. Warren,

I can certainly install a **submersible pump** on your property. However, there are some guidelines and regulations that must be followed. I will outline a few of these to give you a better idea. That way you will know about the procedure before it begins.



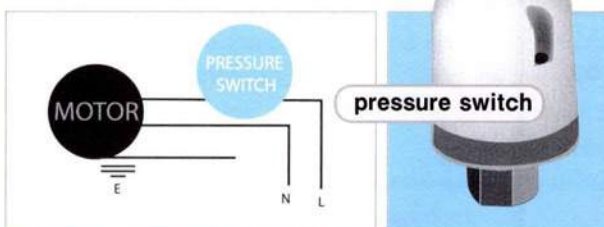
To start, the pump and **well casing** must be grounded. This is code procedure and is absolutely necessary. Also, the **well wiring** has to be appropriate for **direct burial**. This cable will run from the **pressure switch** to the starter, then to the well. Again, it is important that well wiring is listed as **pump wire**. Underground feeder cable is not acceptable. The gauge for these cables will depend on the **depth** of the well. The **horsepower** of the pump is also a depending factor for the gauge.

A two-wire or three-wire pump is considered standard. However, a two-wire pump is easier and cheaper to install. A splice must be made under the **well cap** to the pump cable. This can be done with an **insulated crimp** or a wire connector. If a wire connector is used, the skirts must be pointed downward. This will ensure **condensation** will not **pool** in the connector.

Sincerely,

Robert Burke

Burke Electrical Services



Reading

2 Read the email about submersible pumps. Then, mark the following statements as true (T) or false (F).

- 1 Pump horsepower helps determine cable gauge.
- 2 Underground feeder cable can be used in place of pump wire.
- 3 The casing of the submersible well must be grounded.

Vocabulary

3 Match the words (1-7) with the definitions (A-G).

- | | |
|--|---|
| 1 <input type="checkbox"/> well casing | 5 <input type="checkbox"/> submersible pump |
| 2 <input type="checkbox"/> pressure switch | 6 <input type="checkbox"/> well cap |
| 3 <input type="checkbox"/> pump wire | 7 <input type="checkbox"/> direct burial |
| 4 <input type="checkbox"/> insulated crimp | |

- A a type of wire that has been joined through heating
- B cable or wire that is installed directly in the earth
- C a type of safety device that is activated by pressure
- D prevents solid material and insects from getting in the well
- E a tube-shaped lining of a well
- F a type of pump that is cased in a protective housing along with its electric motor
- G wire that can be used under water

4 Read the sentence pair. Choose where the words best fit the blanks.

1 well / condensation

A They had to dig a _____ to get water for the house.

B _____ built up on the car windows overnight.

2 pool / depth

A It's hard to guess the _____ of the water just by looking.

B If you let the hose drip, water will _____ on the ground.

5 Listen and read the email about submersible pumps again. What kinds of regulations are important to remember during installation?

Listening

6 Listen to a conversation between a homeowner and an electrician. Mark the following statements as true (T) or false (F).

- ___ The well will be 140 ft away from the house.
- ___ Three-wire pumps are easier to install than two-wire pumps.
- ___ Regulations state that the pump must be grounded.

7 Listen again and complete the conversation.

Homeowner: Okay. What about 1 _____
_____?

Electrician: A pump can be two-wire or three-wire. Those are the 2 _____.

Homeowner: What's the difference?

Electrician: Both work fine. But the 3 _____ - _____
_____ might be the best choice.

Homeowner: Why is that?

Electrician: Two-wire pumps are easier to install. They're also cheaper.

Homeowner: What kind of 4 _____ are there on this type of project?

Electrician: There are standard code requirements. The pump and well casing must be grounded. The well wiring must be suitable for 5 _____.

Homeowner: What about safety?

Electrician: A pressure switch is a necessary part of the installation. It will respond to regular amounts of pressure. But the starter will stop the pump if there's 6 _____.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

I want to ...

What's the difference?

What about ...

Student A: You are a homeowner. Talk to Student B about:

- where to install a submersible pump
- the difference between two pumps
- safety measures

Student B: You are an electrician. Talk to Student A about how a submersible pump is installed.

Writing

9 Use the conversation from Task 8 to write the electrician's work report. Write about:

- the location of the submersible pump
- the kind of pump chosen for installation
- safety measures taken

Get ready!

- 1 Before you read the passage, talk about these questions.
- 1 What effect do you think lightning has on electrical lines?
 - 2 What are some safety precautions that should be taken when working with items that have charge build up?

Reading

- 2 Read the pamphlet on induced voltage. Then, mark the following statements as true (T) or false (F).
- 1 ___ Lightning can be dangerous even from a distance.
 - 2 ___ A jumper is used to drain electric build up.
 - 3 ___ Grounding electrodes discharge electricity.

Vocabulary

- 3 Write a word that is similar in meaning to the underlined part.
- 1 The electrician was struck suddenly by the electric build up on the cable. _ _ p _ _ d
 - 2 The cable's metal device that is used to protect an object was rusty. _ h _ _ l _
 - 3 The electrical current went through the conductor of electricity and into the ground. _ _ _ c _ _ _ d _
 - 4 The lightning created imaginary lines that exist in a field of force during the storm. m _ _ n _ _ _ _ _ n _ e _ _ f _ _ r _ e
 - 5 A lightning bolt can relieve itself of electrical charge from cloud to cloud or from a cloud to the ground. _ _ s _ _ _ r _ _
- 4 Fill in the blanks with the correct words and phrases from the word bank.

word BANK

drained lightning induced voltage
surge charge build up jumper

- 1 The _____ strikes during the storm damaged the power lines.
- 2 The electrician used a(n) _____ to close the electrical circuit.
- 3 Do not touch the cable until the charge has been _____.
- 4 The _____ of static electricity can result in an electrical shock.
- 5 If two objects have a positive electrical _____, they will repel each other.
- 6 A _____ of electricity can damage electronic devices in the home.
- 7 _____ from far away lightning is a possible safety hazard when working outdoors.

Induced Voltage

Induced voltage is a concept that should be understood when working with charges. An example that best illustrates this is the effect of lightning. The magnetic lines of force from lightning are powerful from long distances. Although the lightning might be far away, caution must still be used. Touching buried cable, for example, can cause you to get zapped by electricity. There is a build up in the cable's metal shield. This creates a charge. When touched, it will discharge through a person and into the ground. The shield will not fully discharge until a jumper is used. It needs time in order to drain the static voltage build up. However, lightning can still rebuild the charge, even if it's far away. These lines of force are similar to those that occur at home. Installing surge protection at home will protect appliances and other items. A grounding electrode is something which is often used in these situations. Surge protection should be installed in two specific locations. The first is the point-of-entry, which is the main panel. The second is the point-of-use, which is where equipment is used. This precaution will help protect your home appliances should a surge occur.

- 5 Listen and read the pamphlet on induced voltage again. What happens if a person touches a cable with electrical build up?

Listening

- 6 Listen to a conversation between a student and an instructor. Choose the correct answers.

- 1 What is the purpose of the conversation?
A to clarify a topic previously discussed
B to define a vocabulary term
C to argue a difference of opinion
D to compare two concepts
- 2 What is the man confused about?
A how to use a jumper
B how lines of magnetic force work
C how lightning can produce charges
D how a charge discharges through a person

- 7 Listen again and complete the conversation.

Student: I'm still a little confused about the principle of 1 _____.

Instructor: Okay, what part is confusing you?

Student: I guess it's the whole concept of 2 _____
_____. Can you tell me how it works?

Instructor: Well, take lightning, for example. Even from 3 _____, the magnetic lines of force are dangerous.

Student: So, a charge could zap you even from far away?

Instructor: Exactly.

Student: But how does it happen?

Instructor: Let's say you're working with a buried 4 _____
_____. There's a thunderstorm far away from your location. Do you think you should work with the cable?

Student: No, not if lightning can 5 _____ from far away.

Instructor: That's right.

Student: What happens?

Instructor: There's a 6 _____ in the cable's metal shield. It creates a charge.

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

I'm still a little confused about ...

Well, take ..., for example.

Let's say you're working with ...

Student A: You are a student. Talk to Student B about:

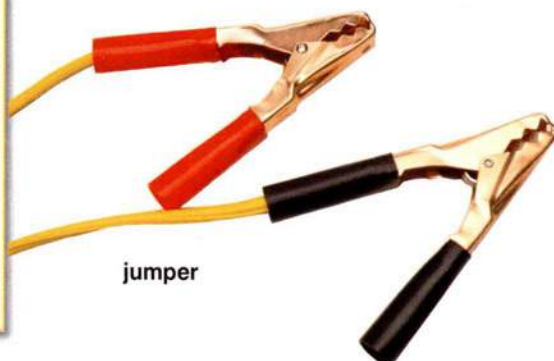
- what you are confused about
- how magnetic lines of force work
- how lightning can cause shocks from a distance

Student B: You are an instructor. Answer Student A's questions about induced voltage.

Writing

- 9 Use the conversation from Task 8 to write the student's notes. Write about:

- the topic of the discussion
- the concepts of the topic being discussed



Get ready!

1 Before you read the passage, talk about these questions.

- 1 What do grounding systems protect households from?
- 2 How can electricity from lightning strikes enter the home?

Reading

2 Read the trade magazine article on electrical build up. Then, mark the following statements as true (T) or false (F).

- 1 ___ Voltage spikes can enter a home through utility lines.
- 2 ___ Utility transformers and poles are used to keep the neutral grounded.
- 3 ___ A ground resistance reading of 0 ohms means there is no electrical pulse.

ELECTRICIAN'S WEEKLY

Direct Strike Damage

A **low-resistance grounding system** is a vital household component. Although rare, it is important to consider the danger of a **direct strike** from lightning. Direct strikes can cause serious damage to your property. Additionally, voltage **build up** can occur on household appliances and wires, causing serious damage. These **voltage spikes** can **endanger** objects and devices within the home. Surges are another threat to household appliances. They can enter through a **utility line** such as a telephone line. They have also been known to enter through power and **coaxial cables**. Also, a surge can occur when power utility providers work on their lines. Surges through these utility lines can cause **massive** amounts of damage. However, it is possible to limit surges from these lines. Clipping surges at their **peaks** and sending them to earth is effective. The neutral is grounded at different locations. The **utility transformer** and various poles serve to ground the neutral. However, this does not mean no **pulse** enters the home. It also does not mean there is no pulse at all. Many believe the pulse is zero because the **ground resistance** is 0 ohms. This **assumption** is incorrect. Despite what some think, there is no such thing as a perfect ground.



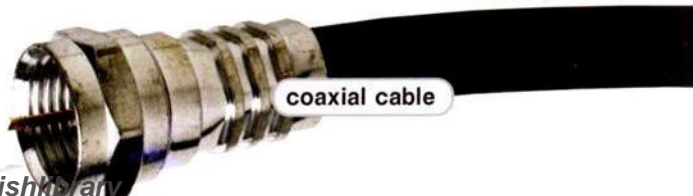
Vocabulary

3 Write a word that is similar in meaning to the underlined part.

- 1 The electrical cable with an inner conductor needs to be replaced for the Internet to work again. _ _ a _ _ l _ c _ b _ _
- 2 The electric company installed a device used to transfer electricity from one circuit to another. _ _ i _ _ t _ t _ _ _ f _ _ _ e _
- 3 Home electronics can be put at risk by power surges. _ _ d _ _ g _ _ _ _
- 4 Many homeowners make ideas that something is true with no proof about how electricity works. _ _ _ u _ _ t _ _ n _
- 5 The storm caused a very large power outage in the city. m _ _ _ i _ _
- 6 The wire that is provided by a utility company was damaged when the homeowner dug in the wrong spot. _ t _ _ i _ _ l _ _ e
- 7 The business installed a device that protects equipment from fault currents to protect their expensive electronics. _ _ w _ _ s _ _ t _ _ _ _
_ r _ _ _ d _ _ _ s _ _ t _ _

4 Read the sentence pair. Choose where the words best fit the blanks.

- 1 **build up / ground resistance**
A _____ of voltage can result in electrical shocks.
B The electrician used a tester to measure the _____.
- 2 **peak / voltage spike**
A The lightning caused a _____ to occur.
B The voltage reached its _____ of 169 volts.
- 3 **strike / pulse**
A The lightning _____ hit very close to the house.
B A strong electrical _____ caused a voltage spike.



- 5 🗣️ Listen and read the trade magazine article on electrical build up again. What can voltage build up do?

Listening

- 6 🗣️ Listen to a conversation between an electrician and a homeowner. Choose the correct answers.

- 1 What is the conversation mostly about?
- A the different types of surge protection
 - B the effect direct strikes have on homes
 - C the ways to prevent damage from direct strikes
 - D the costs of a low resistance grounding system
- 2 What will the man likely do next?
- A install a low resistance grounding system
 - B inspect the utility lines for proper grounding
 - C fix the electrical damage to the appliances
 - D talk about ways to prevent electrical damage

- 7 🗣️ Listen again and complete the conversation.

- Homeowner:** I'm concerned about another 1 _____ affecting my home.
- Electrician:** Well, the first step is to properly protect it.
- Homeowner:** How can I make sure my home isn't 2 _____ the next time?
- Electrician:** There are a few options. First, it is important that everything is connected to a 3 _____.
- Homeowner:** What does that do?
- Electrician:** Basically, it takes a current away from your home and puts it 4 _____.
- Homeowner:** So my appliances won't get 5 _____ like they just did?
- Electrician:** That's right.
- Homeowner:** What else can be done?
- Electrician:** We could try to stop the surges from coming through the 6 _____.

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

I'm concerned about ...

How can I make sure ...

First, it is important that ...

Student A: You are a homeowner. Talk to Student B about:

- how to prevent damage from direct strikes
- how grounding systems work
- other options for protecting your home from electrical surges

Student B: You are an electrician. Talk to Student A about what he or she can do to protect his or her home.

Writing

- 9 Use the conversation from Task 8 to write the electrician's notes. Write about:

- what problem the customer has
- why you recommend a grounding system
- other possible solutions



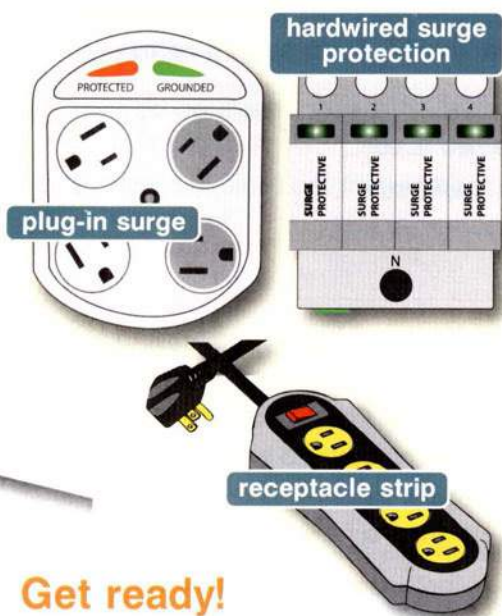
HOME

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SERVICES

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www.surgesavers.com



Surge Savers

grounding block

Our **surge protectors** devices are some of the best on the market. We have devices for the major types of protection against surges. All our products are now **accessible** through our online catalog.

Point-of-entry protection will defend your home against surges. Without it, a single voltage spike can affect everything in your home. There are two specific types: **plug-in surge protection** and **hardwired surge protection**. Plug-in surge protection is the easiest to install. Also, it is usually the best option. Plug-in surge protection uses a **surge breaker** that installs in your service panel. You only need to deal with one wire. Hardwired surge protection involves stripped wires that connect into a device. It is either encased in a metal box or bare.

Point-of-use protection is considered the second stage of surge protection. It protects more sensitive appliances such as computers and fax machines. This type of protection comes on a **receptacle strip** with a long cord. There are common issues associated with point-of-use protection. A **ground skew** is a **recurring** problem. Phone and coaxial cable protection is also important. The **network interface device (NID)** is mounted on the **siding** of the home. It provides surge protection and is also an interface point. It should be noted that a **grounding block** is not entirely necessary.

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some different types of surge protection?
- 2 Where are some places where surge protection should be used?

Reading

2 Read the company webpage about surge protectors. Then, choose the correct answers.

- 1 Which of the following is NOT a type of surge protection?
 - A network interface device
 - B surge breaker
 - C receptacle strip
 - D ground skew
- 2 What is the difference between plug-in and hardwired surge protectors?
 - A Hardwired surge protectors have interface points.
 - B Plug-in surge protectors offer point-of-use protection.
 - C Hardwired surge protectors have multiple wires.
 - D Plug-in surge protectors require grounding blocks.

Vocabulary

3 Match the words (1-8) with the definitions (A-H).

- | | | | |
|---|-------------------|---|-------------------|
| 1 | — surge protector | 5 | — point of use |
| 2 | — ground skew | 6 | — point of entry |
| 3 | — recur | 7 | — grounding block |
| 4 | — siding | 8 | — surge breaker |

- A a device that prevents massive electrical surges coming through a utility line
- B a device used to connect two coaxial cables to the earth
- C a stage of surge protection that occurs at the place electronics are used
- D an appliance that protects a device from voltage spikes
- E an event caused when connected appliances are plugged into different circuits
- F a stage of surge protection that occurs where electricity enters a building
- G boards or shingles that are used as surface material
- H to happen again several times

4 Write a word that is similar in meaning to the underlined part.

- The device where the cables for the telephone are located was installed yesterday.
_ e _ _ _ _ k _ n _ _ _ f _ _ _ _ v _ c _ _
- The surge protector that is located on the service panel was installed quickly. _ l _ _ _ _ n s _ _ g _ _ _ o _ _ c _ _ _ _
- A device that prevents massive surges from coming in through the utility line would have saved the electronics from shorting out. _ u _ _ e b _ _ _ k _ _
- Janet bought a unit that has plug in outlets and contains surge protection circuits to protect her TV and DVD player from surges. _ _ c _ _ t _ _ _ _ _ t _ _ p
- The surge protection with wires that are stripped and connected to a device was installed next to the main panel.
_ _ r _ _ _ _ e _ _ u _ g _ p _ _ _ _ c _ _ _

5 Listen and read the company webpage about surge protectors again. What is the second stage of surge protection?

Listening

6 Listen to a conversation between a customer and a salesperson. Mark the following statements as true (T) or false (F).

- The man only wants point-of-entry protection.
- The woman suggests hardwired protection.
- The man is going to buy a surge breaker.

7 Listen again and complete the conversation.

- C: I'm going to install some 1 _____ in my home. I'm looking to buy some equipment for the installation.
- S: What 2 _____ do you need? Is it tools you're looking for?
- C: No, I'm sorry, that's not what I meant. I need the proper devices for surge protection.
- S: What type of installation is it? 3 _____ or point-of-entry?
- C: 4 _____, _____. But I'm going to start with the point-of-entry installation.
- S: Okay. So, you'll be starting with the 5 _____.
- C: Yes, that's right.
- S: Do you want to use plug-in protection or 6 _____ protection?
- C: Is plug-in protection the type that's easier to install?
- S: Yes, it is.

Speaking

8 With a partner, act out the roles below based on Task 7. Then switch roles.

USE LANGUAGE SUCH AS:

What type of ...

What type are you ...

Do you want to use ... or ...

Student A: You are a salesperson. Talk to Student B about:

- what he or she is looking for
- what kind of surge protection installation he or she wants
- whether he or she wants plug-in or hardwired protection

Student B: You are a customer. Talk to Student A about what kind of surge protection you should buy.

Writing

9 Use the conversation from Task 8 to complete the customer feedback form.

Customer Feedback Form

Salesperson's Name: _____

Item(s) Needed: _____

Was the salesperson knowledgeable about the products?

Glossary

- accessible** [ADJ-U15] If something is **accessible**, it can be used or reached with ease.
- accurate** [ADJ-U4] If a piece of information is **accurate**, it is correct.
- adjacent** [ADJ-U9] If something is **adjacent** to a particular object, it means it is near or close to it.
- air gap** [N-COUNT-U10] An **air gap** is the space between a heater and the wall through which air can flow.
- air handler** [N-COUNT-U11] An **air handler** is a device that has a blower as well as heating and cooling parts. It controls how much air is sent out in an air conditioner or heater.
- anticorrosion** [ADJ-U8] If something is **anticorrosion**, it protects a metal surface from breaking down due to chemical processes.
- appliance** [N-COUNT-U9] An **appliance** is a device that performs a specific task. It is usually for household use.
- arc fault** [N-COUNT-U5] An **arc fault** is an electrical surge or interruption that can cause fires.
- assumption** [N-COUNT-U14] An **assumption** is something you think is probably true even though there is no proof that it is.
- attach** [V-T-U3] To **attach** something is to join it to something else.
- ballast** [N-COUNT-U6] A **ballast** controls the voltage of electrical gas discharge lights (such as fluorescent lights).
- bare** [ADJ-U6] If an object is **bare**, it is not covered and is open to view.
- base depth** [N-UNCOUNT-U6] **Base depth** is the amount of depth that must be allowed when installing a fixture in a ceiling. It is an important part of the measurements for an installation.
- baseboard heater** [N-COUNT-U10] A **baseboard heater** is a heating system located around the perimeter of a room above the lowest part of the walls.
- build up** [N-COUNT-U13] A **build up** is a steady increase in the amount or level of something.
- build up** [N-UNCOUNT-U14] **Build up** refers to an increase in material or an accumulation of material.
- bulb** [N-COUNT-U6] A **bulb** is an electric device that gets hot and gives off light when electricity passes through it.
- burn out** [V PHRASE-I-U8] To **burn out** is to stop functioning.
- buzz** [V-I-U6] To **buzz** is to emit a type of low, vibrating, humming sound.
- care** [N-UNCOUNT-U3] The **care** of a device or object is the equipment needed or actions required to keep it in working order.
- ceiling box** [N-COUNT-U6] A **ceiling box** is used to anchor light fixtures. It serves as a junction box where the fixture's wires meet.
- ceiling fan** [N-COUNT-U7] A **ceiling fan** is a device with rotating blades that is attached to a ceiling and is used to move air around a room.
- charge** [N-COUNT-U13] A **charge** is the amount of stored electricity an object holds.
- circuit breaker ground fault circuit interrupter** [N-COUNT-U2] A **circuit breaker ground fault circuit interrupter** protects against a ground fault and a circuit overload.
- circulate** [V-T-U7] To **circulate** something is to move something continuously throughout a space.
- clearance** [N-UNCOUNT-U7] **Clearance** is the amount of space in which something can move without touching something else.
- coaxial cable** [N-COUNT-U14] A **coaxial cable** is an electrical cable with an inner conductor. It is used for radios, cable TV signals, and Internet connections.
- coil** [N-COUNT-U3] A GFCI **coil** is a transformer that sends a warning signal when the sensor detects a change in the electrical current.
- compare** [V-T-U1] To **compare** is to examine two or more items (objects, people, ideas) so that similarities and differences can be noted.
- condensation** [N-UNCOUNT-U12] **Condensation** is the process by which something turns from a gaseous state to a liquid one.
- configuration** [N-UNCOUNT-U2] **Configuration** is the arrangement of the parts of an object.
- consumption** [N-UNCOUNT-U10] **Consumption** is the act of making use of or consuming a resource.

convenient [ADJ-U2] If something is **convenient**, it is suitable or well-suited for a particular purpose.

cord connected ground fault circuit interrupter [N-COUNT-U2] A **cord connected ground fault circuit interrupter** is a GFCI combined with an extension cord. It is useful for receptacles that do not have the protection of a GFCI.

corrode [V-T-U6] To **corrode** metal is for a chemical reaction to take place that slowly destroys the metal.

corrugated duct [N-COUNT-U11] A **corrugated duct** is a flexible duct that has a shape consisting of ridges and grooves.

coverplate [N-COUNT-U10] A **coverplate** is a piece of metal that covers the elements in a heating unit.

coverage [N-UNCOUNT-U8] **Coverage** is the amount of an area that is reached or covered by something.

cross support [N-COUNT-U7] A **cross support** is a solid beam that forms part of the structure of a ceiling.

cutoff switch [N-COUNT-U11] A **cutoff switch** is a mechanism that is used to completely shut down or disable a device.

depth [N-UNCOUNT-U12] **Depth** refers to the dimension an object takes. It is usually downward from an upper surface.

derate [V-I-U9] If electrical devices **derate**, then the power rating of those devices is reduced.

diagnose [V-T-U4] To **diagnose** an electrical problem is to discover what kind of problem it is by inspecting it.

digital [ADJ-U10] If something is **digital**, it displays data in the form of numbers.

direct burial [N-UNCOUNT-U12] **Direct burial** refers to a cable or wire that is installed directly in the earth.

discharge [V-I-U13] To **discharge** means to relieve an object of a charge.

disconnect [N-COUNT-U11] A **disconnect** is an act of disconnecting an object by mechanical means.

dishwasher [N-COUNT-U9] A **dishwasher** is a machine that is used for washing kitchen dishes and utensils automatically.

downstream [ADV-U1] If something is **downstream**, it is in the latter part of a system or process.

drain [V-T-U13] To **drain** means to withdraw a substance gradually.

drop-in [ADJ-U9] If an object is described as being **drop-in**, it is ready for use and only needs to be lifted and placed in an opening.

dry board [N-COUNT-U1] A **dry board** is a white, glossy surface that is used for making non-permanent markings.

dual pin bulb [N-COUNT-U6] A **dual pin bulb** for fluorescent bulbs has two pins on each side that allows electricity to power the light.

dusk-to-dawn light [N-COUNT-U8] A **dusk-to-dawn light** is a light that automatically turns on when it senses darkness and turns off when it senses sunlight.

electric clothes dryer [N-COUNT-U11] An **electric clothes dryer** is an appliance that removes moisture from a load of clothing using electricity to generate heat.

electric stove [N-COUNT-U9] An **electric stove** uses electricity to produce heat for cooking and baking.

electric wall heater [N-COUNT-U10] An **electric wall heater** is a heating unit in the wall which usually uses a fan to make hot air flow through a room.

electrode [N-COUNT-U13] An **electrode** is a conductor. A current goes through it in order to enter or leave a non-metallic object.

enclosed [ADJ-U6] If an object is **enclosed**, it is surrounded or closed in on all sides.

endanger [V-T-U14] To **endanger** means to create a dangerous situation or put something at risk.

entry light [N-COUNT-U8] An **entry light** is a light that illuminates an area outside a door or along a path to a door.

erratic [ADJ-U5] If something is **erratic**, it is irregular or unpredictable in the way it moves.

exceed [V-T-U1] To **exceed** is to go beyond in quantity or quality.

exemption [N-COUNT-U5] An **exemption** is the state of being excused from something that most people must do.

exposed [ADJ-U8] If something is **exposed** it is visible or unprotected.

fault [N-COUNT-U4] A **fault** is an irregular electrical current.

feature [N-COUNT-U3] A **feature** is a part of something that is important.

feed [N-COUNT-U10] A **feed** is a wire that gives or passes electricity to a heating system.

feed wire [N-COUNT-U11] A **feed wire** is a wire that brings a current to a device.

Glossary

- fine print** [N-UNCOUNT-U5] **Fine print** is the small writing containing important information that is often found at the bottom of documents.
- floodlight** [N-COUNT-U8] A **floodlight** is a very bright light that illuminates a wide area.
- flow out** [V PHRASE-I-U1] To **flow out** means to come out of something, like a liquid.
- fluorescent** [ADJ-U6] If a light fixture is **fluorescent**, it emits light through exposure to radiation from an external source.
- follow** [V-T-U7] To **follow** something is to act in accordance or agreement with something.
- four-conductor cable** [N-COUNT-U11] A **four-conductor cable** has four insulated hot wires as well as a ground.
- frame screw** [N-COUNT-U9] A **frame screw** is used to fasten metal studs to a track.
- garbage disposal** [N-COUNT-U9] A **garbage disposal** is a type of kitchen appliance that is used for disposing of garbage. It is an electric device that is usually installed under a kitchen sink.
- general-purpose** [ADJ-U1] If something is **general-purpose**, it can be used in many ways and is not restricted to one function.
- GFCI tester** [N-COUNT-U4] A **GFCI tester** is a device used to test the flow of electricity through circuits.
- give out** [V PHRASE-U4] To **give out** is to quit or shut off.
- go with** [V PHRASE-U2] To **go with** is to choose.
- ground fault circuit interrupter (GFCI)** [N-COUNT-U1] A **ground fault circuit interrupter (GFCI)** is a circuit breaker that is fast-acting. If it senses an imbalance in an electrical current, it shuts off the electricity immediately.
- ground resistance** [N-UNCOUNT-U14] **Ground resistance** is the opposition of the earth to the current that flows through it.
- ground skew** [N-COUNT-U15] A **ground skew** occurs when interconnected appliances are plugged into different circuits. In this situation, the appliances might not work properly at all times.
- grounding block** [N-COUNT-U15] A **grounding block** is a device used to connect two coaxial cables to the earth. It helps to prevent surges.
- hardwired** [ADJ-U9] If something is **hardwired**, it usually comes directly from a source and cannot be modified.
- hardwired surge protection** [N-UNCOUNT-U15] **Hardwired surge protection** is a type of protection with wires that are stripped and connected into a device. Some are encased in a metal box.
- heat pump** [N-COUNT-U11] A **heat pump** takes lower temperature heat from one location and moves it to another location at a higher temperature.
- high output bulb** [N-COUNT-U6] A **high output bulb** is a type of bulb that produces brighter light due to high wattage.
- horsepower** [N-UNCOUNT-U12] **Horsepower** is a measure of how powerful an electrical device is.
- imbalance** [N-COUNT-U3] An **imbalance** occurs when there is more electric current going out of the device than there is coming back in.
- incandescent** [ADJ-U6] If a light fixture is **incandescent**, it emits light when it is heated.
- independently** [ADV-U7] If something exists **independently**, it does not rely on other things in order to function.
- indicate** [V-T-U4] To **indicate** is to point toward or specify something.
- induced voltage** [N-UNCOUNT-U13] **Induced voltage** is voltage that is generated in a conductor when it has been subjected to a moving magnetic field.
- insulated crimp** [N-COUNT-U12] An **insulated crimp** is a type of wire that has been joined through heating.
- integral thermostat** [N-COUNT-U10] An **integral thermostat** is a power-saving device which automatically turns the heater on and off when necessary.
- interrupt** [V-T-U4] To **interrupt** an electrical current is to change or stop it.
- joist** [N-COUNT-U6] A **joist** is a beam made of wood, steel, or concrete. It is set parallel from wall to wall to support a ceiling or a floor.
- jumper** [N-COUNT-U13] A **jumper** is a short length of conductor. It is used to make a temporary connection between the terminals of a circuit or to completely bypass a circuit.

landscape light [N-COUNT-U8] A **landscape light** is a low-voltage light that illuminates an outdoor area, usually in a manner that is visually appealing.

last resort [N PHRASE-U2] A **last resort** is a solution to be used after all others have been rejected or have failed.

leakage [N-UNCOUNT-U5] **Leakage** is the escape of electricity from an electrical system.

light fixture [N-COUNT-U6] A **light fixture** is a lighting unit that has one or more lamps, a socket, and various other parts that hold it in place.

lightning [N-UNCOUNT-U13] **Lightning** is an electric spark discharge that occurs in the atmosphere. It can occur within a cloud, between clouds, or between a cloud and the ground.

line connection [N-COUNT-U3] A **line connection** links wires to the electric panel and is the connection that provides the power.

load connection [N-COUNT-U3] A **load connection** links the object using electricity to the outlet and is the connection that uses the power.

low-resistance grounding system [N-COUNT-U14] A **low-resistance grounding system** protects a device such as a power transformer or generator from fault currents.

magnetic line of force [N-COUNT-U13] A **magnetic line of force** is an imaginary line that exists in a field of force. The direction of the line at any point represents the direction of the force at that point.

manufacturer [N-COUNT-U2] A **manufacturer** can be a person, a group of people, or a company that make or produce particular things.

marking [N-COUNT-U5] A **marking** is a mark or symbol that identifies an object.

massive [ADJ-U14] If something is **massive**, it is very large in size.

max out [N-COUNT-U2] A **max out** is when the limit of a certain capacity is reached.

mild [ADJ-U1] If a substance is **mild**, it is not severe or extreme.

mix up [V PHRASE-U5] To **mix up** something is to confuse it with something else.

monitor [V-T-U5] To **monitor** something is to check or watch it to find out what is happening.

motion detector [N-COUNT-U8] A **motion detector** is a device that activates a light when it senses movement.

nameplate rating [N-COUNT-U9] **Nameplate rating** refers to the maximum operating rating that has been applied to a piece of electrical equipment by the manufacturer. This includes amps, volts, and other specifications.

national electrical code [N PHRASE-U5] The **national electrical code** is a set of rules for how to install electrical equipment.

network interface device (NID) [N-COUNT-U15] A **network interface device (NID)** is mounted on the side of a house. It is where the cables for the telephone go in and the wire for the house telephone goes out.

nonconductive [ADJ-U1] If an object is **nonconductive**, it does not have the capability of conducting.

on site [ADV PHRASE-U6] If a work project is **on site**, it takes place on the site or is located at the site.

outgoing [ADJ-U3] If a wire or current is **outgoing**, it is going away from the source that created or contains it.

peak [N-COUNT-U14] A **peak** is the time when something is at its highest level.

photoelectric cell [N-COUNT-U8] A **photoelectric cell** is a sensor that measures the amount of light in a particular area.

plug-in surge protection [N-UNCOUNT-U15] **Plug-in surge protection** covers those surge protectors that are simply pushed into place on the service panel.

point-of-entry [ADJ-U15] If something is **point-of-entry** it is the first stage of surge protection that occurs where electricity enters a building. A point-of-entry protection system stops voltage spikes from affecting an entire house.

point-of-use [ADJ-U15] If something is **point-of-use** it is a stage of surge protection that occurs at the place electronics are used. It provides protection for more sensitive components such as home electronics, personal computers, fax machines, and other appliances.

pool [V-I-U12] To **pool** means to bring together in one place.

portable ground fault circuit interrupter [N-COUNT-U2] A **portable ground fault circuit interrupter** is used when it is not practical to install a GFCI. It contains circuitry in a plastic enclosure. It also has receptacle slots in the front and plug blades in the back.

Glossary

- pressure switch** [N-COUNT-U12] A **pressure switch** is a type of safety device. It is activated by specific amounts of pressure.
- primary** [ADJ-U5] If something is **primary**, it is first in level or importance.
- probe** [N-COUNT-U3] A **probe** is a piece of equipment used for getting information about something.
- procure** [V-T-U2] To **procure** something is to get it from someone or someplace.
- prong** [N-COUNT-U1] A **prong** is something that is pointed and projected.
- provide** [V-T-U3] To **provide** is to give or supply something.
- pulse** [N-COUNT-U14] A **pulse** is a series of disturbances in voltage or current. It usually occurs at regular intervals.
- pump wire** [N-UNCOUNT-U12] **Pump wire** is a type of wire that can be used under water.
- range hood** [N-COUNT-U9] A **range hood** is an exhaust hood that is located over a kitchen range hood. It leads to a vent that exhausts unwanted fumes.
- receptacle ground fault circuit interrupter** [N-COUNT-U2] A **receptacle ground fault circuit interrupter** combines a single GFCI device within one or more receptacle outlets. A receptacle type fits into a standard outlet box.
- receptacle strip** [N-COUNT-U15] A **receptacle strip** is a unit that has plug-in outlets and contains surge protection circuits.
- recur** [V-I-U15] To **recur** means that something happens again.
- reference** [N-COUNT-U3] A **reference** is a guide someone goes to when they need help with a particular task.
- refrigerator** [N-COUNT-U9] A **refrigerator** is an electrical kitchen appliance which keeps food and drink stored in it cool.
- reliable** [ADJ-U1] If something is **reliable**, it can be trusted to do what it is expected to do.
- rely on** [V PHRASE-U4] To **rely on** someone or something is to depend on that person or thing.
- remote control** [N-COUNT-U7] A **remote control** is a device that is used to control a machine or electronic equipment at a distance.
- renovate** [V-T-U2] To **renovate** something is to make it look new again by repairing or improving it.
- reset** [ADJ-U2] **Reset** refers to a device's ability to have its settings changed by using a control mechanism so that it is ready to be used again.
- respective** [ADJ-U5] If two things belong to **respective** categories, they belong to two particular and different categories.
- response time** [N-COUNT-U10] A **response time** is the amount of time it takes a heater to heat up after it is turned on.
- reverse** [V-T-U3] To **reverse** is to change the usual order of the parts of something.
- rigid duct** [N-COUNT-U11] A **rigid duct** is a type of duct that allows for thermal insulation and noise absorption. It is smooth-walled.
- security** [N-UNCOUNT-U8] **Security** is the condition of being protected from danger.
- sense** [V-T-U5] To **sense** is to feel or detect by the use of the senses.
- sensitivity** [N-UNCOUNT-U8] **Sensitivity** is the level of ability to measure the changes or qualities of something.
- sensor** [N-COUNT-U3] A **sensor** is an object that distinguishes changes in its environment.
- shield** [N-COUNT-U13] A **shield** is a device that is used to protect a person or an object.
- short out** [V PHRASE-U10] To **short out** is to make a wire or electrical device have a short circuit.
- siding** [N-UNCOUNT-U15] **Siding** is boards or shingles that are used as surface material for the outside of a building.
- single pin bulb** [N-COUNT-U6] A **single pin bulb** for fluorescent bulbs has one pin on each side that allows electricity to power the bulb.
- slant** [N-COUNT-U8] A **slant** is the angle of a surface that is not straight up and down or side to side.
- slide-in** [ADJ-U9] If an object is described as being **slide-in**, it is ready for use and only needs to be pushed into place.
- socket** [N-COUNT-U6] A **socket** supports a light fixture and allows it to connect with an electrical current.
- stable** [ADJ-U7] If something is **stable**, it stays securely in one place and cannot be moved easily.
- standard** [ADJ-U2] If something is **standard**, it is regarded as being common or customary.
- sticker** [N-COUNT-U3] A **sticker** is a paper with one adhesive side that clings to another surface.

strain relief [N-COUNT-U9] A **strain relief** refers to a device that is attached to an electrical cord. It reduces the amount of strain on the cord.

strike [N-COUNT-U14] A **strike** is the act or instance of hitting something. A lightning strike is when lightning hits an object or person.

submersible pump [N-COUNT-U12] A **submersible pump** is a type of pump that is cased in a protective housing along with its electric motor. The casing allows the unit to be used under water.

surge [ADJ-U13] If something **surges** it moves strongly, in a wavelike forward motion.

surge breaker [N-COUNT-U15] A **surge breaker** is installed in the main service panel and serves to prevent massive surges from coming in through the utility line.

surge protector [N-COUNT-U15] A **surge protector** is an appliance that protects a device from voltage spikes. It regulates the voltage supplied to that device.

sustain [V-T-U5] To **sustain** is to continue to maintain something or keep it working.

swing-up [ADJ-U7] If a fan is **swing-up**, it can be hung at an angle during wiring and then swung into place to complete installation.

terminal [N-COUNT-U3] A **terminal** is the place used to connect two or more wires.

test button [N-COUNT-U4] A **test button** is a button that you can push in order to test or check whether a device is working.

throw [V-T-U4] To **throw** is to move a switch in order to turn something on or off.

unintentional [ADJ-U5] If something is **unintentional**, it is not done on purpose.

utility line [N-COUNT-U14] A **utility line** is a wire that is provided and owned by a utility company. It carries a power supply.

utility transformer [N-COUNT-U14] A **utility transformer** is a device used to transfer electric energy from one circuit to another and causes change in voltage or currents.

variable-speed [ADJ-U7] If something is **variable-speed**, it has settings that allow a user to operate it faster or more slowly.

variable-wattage unit [N-COUNT-U10] A **variable-wattage unit** is a heating system that can vary the amount of wattage it uses and is ideal for huge rooms or whole houses.

vent run [N-COUNT-U11] A **vent run** connects an electric clothes dryer to the outside ventilation system.

verify [V-T-U4] To **verify** is to test or check something to make sure that it is correct.

vertical [ADJ-U1] If something is **vertical**, it is upright or running lengthwise up and down.

via [PREP-U1] **Via** means to do something by way of a particular route.

voltage spike [N-COUNT-U14] A **voltage spike** is a sudden increase of voltage. It can cause serious damage to electronic circuits.

wall thermostat [N-COUNT-U10] A **wall thermostat** is a unit on the wall that allows homeowners to read and adjust the temperature of a heating system.

water heater [N-COUNT-U11] A **water heater** generates heat by heating incoming cold water from a water main or well.

watertight [ADJ-U8] If something is **watertight**, water cannot pass through it.

well [N-COUNT-U12] A **well** is a hole that is bored or drilled into the earth in order to obtain a substance such as water or oil.

well cap [N-COUNT-U12] A **well cap** is installed on the top of a well casing. It prevents solid material and insects from getting in the well.

well casing [N-COUNT-U12] A **well casing** is a tube-shaped lining of a well that is either bored or drilled.

whip [N-COUNT-U9] A **whip** is found in drop-in types of range hoods and electric stoves. It is a pigtail of wires that hangs from the unit.

wobble [V-I-U7] To **wobble** is to move back and forth unsteadily.

zap [V-T-U13] To **zap** means to strike suddenly or instantly.



Electrician

Career Paths: Electrician is a new educational resource for electrical professionals who want to improve their English communication in a work environment. Incorporating career-specific vocabulary and contexts, each unit offers step-by-step instruction that immerses students in the four key language components: reading, listening, speaking, and writing. **Career Paths: Electrician** addresses topics including electrical concepts, types of wires, electrical service entrances, installing appliances, and wire codes.

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