



## **Measuring Up to the Ohio Learning Standards**

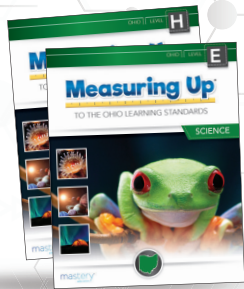
for science meets the needs of the OH State Test. The instructional worktexts promote the analysis and interpretation of data, critical thinking, problem solving, and connecting science curriculum to other subject areas.

Lessons feature:

- 100% coverage of Ohio Learning Standards content.
- Lesson goals that outline what students will learn, connecting prior knowledge to scientific concepts.
- Independent practice with items that meet the rigor of the Ohio State Test.
- Building Stamina unit tests that check for student understanding.
- Hands-on activities, experiments, and investigations.



Available for grades 5 and 8



# WHAT YOU'LL SEE IN EACH LESSON

## WORDS TO KNOW:

Vocabulary students will encounter is listed and defined in context.

## THE BIG IDEA:

Lesson objectives set the stage for what students will learn.

## WHAT I NEED TO KNOW:

Quickly highlights and reviews the lesson concept.

## WHAT I HAVE LEARNED:

Offers independent practice with item types that meet the rigor of the Ohio State Test.

UNIT 1

WORDS TO KNOW  
circuit  
electric current

### Lesson 3

HOW DOES AN ELECTRIC CURRENT TRANSFER ENERGY?

#### THE BIG IDEA

- Energy can be transferred from place to place by electric currents.

#### WHAT I NEED TO KNOW

**TURN AND TALK**  
What are examples of electrical energy that you encounter every day? Discuss with a partner how a day without electricity would affect you.

What would you do if you had no electricity for a day? You may not think about it all of the time, but you use electricity in many ways. Electricity is so important because it transfers energy into many things we use.

Electricity transfers by traveling along wires in closed circuits as electric currents. A circuit is a path that ends in the same place it begins, like a circle. A circuit often has a switch that, when turned off, stops the flow of electricity. An electric current is the movement of electric charges. A current links different types of energy together. For example, when electricity travels along a circuit to power a light bulb, the electric energy becomes light energy.

**Simple Electric Circuit**

switch  
battery  
light bulb  
wire

An electric circuit works to transform to many other types of energy. Electricity interacts with a motor in a fan to become motion. Electricity interacts with a stereo to become sound. Electricity interacts with a heating element in a space heater to become heat. Electricity interacts with the digital display of a clock to become light you can see.

The energy in an electric circuit comes from places that generate electricity. Electrical currents can start as chemical, light, or mechanical energy. A generator is a machine that makes electrical energy. A hydroelectric generator takes energy from moving water and turns it into an electric current. A windmill works in a similar way, but it converts the energy in wind into electricity. Other generators take energy from coal or nuclear energy. A battery stores chemical energy that can be converted into an electric current.

You can know that electricity is present when it is doing work. For example, when you flip a light switch the room lights up. Flipping the switch allows the electric current in the circuit to go to the light bulb and shows a transfer of energy from the generator to the lightbulb.

#### THINK ABOUT IT

How does electricity produce other types of energy, such as light, sound, heat, and motion?

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Lesson 3 HOW DOES AN ELECTRIC CURRENT TRANSFER ENERGY?

#### WHAT I HAVE LEARNED

1. What is an electric current?  
 A The work done by electricity  
 B The movement of electric charge  
 C The path on which electric charges travel  
 D The conversion of electricity to movement

**HINT, HINT**  
Which example involves a source of light?

2. Which of these is an example of electricity generated by light?  
 A A pot of boiling water  
 B A solar panel on a rooftop  
 C A heating pad plugged into the wall  
 D A dam that is holding back a lot of water

**SKETCH IT**  
Try to draw a circuit with the lightbulb off and the lightbulb on. What does the switch look like in each sketch?

3. How does moving a switch turn the lights on in a room?  
 A It releases heat that emits light.  
 B It transforms mechanical energy.  
 C It makes electricity that travels the circuit.  
 D It permits electricity to flow in a complete circle.

4. A coal plant generates electricity for a house. Which example provides evidence that energy from coal can be converted to sound energy?  
 A A book falls off a table with a bang.  
 B A faucet makes noise when it is on.  
 C A piano produces music when played.  
 D A television set plays the soundtrack of a movie.

5. Which example provides evidence that energy of motion can be converted to electricity?  
 A A remote control turns on a television.  
 B The reflectors on a bicycle light up when turning.  
 C A hot tub makes bubbles when the jets are turned on.  
 D Water moving through a dam lights up a town downstream.

**HINT, HINT**  
How can generators produce electricity?

6. What happens when a generator is in use?  
 A Fuel is burned.  
 B Water flows up hill.  
 C Light moves in a circle.  
 D Electricity moves in a circuit.

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## TEACHER EDITION

The **Teacher Edition** includes support for:

- performance expectations
- disciplinary core ideas
- cross cutting concepts
- prerequisite knowledge and standards
- misconceptions
- working with struggling, advanced, and English language learners

Full-length, grade-level practice tests built to the Ohio Learning Standards.

Lesson 3 HOW DOES AN ELECTRIC CURRENT TRANSFER ENERGY?

### TEACHER NOTES

**TIPS FOR THE STRUGGLING LEARNER**

- Although most students will struggle with the effects of electricity they may not realize that electricity works in physical paths. Have students identify uses of electricity in the classroom. As a class, draw a rough sketch of the electrical circuit, and have students describe the function of each device in the circuit. Then, have students draw a simple circuit to show how a light or appliance is connected to the circuit.

**TIPS FOR THE ENGLISH LANGUAGE LEARNER**

- Some English language learners may struggle with the terms of the components of the electrical circuit. As a parallel, introduce the simple language words that they may encounter in the lesson (generator, switch, wire, light bulb). Have students build a simple circuit and have them describe the circuit in both English and their student's home language.

**ACTIVITIES FOR THE ADVANCED LEARNER**

### TEACHER NOTES

**STANDARDS PS.5.4**

**The Big Idea**  
Energy can be transferred from place to place by electric currents.

**Prerequisite Knowledge & Standards**

LESS 1.1 The sun is the principal source of energy.  
 2.PS.1 Forces change the motion of an object.  
 2.PS.1.1 Motion can increase, change direction or stop depending on the forces applied.  
 2.PS.1.2 The change in motion of an object is related to the size of the force.  
 3.PS.1.3 There are many different forms of energy. Energy is the ability to cause motion or create change.  
 4.PS.1.2 Energy can be transferred from one form to another or can be transferred from one location to another.  
 4.PS.1.3 Energy transfers from hot objects to cold objects as heat, resulting in a temperature change.  
 4.PS.1.3.1 Electric circuits require a complete loop of conducting materials through which an electrical current can be transferred.

**ELA Connection**

W.5.7 Conduct short research projects that are several sources to build knowledge through investigation of different aspects of a topic.  
 W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources, summarize or paraphrase information in notes and finished work, and provide a list of sources.

**Misconceptions**

- Electric circuits such as batteries transfer energy all the time, even when there is not a complete circuit. (1)
- Batteries have electricity inside them. (2)
- Energy "uses up" energy. (2)
- Energy is confined to some particular origin, such as what we get from food or what the electric company sells. (2)
- Energy is only lost in many energy transformations. (2)

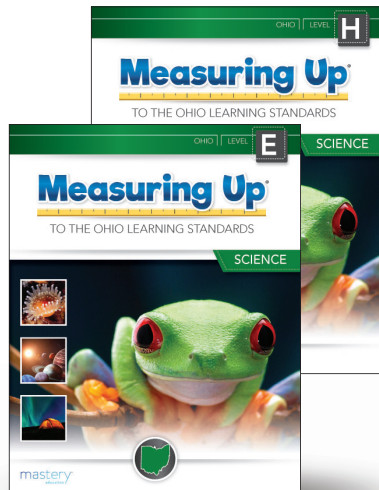
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# Measuring Up<sup>®</sup>

## Science

Quick, yet comprehensive  
Ohio Learning Standards  
science coverage



Grades 5 and 8

### Lessons feature:

- Comprehensive OH Standards science content with independent practice items that meet the rigor of the OH State Test.
- Building Stamina unit tests that check for student understanding.
- Hands-on activities, experiments, and investigations.

Each grade level covers a wide variety of scientific concepts including life, earth, and physical science.

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- Energy in Waves
- Mechanisms of Diversity
- Changing Earth

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