



Battle Creek Area Mathematics and Science Center Summative Assessment - End of Unit Exam

Attached is the Summative Assessment for the Battle Creek Area Mathematics and Science Center Science Unit, *Energy Transfer*. This assessment includes a number of multiple-choice questions, one constructed response question, and several items from the unit's Student Journal. Summative assessment of targeted concepts and skills provides feedback to the individual student and the teacher on conceptual understanding, demonstration of achievement of selected content, and determination of readiness for refinement and application of new knowledge and skills. The inclusion of the Student Journal items provides the opportunity to determine the level of understanding and ability of key knowledge and skills targeted in this unit. The Student Journal items evaluate individual student learning and the effectiveness of instruction. Rubrics are included in the Summative Assessment to ensure consistent scoring of the items. All components of this assessment provide multiple opportunities to assess student understanding of each science content expectation addressed in the unit.

The BCAMSC Summative Assessments are in draft form and may change based on student performance and teacher feedback. The BCAMSC Outreach Staff will use data collected from participating districts to make adjustments for the following school year.

If you have any questions or suggestions regarding the Summative Assessment, please direct your calls to Nancy Karre at (269) 965-9584 or email: nancy@bcamsc.org.



A S S E S S M E N T



Name: _____



Date: _____

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1. Energy is a concept that describes:
 - a. fossil fuel
 - b. important life activities
 - c. gravity and friction
 - d. work or changes

2. Food energy is an example of:
 - a. chemical energy
 - b. heat energy
 - c. body energy
 - d. carbohydrates

3. Anita and Joseph decided to design an investigation to test the ring magnet for its strongest part. Choose the question for their investigation.
 - a. Do ring magnets attract all metals?
 - b. What part of the ring magnet is the strongest?
 - c. Are ring magnets stronger than bar magnets?
 - d. How do ring magnets work?

4. Choose the materials list for Anita and Joseph's investigation.
 - a. two bar magnets, two ring magnets, box of paper clips
 - b. two ring magnets, aluminum foil, iron nail
 - c. one bar magnet, one ring magnet, one horseshoe magnet
 - d. one ring magnet, box of paper clips



Energy Transfer (cont.)

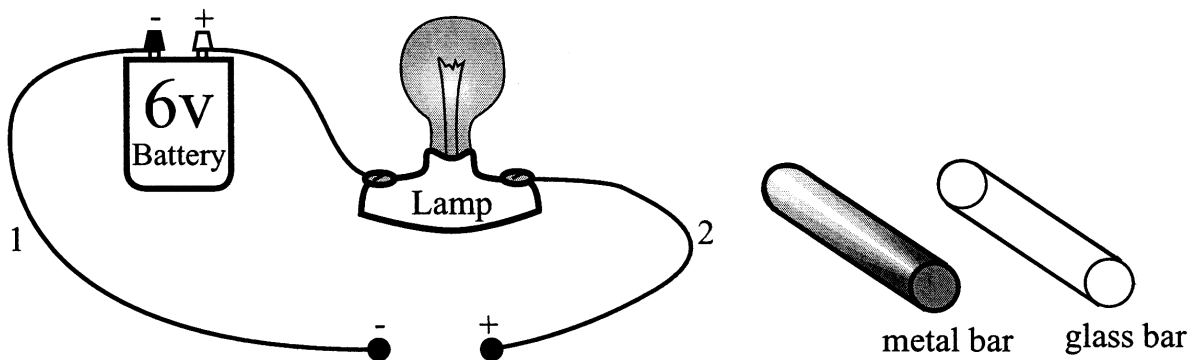


5. Anita and Joseph collected the following data for their investigation:

Position of Magnet	Number of Paper Clips		
	Trial 1	Trial 2	Trial 3
Flat side A	20	20	20
Flat side B	21	19	20
Edge of ring	19	20	20

Choose the BEST conclusion statement based on their table.

- a. Flat side A is stronger than the edge of the ring magnet.
- b. The data collected did not show a stronger or weaker part of the ring magnet.
- c. There is not enough data collected to draw a conclusion.
- d. Anita and Joseph used three trials to test the strength of the ring magnet.

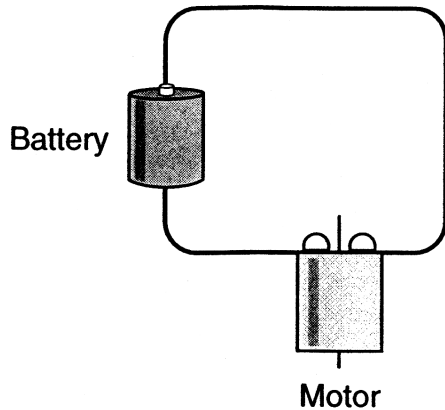


6. Using the battery and light bulb shown above, how could you show that metal conducts electricity and glass does not conduct electricity?

- a. Touch the metal and glass bars together.
- b. Touch wire 1 to the metal bar and then to the glass bar.
- c. Touch wire 2 to the metal bar and then to the glass bar.
- d. Touch wires 1 and 2 to opposite ends of the metal bar and repeat with the glass bar.



7. The following diagram shows the circuit for John's model dinosaur. The dinosaur has a motor for motion. Which of these BEST describes the energy changes that propel the dinosaur?



- a. mechanical to electrical to chemical
b. chemical to electrical to mechanical
c. electrical to chemical to mechanical
d. chemical to mechanical to electrical
8. Shannon's family uses a "hot air" popcorn popper that heats air and blows the hot air on the popcorn kernels to make them pop. What form of energy makes the popcorn popper operate?
- a. Sound energy, because the popcorn makes a popping sound, and you hear the motor.
b. Electrical energy, because electrical current is used to heat the air and run the fan.
c. Food energy, because popcorn is a food.
d. Motion energy, because the popcorn moves when it pops.
9. Shannon melted some butter in a pan on the stove to put on her popcorn. What form of energy made the butter melt?
- a. light energy
b. heat energy
c. food energy
d. sound energy

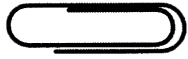


Energy Transfer (cont.)



10. Which of these will be attracted to a magnet?

a.



steel paper clip

b.



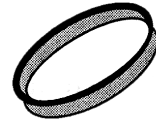
copper coin

c.



aluminum can

d.



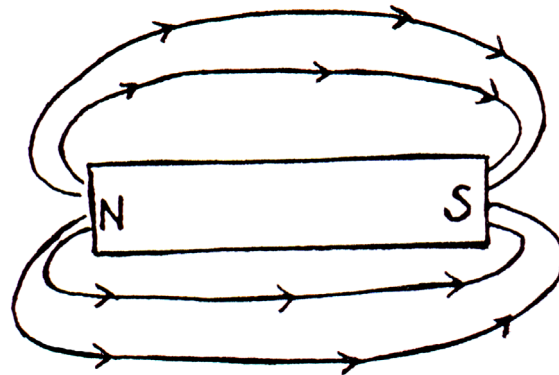
rubber band

11. Rachel tested forks to see if they are attracted to magnets. She predicted that all forks are attracted to magnets. She placed a magnet next to a plastic fork and then a steel fork. Which of the following would you expect Rachel to observe?

- a. All forks are attracted to magnets.
- b. The steel fork is attracted to magnets.
- c. The plastic fork is attracted to magnets.
- d. The shape of a fork causes a magnet to be attracted to it.

12. The picture shows the magnetic field surrounding a magnet. Where is the magnet strongest?

- a. The magnet is strongest at the poles.
- b. The magnet has the same strength all over.
- c. The north pole is the strongest part of the magnet.
- d. The south pole is the strongest part of the magnet.

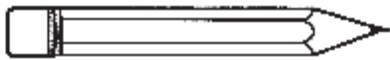


13. Jim and Andy are playing in the sand with a magnet. They notice that some grains of sand stick to the magnet, but many do not. Why do you think this happened?

- a. Some sand grains are soluble to the magnet.
- b. Some metals in the sand dissolved.
- c. Some sand grains split apart with a strong magnet.
- d. Some sand grains contain metals that attract to the magnet.



14. Louise investigated the parts of a pencil. She tested each part with a circuit to see if the materials were conductors or nonconductors of electricity. If a material is a conductor, the bulb will light. Her results are shown below. Which of the parts are made of a material that conducts electricity?



Part of Pencil	Bulb Lights
eraser holder	yes
eraser	no
wood part	no
graphic point	yes

- a. only the eraser holder
- b. the eraser holder and the graphite point
- c. all of the parts
- d. none of the parts

15. Sara and Collin were investigating the effect of the sun on a black balloon and a white balloon. They recorded the temperature of the black and white balloon placed in the sunlight over one hour. They collected the following data in their investigation.

	0 minutes	15 minutes	30 minutes	45 minutes	1 hour
white balloon	22°C	23°C	23°C	23°C	22°C
black balloon	22°C	24°C	27°C	28°C	28°C

Choose the BEST conclusion for their investigation.

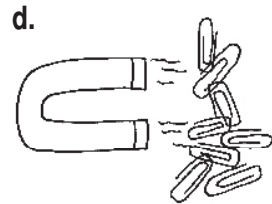
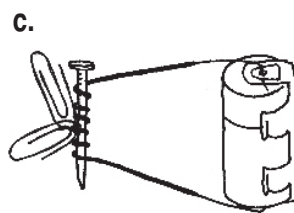
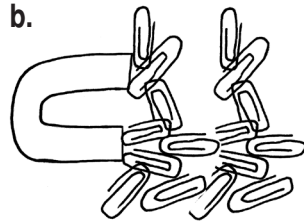
- a. The black balloon is darker than the white balloon and the white balloon gets warmer.
- b. The temperature of the black balloon gets warmer than the white balloon when placed in the sun.
- c. The temperature of black and white balloon rises when placed in the sun for one hour.
- d. After one hour the temperature of the white balloon was the same as the temperature of the black balloon.



Energy Transfer (cont.)



16. What is the BEST explanation for the results in Sara and Collin's investigation?
- a. The black balloon absorbs more light energy that is transferred to heat energy.
 - b. Black and white balloons absorbed equal amounts of light energy.
 - c. Light energy does not transfer to heat energy because latex balloon does not conduct heat.
 - c The white balloon reflected light energy onto the black balloon transferring heat energy.
17. Alvin and Kara were constructing a simple circuit using a wire, mini bulb, and battery. Kara notice that the ends of the wire became hot when attached to the battery. Choose the explanation that BEST describes the heat production in the wire.
- a. The bulb could not absorb all the heat generated by the battery.
 - b. Light energy from the mini bulb heated the wires.
 - c. Electrical energy flowing through the wire produces heat energy.
 - d. The wires got warm from handling and rubbing by Alvin and Kara.
18. Choose the diagram that BEST illustrates the magnetic effect in an electrical circuit.



19. To help keep warm at the football game, Alex rubbed his hands together. How did the rubbing help to keep his hands warm?
- a. Heat is produced through the friction of rubbing the hands against each other.
 - b. Heat is produced when Alex blows warm air on his hands.
 - c. Heat is produced when Alex places his hands in his pockets.
 - d. Alex could not warm his hands without adding heat energy.



20. Cassie built an electrical circuit with a switch. She used aluminum foil to complete the circuit at the switch. She wondered if other materials would work as well as the aluminum foil. She decided to carry out an investigation to answer her question.

Material Used for Switch	Incomplete	Complete
penny		X
paper	X	
plastic spoon	X	
metal spoon		X
paper clip		X
tack		X
piece of wood	X	
nail		X
piece of cloth	X	
plastic straw	X	
magnet		X

Look at Cassie's data table and write a conclusion based on her results.

21. The Rodriguez family was on a camping trip. They enjoyed roasting hot dogs over the campfire. Write a caption for the illustration that describes the heat energy transfer from the flame of the fire to the roasting hot dog.



22. Draw and write another way the hot dogs could be heated.

23. Draw and label a complete circuit using two wires, one bulb, and one battery. Use



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arrows to show how electrical energy is transferred to light energy.

Rubric for Energy Transfer Summative Assessment

(Total Possible Points - 28)

Question #1: Energy is a concept that describes: (P.EN.04.12)

Answer: d (1 point)

Question #2: Food energy is an example of: (P.EN.04.12)

Answer: a (1 point)

Question #3: Anita and Joseph decided to design an investigation to test the ring magnet for its strongest part. Choose the question for their investigation. (P.PM.04.33, S.IP.04.12)

Answer: b (1 point)

Question #4: Choose the materials list for Anita and Joseph's investigation. (S.IP.04.13)

Answer: d (1 point)

Question #5: Anita and Joseph collected the following data for their investigation. Choose the BEST conclusion statement based on their table. (S.IA.04.11, S.RS.04.15)

Answer: b (1 point)

Question #6: Using the battery and light bulb shown above, how could you show that metal conducts electricity and glass does not conduct electricity? (P.EN.04.51)

Answer: d (1 point)

Question #7: Which of these BEST describes the energy changes that propel the dinosaur? (P.EN.04.51)

Answer: b (1 point)

Question #8: What form of energy makes the popcorn popper operate? (P.EN.04.12)

Answer: b (1 point)

Question #9: Shannon melted some butter in a pan on the stove to put on her popcorn. What form of energy made the butter melt? (P.EN.04.12, P.EN.04.41)



Energy Transfer
Answer Key (cont.)

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Answer: b (1 point)

Question #10: Which of these will be attracted to a magnet? (P.PM.04.34)

Answer: a (1 point)

Question #11: Rachel tested forks...She placed a magnet next to a plastic fork and then a steel fork. Which of the following would you expect Rachel to observe? (P.PM.04.34)

Answer: b (1 point)

Question #12: The picture shows the magnetic field surrounding a magnet. Where is the magnet strongest? (P.PM.04.33)

Answer: a (1 point)

Question #13: Jim and Andy are playing in the sand with a magnet. They notice that grains of sand stick to the magnet, but many do not. Why do you think this happened? (P.PM.04.33, P.PM.04.34)

Answer: d (1 point)

Question #14: Louise investigated the parts of a pencil...Which of the parts are made of a material that conducts electricity? (P.PM.04.33, P.PM.04.34)

Answer: b (1 point)

Question #15: Sara and Collin were investigating the effect of the sun on black paper and white paper... Choose the BEST conclusion for their investigation. (P.EN.04.41, S.IA.04.11, S.RS.04.15)

Answer: b (1 point)

Question #16: What is the BEST explanation for the results in Sara and Collin's investigation? (P.EN.04.41)

Answer: a (1 point)

Question #17: Choose the explanation that BEST describes the heat production in the wire. (P.EN.04.42, P.EN.04.43)

Answer: c (1 point)

Question #18: Choose the diagram that BEST illustrates the magnetic effect in an electrical circuit. (P.EN.04.52)

Answer: c (1 point)



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Question #19: To help keep warm at the football game, Alex rubbed his hands together. How did the rubbing help to keep his hands warm? (P.EN.04.43)

Answer: a (1 point)

Question #20: Look at Cassie's data table and write a conclusion based on her results. (P.FM.05.31)

Scoring (1 point)

1 - Conclusion explains that metals are good conductors of electricity.

Summative Assessment: Student Journal

Question #21 - Activity #2, Journal Entry Question #1: The Rodriguez family was on a camping trip.

They enjoyed roasting hot dogs over the campfire. Write a caption for the illustration that describes the heat energy transfer from the flame of the fire to the roasting hot dog. (P.EN.04.41)

Elements

- Chemical energy from burning transforms to heat energy.
- Heat energy transfers to the hot dog.
- Heat energy causes the temperature of the hot dog to increase.

Scoring (3 points)

- Response includes all three elements
- Response includes two elements
- Response includes one element
- No response, no elements, can't read the answer

Question #22 - Activity #2, Journal Entry Question #2: Draw and write another way the hot dogs could be heated. (P.EN.04.41)

Elements

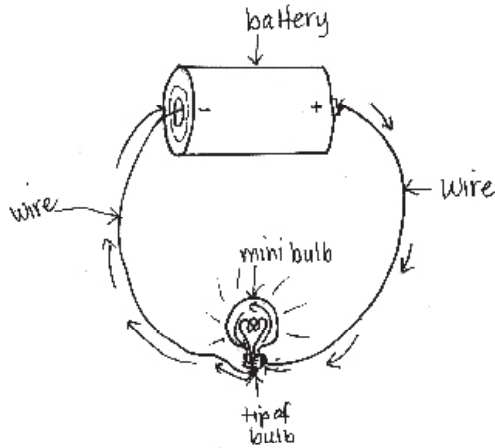
- Response includes the addition of heat energy through electricity, burning, or solar heating.

Scoring (1 point)

- Response includes one element
- No response, no elements, can't read the answer



Question #23 - Activity #6, Journal Entry Question #1: Draw and label a complete circuit using two wires, one bulb, and one battery. Use arrows to show how electrical energy is transferred to light energy. (P.EN.04.52)



Elements

- a. Wires are connected to each battery terminal.
- b. One wire connects to tip of bulb.
- c. One wire connects to metal side (screw) of bulb.
- d. Arrows demonstrate the flow of electrons (electricity).

Scoring (4 points)

- 4 - Response includes all four elements
- 3 - Response includes three elements
- 2 - Response includes two elements
- 1 - Response includes one element
- 0 - No response, no elements, can't read the answer