5th

8th

11th

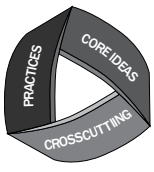
FS

M-Step™

Michigan Student Test of Educational Progress

# Grade 8 Science

Sample Items




MICHIGAN Department of Education

**MICHIGAN STATE BOARD OF EDUCATION**
**STATEMENT OF ASSURANCE OF COMPLIANCE WITH FEDERAL LAW**

The Michigan State Board of Education complies with all Federal laws and regulations prohibiting discrimination and with all requirements and regulations of the U.S. Department of Education. It is the policy of the Michigan State Board of Education that no person on the basis of race, color, religion, national origin or ancestry, age, sex, marital status, or handicap shall be discriminated against, excluded from participation in, denied the benefits of, or otherwise be subjected to discrimination in any program or activity for which it is responsible or for which it receives financial assistance from the U.S. Department of Education.

The sample items included in this set can be used by students and teachers to become familiar with the kinds of items students will encounter on the paper/pencil summative assessments.
The sample items demonstrate the rigor of Michigan's academic content standards. They are not to be interpreted as indicative of the focus of the M-STEP assessments; they are simply a collection of item samples. Every standard is not included in this sample set.

## PART X DIRECTIONS:

You will be taking Part X of the Science M-STEP. This part includes passages and pictures that you will read and use to answer different types of questions. You may underline, circle, or write in this test booklet to help you, but nothing marked in this test booklet will be scored.

Carefully read each passage and look at each picture before answering the questions that follow. Mark your answers in Part X of your **Answer Document** with a No. 2 pencil. If you erase an answer, be sure to erase it completely. Remember that if you skip a question in the test booklet, you need to skip the answer space for that question on the **Answer Document**. If you are not sure of an answer, mark your **best** choice.

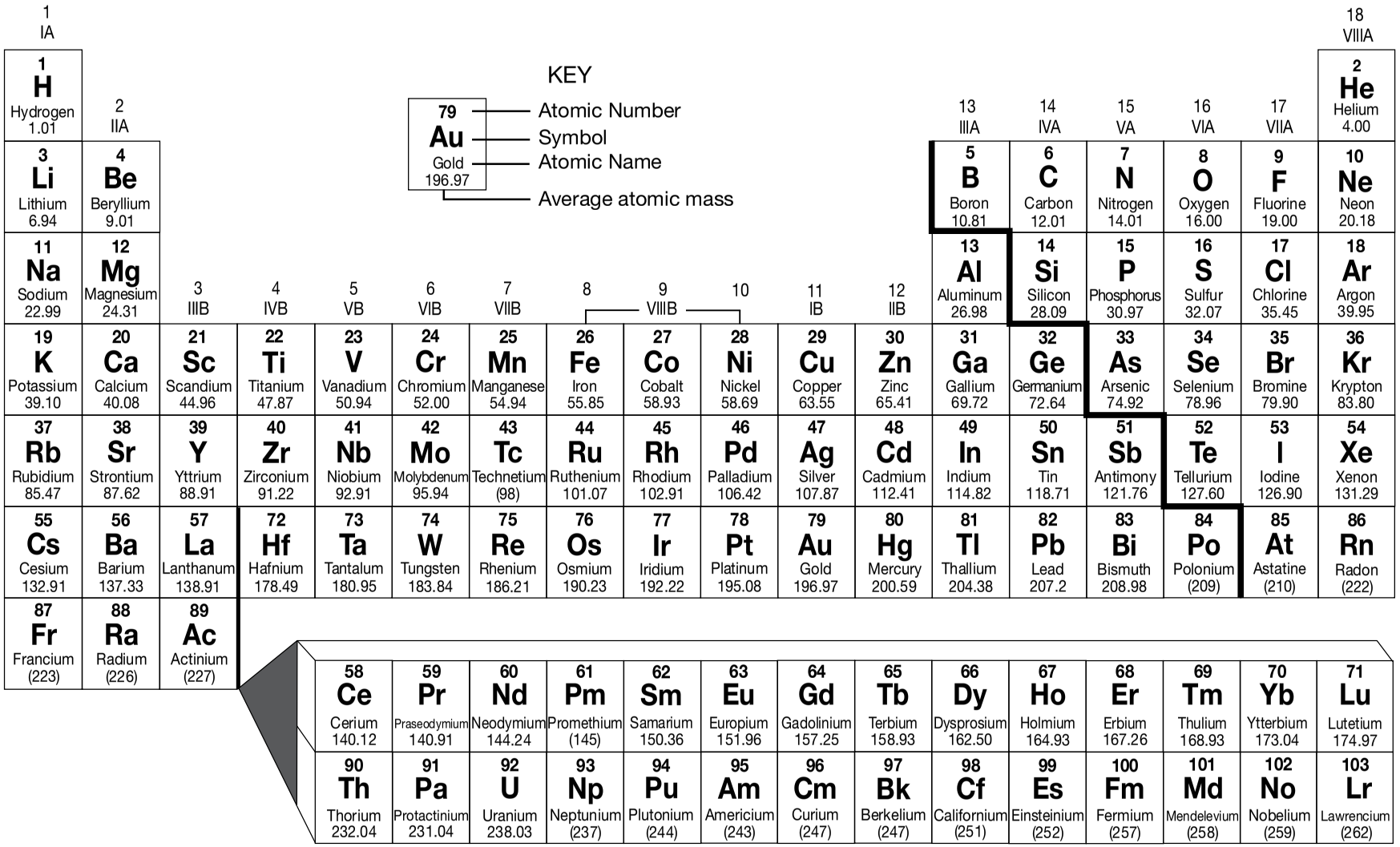
A Periodic Table of the Elements has been provided for your reference on the next page.

When you come to the **STOP** sign, you have finished Part X. If you finish early, you may go back and check your work. Check to make sure that you have answered every question.

It is important to do your best on this test so your teacher and school can know how much you have learned this school year.

**WAIT**

# Periodic Table of the Elements




| | 1 IA | 2 IIA | 3 IIIB | 4 IVB | 5 VB | 6 VIB | 7 VIIB | 8 | 9 VIIIB | 10 | 11 IB | 12 IIB | 13 IIIA | 14 IVA | 15 VA | 16 VIA | 17 VIIA | 18 VIIIA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 H Hydrogen 1.01 | | | | | | | | | | | | | | | | | 2 He Helium 4.00 |
| 2 | 3 Li Lithium 6.94 | 4 Be Beryllium 9.01 | | | | | | | | | | | 5 B Boron 10.81 | 6 C Carbon 12.01 | 7 N Nitrogen 14.01 | 8 O Oxygen 16.00 | 9 F Fluorine 19.00 | 10 Ne Neon 20.18 |
| 3 | 11 Na Sodium 22.99 | 12 Mg Magnesium 24.31 | | | | | | | | | | | 13 Al Aluminum 26.98 | 14 Si Silicon 28.09 | 15 P Phosphorus 30.97 | 16 S Sulfur 32.07 | 17 Cl Chlorine 35.45 | 18 Ar Argon 39.95 |
| 4 | 19 K Potassium 39.10 | 20 Ca Calcium 40.08 | 21 Sc Scandium 44.96 | 22 Ti Titanium 47.87 | 23 V Vanadium 50.94 | 24 Cr Chromium 52.00 | 25 Mn Manganese 54.94 | 26 Fe Iron 55.85 | 27 Co Cobalt 58.93 | 28 Ni Nickel 58.69 | 29 Cu Copper 63.55 | 30 Zn Zinc 65.41 | 31 Ga Gallium 69.72 | 32 Ge Germanium 72.64 | 33 As Arsenic 74.92 | 34 Se Selenium 78.96 | 35 Br Bromine 79.90 | 36 Kr Krypton 83.80 |
| 5 | 37 Rb Rubidium 85.47 | 38 Sr Strontium 87.62 | 39 Y Yttrium 88.91 | 40 Zr Zirconium 91.22 | 41 Nb Niobium 92.91 | 42 Mo Molybdenum 95.94 | 43 Tc Technetium (98) | 44 Ru Ruthenium 101.07 | 45 Rh Rhodium 102.91 | 46 Pd Palladium 106.42 | 47 Ag Silver 107.87 | 48 Cd Cadmium 112.41 | 49 In Indium 114.82 | 50 Sn Tin 118.71 | 51 Sb Antimony 121.76 | 52 Te Tellurium 127.60 | 53 I Iodine 126.90 | 54 Xe Xenon 131.29 |
| 6 | 55 Cs Cesium 132.91 | 56 Ba Barium 137.33 | 57 La Lanthanum 138.91 | 72 Hf Hafnium 178.49 | 73 Ta Tantalum 180.95 | 74 W Tungsten 183.84 | 75 Re Rhenium 186.21 | 76 Os Osmium 190.23 | 77 Ir Iridium 192.22 | 78 Pt Platinum 195.08 | 79 Au Gold 196.97 | 80 Hg Mercury 200.59 | 81 Tl Thallium 204.38 | 82 Pb Lead 207.2 | 83 Bi Bismuth 208.98 | 84 Po Polonium (209) | 85 At Astatine (210) | 86 Rn Radon (222) |
| 7 | 87 Fr Francium (223) | 88 Ra Radium (226) | 89 Ac Actinium (227) | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 58 Ce Cerium 140.12 | 59 Pr Praseodymium 140.91 | 60 Nd Neodymium 144.24 | 61 Pm Promethium (145) | 62 Sm Samarium 150.36 | 63 Eu Europium 151.96 | 64 Gd Gadolinium 157.25 | 65 Tb Terbium 158.93 | 66 Dy Dysprosium 162.50 | 67 Ho Holmium 164.93 | 68 Er Erbium 167.26 | 69 Tm Thulium 168.93 | 70 Yb Ytterbium 173.04 | 71 Lu Lutetium 174.97 |
| 90 Th Thorium 232.04 | 91 Pa Protactinium 231.04 | 92 U Uranium 238.03 | 93 Np Neptunium (237) | 94 Pu Plutonium (244) | 95 Am Americium (243) | 96 Cm Curium (247) | 97 Bk Berkelium (247) | 98 Cf Californium (251) | 99 Es Einsteinium (252) | 100 Fm Fermium (257) | 101 Md Mendelevium (258) | 102 No Nobelium (259) | 103 Lr Lawrencium (262) |

Numbers within parentheses refer to the atomic mass of the most stable isotope.

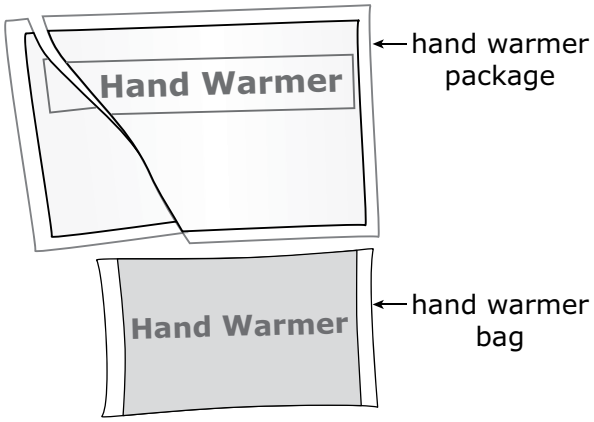


GO ON

**Read the passage, look at the pictures, and answer the questions.**

## How do Hand Warmers Work?

Two students are outside in the cold, waiting for a bus. One of the students has a package of hand warmers and offers to share them with the other student. The student opens the package and they each put a hand warmer bag in one of their gloves.




After a few minutes, the students notice that the hand warmer bags start to feel warm. The students want to know how hand warmer bags get warm. They decide to ask their science teacher if they can test the materials inside the hand warmer bags. After reading the ingredients on the hand warmer package, the students decide to focus on iron because it is the most common ingredient.

The students designed the following procedure.

1. Open a new hand warmer package.
2. Cut open the hand warmer bag.
3. Separate the materials by using a magnet to attract the iron.
4. Place the iron on a dish.
5. Make initial observations and calculations to record properties of the iron.
6. Leave the iron in the dish overnight.
7. Record final observations and calculations the next day.

**Iron from Hand Warmer Bag**

**Hand Warmer Investigation Data**

| Property/ Calculation | Initial | Final |
|---|---|---|
| Color | Grey | Red |
| Texture | Powder | Powder |
| Mass | 21 g | 30 g |
| Volume | 2.67 $cm^3$ | 5.73 $cm^3$ |
| Density | 7.87 $g/cm^3$ | 5.24 $g/cm^3$ |

GO ON

**1** This question has **three** parts.

Use the data table to complete the following statements.

**Part A**

The students can tell that a chemical reaction involving iron _____ .

**A** occurred

**B** did not occur

**Part B**

This is because a new substance _____ form overnight.

**A** did

**B** did not

**Part C**

Choose one set of properties that supports the completed statement in Part A.

**A** density and color

**B** color and volume

**C** volume and texture

**D** texture and mass

**E** mass and density

**2** This question has **two** parts.

Complete the statements below.

**Part A**

The final mass of the material on the dish the next day is _____ the initial mass of the material.

**A** more than

**B** less than

**C** equal to

**Part B**

This could happen if iron atoms are _____ the environment.

**A** escaping into

**B** combining with matter in

**C** being produced and released into

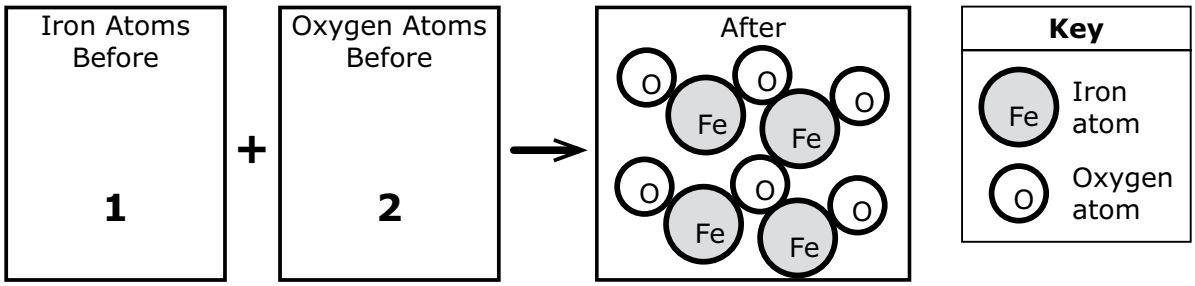
**D** being exchanged in equal amounts with

**3** This question has **three** parts.

The students decide to develop a model to explain why the iron appeared to change overnight. To complete the model the students need to include:

- iron atoms from the hand warmer
- oxygen atoms from the air
- the final substance they observed

Complete the student model by choosing the appropriate number of atoms.




**GO ON**

**Part A**

Select the correct number of iron atoms that should go in Box 1 to complete the student model.

**A** 1

**B** 2

**C** 4

**D** 6

**Part B**

Select the correct number of oxygen atoms that should go in Box 2 to complete the student model.

**A** 1

**B** 2

**C** 4

**D** 6

**Part C**

Select one limitation of the model shown in Part A.

**A** The model does not show conservation of matter.

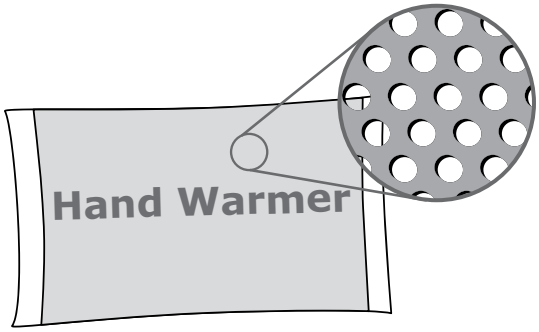
**B** The model does not show the color change of the final substance.

**C** The model does not show how the atoms are organized in the final substance.

**Read the passage, look at the pictures, and answer the questions.**

## How do Hand Warmers Work? (continued)

After observing what happens with the iron in the hand warmers, the students decide to work on improving the hand warmers to make them get warm faster. The students observe that the hand warmer bag is made of fabric containing tiny holes.

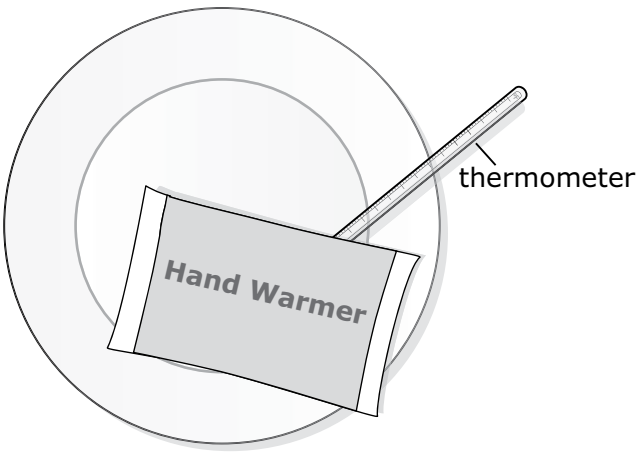



They think that if oxygen is needed to produce heat, maybe only a small amount of oxygen is getting through the fabric. To test this, the students design an investigation to record the change in temperature when the hand warmer ingredients are left in the hand warmer bag and when they are taken out of the hand warmer bag. The students set up two systems.

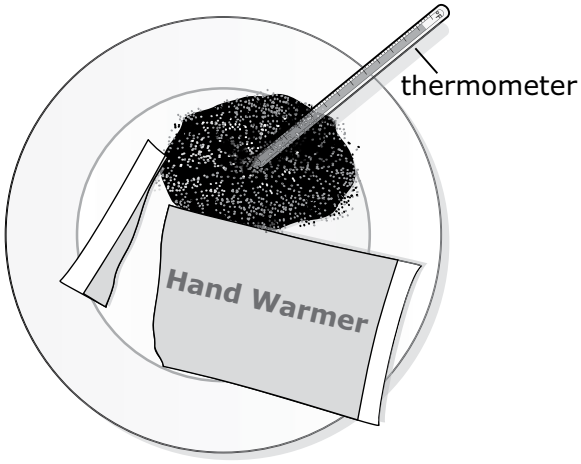
**Investigation Plan**

1. Open two hand warmer packages. Place one hand warmer bag on a dish labeled System 1.
2. Cut open the other hand warmer bag and pour the materials from inside the bag onto the dish labeled System 2.
3. Place a thermometer under the hand warmer bag in System 1 and a thermometer inside the materials in System 2.
4. Record the temperature of both systems every five minutes until one of the systems nears the starting temperature.

**System 1**

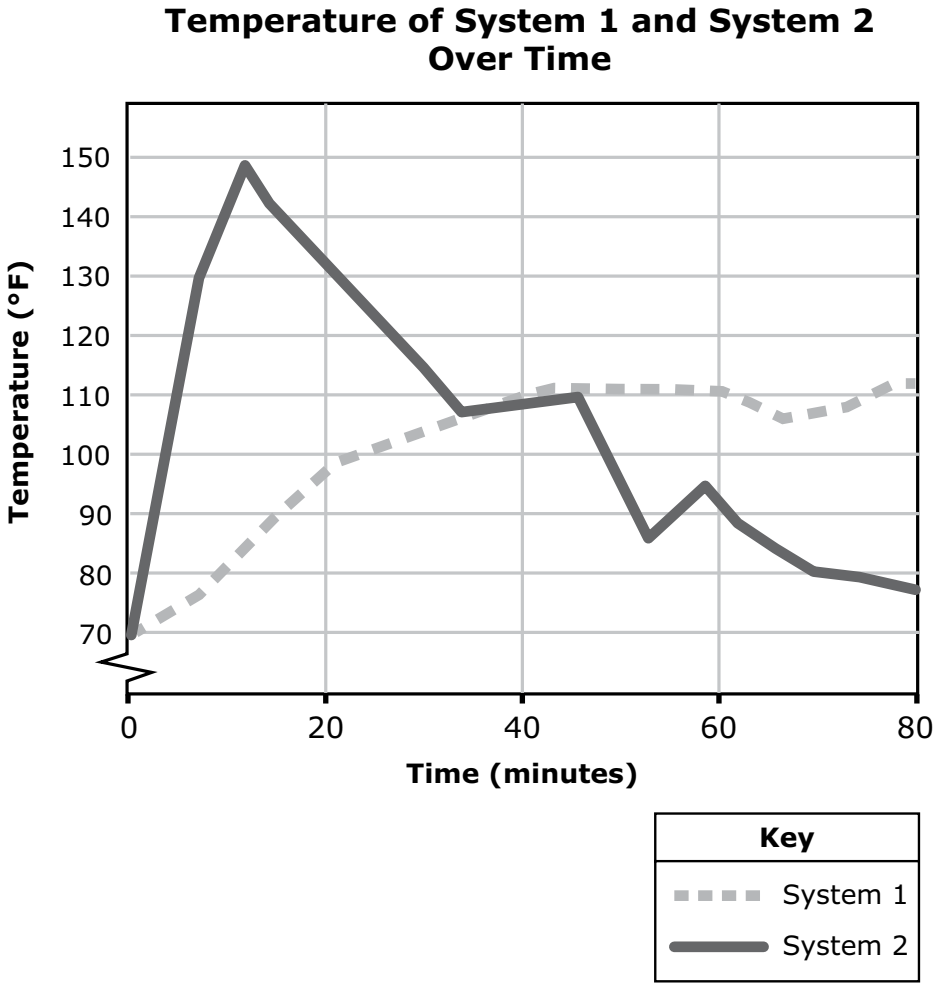



**System 2**




**GO ON**

The temperature data from both systems are shown below.



**4** This question has **two** parts.

Compare the two sets of data in the graph.

**Part A**

Select **two** similarities between System 1 and System 2.

**A** The temperature increases in both systems.

**B** The temperature decreases in both systems.

**C** The temperature remains constant in both systems.

**Part B**

Select **two** differences between System 1 and System 2.

**A** The temperature of System 1 increases more quickly than System 2.

**B** The temperature of System 2 increases more quickly than System 1.

**C** System 2 reaches a greater maximum temperature than System 1.

**5** This question has **three** parts.

Identify and explain the temperature pattern in the graph. Select the **best** claim statement, evidence statement, and reasoning statement that can be used to explain the pattern.

**Part A: Claim Choices**

**A** Energy is transferred from each system to the thermometers.

**B** Energy is transferred from the thermometers to each system.

**C** Energy is not transferred in either of the systems.

**Part B: Evidence Choices**

**A** The thermometer measured a higher temperature at 50 minutes than at 0 minutes.

**B** The thermometer measured a lower temperature at 50 minutes than at 0 minutes.

**C** The temperature did not change between 0 minutes and 50 minutes.

**GO ON**

**Part C: Reasoning Choices**

**A** The iron absorbs energy from the oxygen during the chemical reaction.

**B** The hand warmer bag is absorbing thermal energy from the thermometer.

**C** The iron is reacting with oxygen in the air and that reaction releases energy.

**D** The hand warmer bag contained energy that is released when the package is opened.

**6** The students want to redesign the hand warmer bag in such a way that the hand warmer would take less time to get warm but would also remain a safe product. The new design includes more small holes in the fabric of the hand warmer bag.

Which statement **best** evaluates if the new design would or would not work?

**A** The new design would not work because the additional holes in the bag would allow oxygen from the air to move into the bag and cool the iron.

**B** The new design would not work because the only way to increase the temperature is to generate more energy by adding iron.

**C** The new design would work because when the iron in the hand warmer is exposed to more oxygen in the air, the temperature will increase at a faster rate.

**D** The new design would work because when pieces of iron are able to move out of the additional holes, they will be in contact with more oxygen, which will quickly increase the temperature.

**7** Which statement **best** describes a trade-off if a new hand warmer bag is designed to get warm faster than the original design?

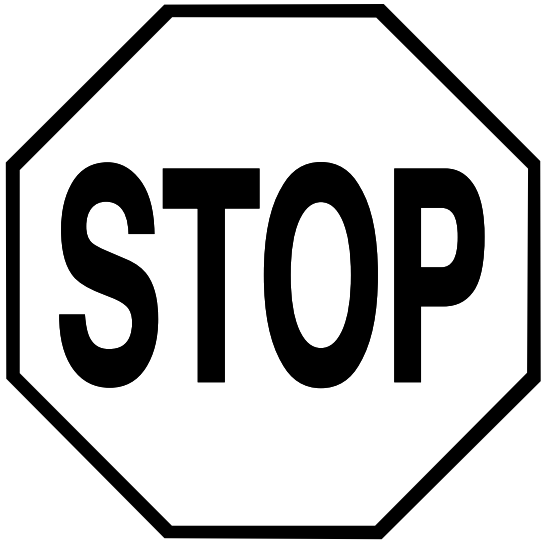
**A** The hand warmer bag would be more expensive than the original design.

**B** The hand warmer bag would contain more iron and be bigger than the original design.

**C** The hand warmer bag would not get as warm as the original design.

**D** The hand warmer bag would cool down faster than the original design.

**GO ON**




**You have been working on Part X.**

**If you finish early, you may go back and check your work for Part X only.**

5th

8th

11th

FS

# Grade 8
# Science Sample Items

M-Step™
Michigan Student Test of Educational Progress

MICHIGAN Department of Education

*Office of Educational Assessment and Accountability (OEAA)*
*Phone: 1-877-560-8378*
*Website: www.michigan.gov/oeaa*
*Email: mde-oeaa@michigan.gov*