2023-2024 Gr7 Science Benchmark Unit 1

Question 1.

A student owns an antique lunch box that they like a lot. Unfortunately, the lunch box is made of thin metal and does a very poor job of keeping food cool, especially on hot days. The student decides to line the box with an insulating material to keep the food cool longer. They want to test several materials (aluminum foil, an old towel, cardboard) to see which would work the best.

What would be the **best** way to determine this?

A. Line the lunchbox with one of the materials and put an ice cube in a small cup inside it. Leave it in the sun and check periodically. Repeat with each material in turn.

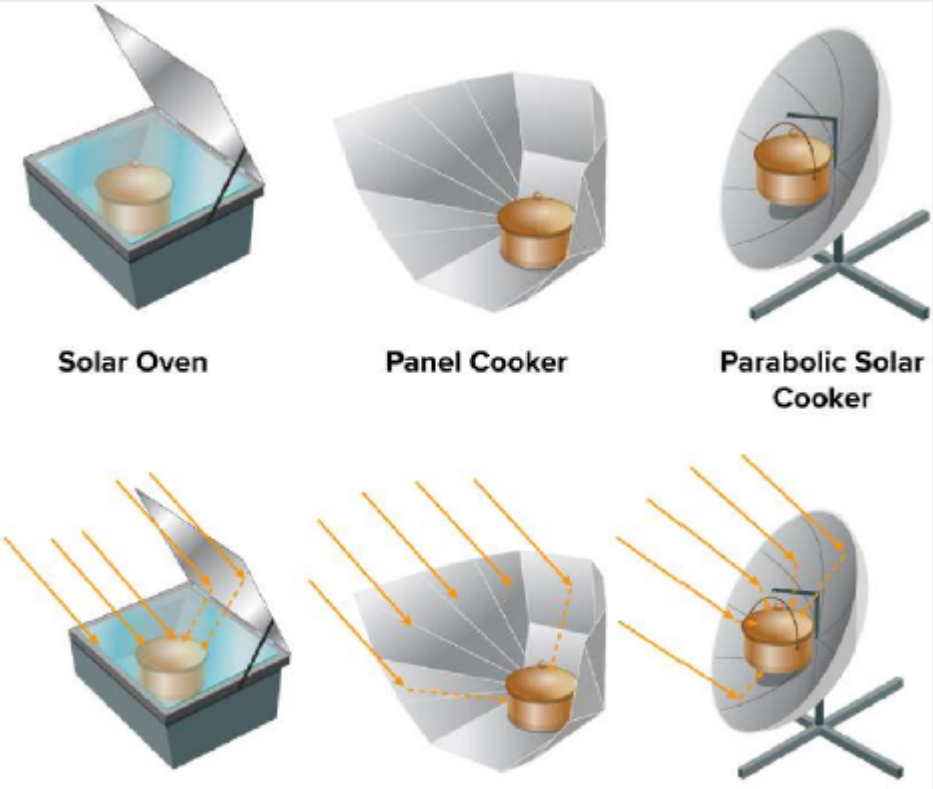
B. Prepare three beakers of hot water. Place a piece of aluminum foil over one beaker, a piece of towel over the second, and a piece of cardboard over the third. With the help of a friend, put a hand on each material and determine which material lets you feel the warmth last.

C. Put all the materials in the refrigerator or the freezer overnight so they start out at the same temperature. Wrap a thermometer inside each. Open the material up and check the temperature every 60 seconds to see which warms up the slowest.

D. Put all the materials in the refrigerator or the freezer overnight so they start out at the same temperature. Wrap just the bulb of a thermometer inside each. Monitor the temperatures without unwrapping to see which warms up the least.

Solar cookers have become important tools for many rural and developing countries, especially in areas where access to electricity is inconsistent, weather knocks out power lines, or where fuel is not readily available.

The diagrams show three common solar-cooker designs. Each of the solar cookers use the Sun to cook food. Use the diagrams and your knowledge of science to answer the questions that follow.



Question 2.

How do solar cookers transfer energy?

If you wanted to build your own solar cooker at home using a box, what other materials would you need in order for it to work?

Question 3.

Ben wants to test whether the material used to make a disposable cup affects the amount of thermal energy transferred to a person's hand. He investigates by carefully pouring the same volume of 90°C water into a foam cup and into a paper cup.

Which additional step in the investigation will help Ben determine which material reduces thermal energy (heat) transfer to the hand of a person holding the cup?

A. Measure the outside surface temperature of each cup after 10 minutes.

B. Stir the water in each cup for 10 minutes before measuring its temperature.

C. Vary the amount of water held by each cup before measuring its temperature.

D. Measure the outside surface temperature of each cup after placing each on a different surface.

Question 4.

All of the following are good conductors of heat except _____.

A. wood

B. aluminum

C. copper

D. silver

Question 5.

Joanna claims that a large block of ice will cool a substance more than a small block of ice will at the same temperature. To support her claim, Joanna places two blocks of ice, one larger than the other, into separate beakers each containing some water. She compares the final water temperatures of the two beakers after each block of ice has melted.

Which change to Joanna's procedure will provide better evidence to support her claim?

A. She places each block of ice into beakers of different sizes, each containing different volumes of water.

B. She places each block of ice into beakers of different sizes, each containing 2000 mL of water at the same temperature.

C. She places each block of ice into identical 3000 mL beakers, each containing water at different temperatures, and measures the temperature before and after adding the ice.

D. She places each block of ice into identical 3000 mL beakers, each containing 2000 mL of water at room temperature, and measures

the temperature before and after adding the ice.

Question 6.
While a substance is boiling, its temperature _____.

A. increases

B. decreases

C. does not change

D. may increase or decrease, depending on the substance

Question 7.
Adding thermal energy to a cup of water may cause the particles to _____.

A. move faster

B. move closer together

C. slow down

D. collide less frequently

Question 8.
Kinetic energy is the energy of

_____ .

Question 9.
In classifying matter, which statement best describes a solid?

A. Atoms are closely spaced and may vibrate in position but do not change relative positions.

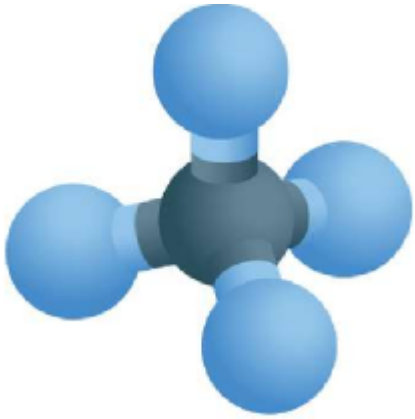
B. It is made of molecules or inert atoms that are moving about relative to each other.

C. Molecules are constantly in contact with each other and do not move.

D. Molecules are widely spaced except when they happen to collide.

Question 10.

Methane is a greenhouse gas that is often used as fuel for ovens and automobiles. Scientists often use models to show the atomic structure of methane, as shown. It is a molecule made of four hydrogen atoms bonded to a single carbon atom.



What are the benefits of this model? Select **all** that apply.

A. The amount of methane gas in the atmosphere can be observed.

B. The atoms in methane gas can be represented.

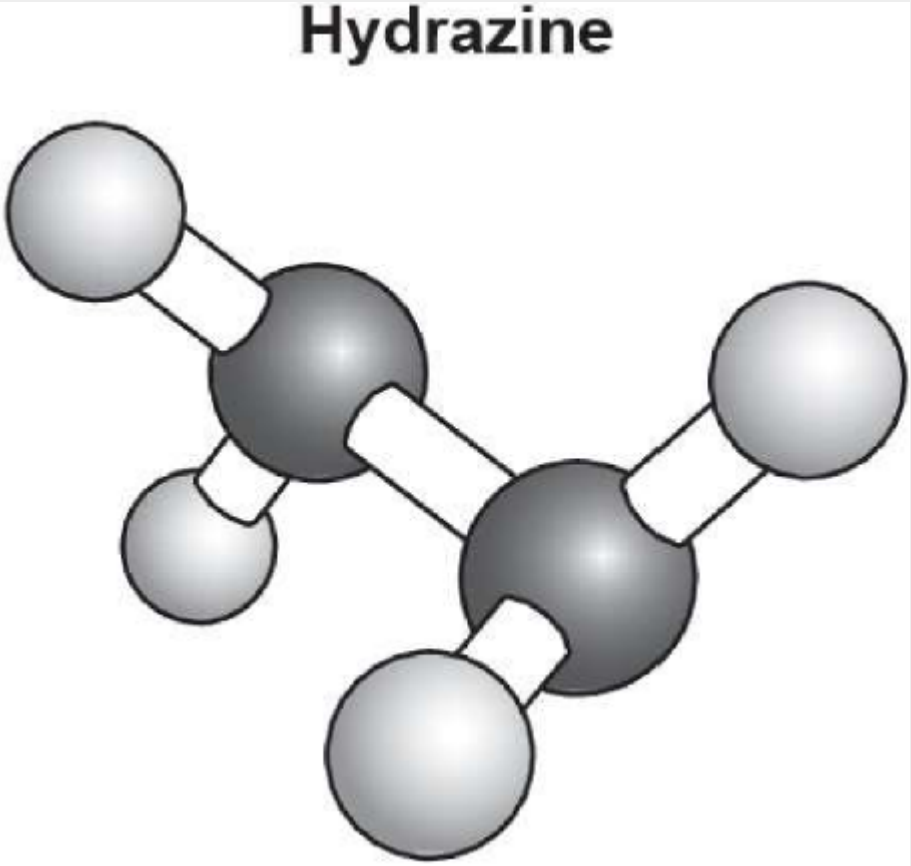
C. The color of methane gas can be shown.

D. The impact of methane gas on the environment can be illustrated.

E. The shape of a methane molecule can be observed.

F. The uses of methane gas can be observed.

The model shown represents one molecule of hydrazine, a chemical in rocket fuel. The black spheres represent nitrogen atoms, and the white spheres represent hydrogen atoms. Based on the model, what is the atomic composition of hydrazine?



Question 11.
The black spheres represent nitrogen atoms, and the white spheres represent hydrogen atoms. Based on the model, what is the atomic composition of hydrazine?

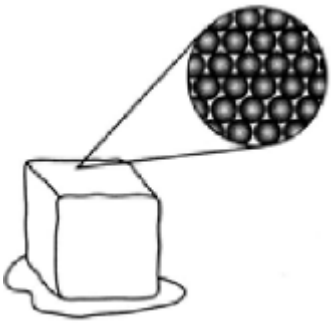
A. 1 atom of nitrogen and 1 atom of hydrogen

B. 4 atoms of nitrogen and 2 atoms of hydrogen

C. 2 atoms of nitrogen and 2 atoms of hydrogen

D. 2 atoms of nitrogen and 4 atoms of hydrogen

Question 12.
What two states of matter are pictured in the image?



A. liquid and gas

B. gas and solid

C. solid and liquid

D. volume and solid

Question 13.
The temperature at which a liquid becomes a gas is the _____ point.

A. freezing

B. boiling

C. condensation

D. melting

Question 14.
If thermal energy is added to a liquid, what is the most likely thing that will happen to the substance?

A. The liquid will become solid when it reaches its evaporation point.

B. The liquid will become solid when it reaches its freezing point.

C. The liquid will change to gas when it reaches its melting point.

D. The liquid will remain liquid until it reaches its boiling point.