

PRACTICE TEST

Science and
Technology/Engineering

Grade 8

Student Name

School Name

District Name

Grade 8 Science and Technology/Engineering PRACTICE TEST

This practice test contains 23 questions.

Directions

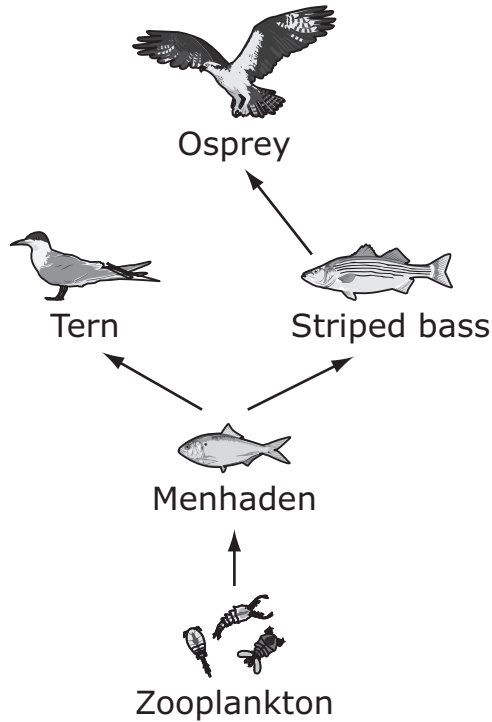
Read each question carefully and then answer it as well as you can. You must record all answers in this Practice Test Booklet.

For some questions, you will mark your answers by filling in the circles in your Practice Test Booklet. Make sure you darken the circles completely. Do not make any marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

If a question asks you to show or explain your work, you must do so to receive full credit. Write your response in the space provided in this Practice Test Booklet. Only responses written within the provided space will be scored.

If you do not know the answer to a question, you may go on to the next question. When you are finished, you may review your answers and go back to any questions you did not answer.

1 The diagram shows part of a food web from the Chesapeake Bay.



Which of the following best describes the ecological relationships of the organisms in the food web?

(A)

Competition	Predator–Prey
zooplankton and menhaden	tern and osprey

(B)

Competition	Predator–Prey
tern and striped bass	striped bass and menhaden

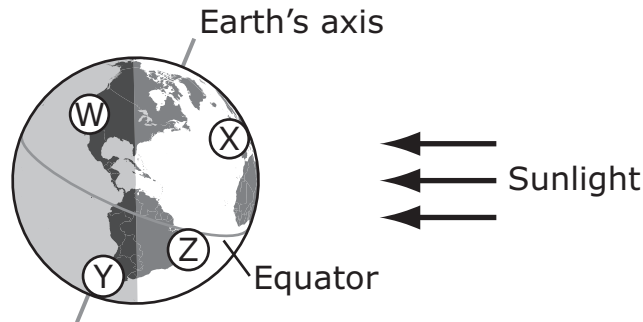
(C)

Competition	Predator–Prey
osprey and striped bass	osprey and menhaden

(D)

Competition	Predator–Prey
osprey and zooplankton	zooplankton and tern

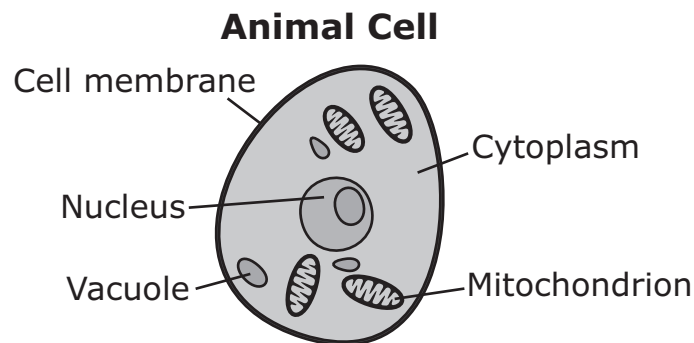
- 2 The diagram shows Earth and the direction of incoming sunlight.



At which two locations is it summer?

- (A) locations W and X
- (B) locations W and Y
- (C) locations X and Z
- (D) locations Y and Z

- 3 A diagram of an animal cell is shown.



Which part of the cell is responsible for releasing energy during cellular respiration?

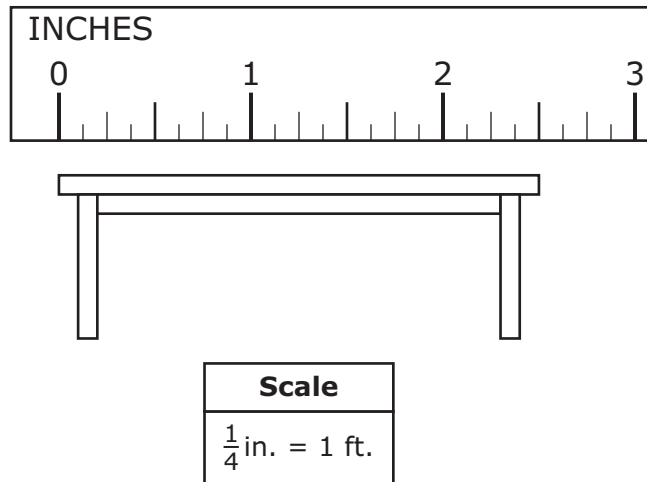
- (A) cell membrane
- (B) cytoplasm
- (C) mitochondrion
- (D) nucleus
- (E) vacuole

- 4 Which of the following best shows the appearance and positions of Earth and the Moon during a total lunar eclipse?



This question has two parts. Write your response on the next page. Be sure to label each part of your response.

- 5** A student in a woodworking class made a drawing of a table, as shown.



- A. Determine the table's actual length. Show your calculations and include units in your answer.
- B. The student plans to show the design of the table to the other students in the class. The student is deciding whether to show the drawing above or an orthographic projection.

Describe one advantage of showing an orthographic projection instead of the drawing above.

The following section focuses on how rust forms.

Read the information below and use it to answer the three selected-response questions and one constructed-response question that follow.

At the beginning of summer, some paint was scratched off a student's bicycle. The exposed metal where the bicycle was scratched had a shiny, silvery color. The student kept the bicycle outside all summer. By the end of summer, the exposed metal had changed to rust, which is dark orange in color.

The student did some research to find out what happened to the metal and learned that the bicycle is made of steel, which contains mostly iron. The student conducted two investigations to learn more about the process that changed the steel into rust.

Investigation 1: The student placed equal amounts of iron filings (small pieces of iron) into beakers X, Y, and Z. At the start of the investigation, all of the filings were gray. The student added nothing else to beaker X, water to beaker Y, and table salt (NaCl) and hydrogen peroxide (H₂O₂) to beaker Z. The student's observations over a two-day period are shown in the table.

Investigation 1

Beaker	Substance(s) Added	Color of Filings on Day 1	Color of Filings on Day 2
X	none	all gray	all gray
Y	a few drops of water	all gray	some gray and some dark orange
Z	some table salt and a few drops of hydrogen peroxide	some gray and some dark orange	all dark orange

Investigation 2: The student combined table salt and hydrogen peroxide in a beaker, added small pieces of steel, and placed a thermometer in the beaker. After one minute, the student measured the mass of the contents in the beaker. The student measured the contents in the beaker again at 10 minutes and discovered the mass had decreased slightly. The student's observations are shown in the table.

Investigation 2

Beaker Contents at 1 Minute	Beaker Contents at 10 Minutes
a pale orange color	a dark orange color
bubbling	no longer bubbling
25°C	40°C
166.1 g	164.7 g

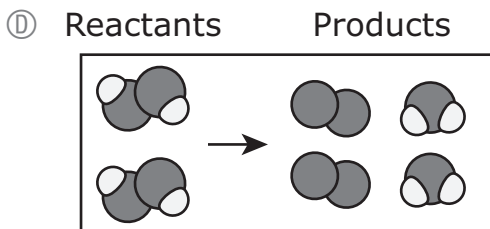
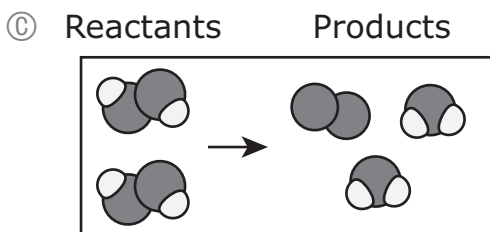
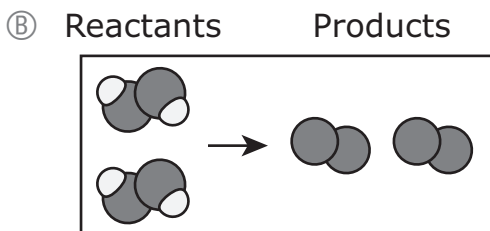
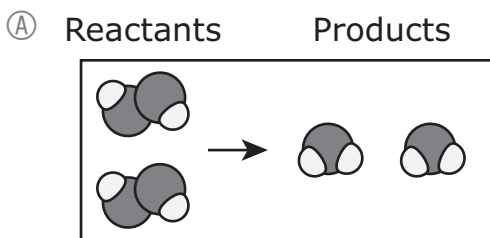
- 6 Select **all** the beakers from Investigation 1 that show evidence of a chemical change.
- Ⓐ beaker X
 - Ⓑ beaker Y
 - Ⓒ beaker Z

- 7 When hydrogen peroxide reacts with iron, hydrogen peroxide first breaks apart to form water and oxygen. In the diagrams shown, hydrogen atoms are white and oxygen atoms are gray.



The law of conservation of mass determines the number of water and oxygen molecules produced in the reaction.

Which of the following models shows the correct number of water and oxygen molecules produced in the reaction?



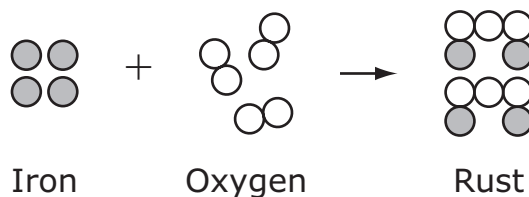
- 8 In Investigation 2, an exothermic reaction occurred as energy was released. What is the **best** evidence that an exothermic reaction occurred in the beaker?
- Ⓐ The mass decreased.
 - Ⓑ The bubbling stopped.
 - Ⓒ There was a change in the color.
 - Ⓓ There was an increase in temperature.

This question has three parts. Write your response on the next page. Be sure to label each part of your response.

- 9 Rust is produced when iron reacts with oxygen. The table shows some characteristics of a sample of iron and of a sample of rust.

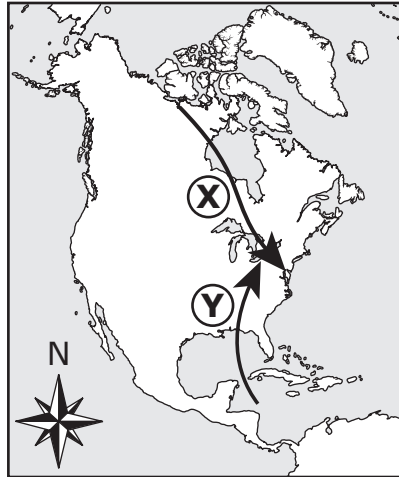
Characteristic	Iron Sample	Rust Sample
density (g/cm ³)	7.86	5.26
magnetic	yes	no
mass (g)	563.2	426.7
melting point (°C)	1535	1565
temperature (°C)	21	21

- A. Identify the **three** characteristics from the table above that can be used to support the claim that iron and rust are different substances.
- B. Explain why the characteristics you identified in Part A help support the claim that iron and rust are different substances.
- C. The model shown represents the reaction between iron and oxygen that results in rust.



Based on the model, explain why iron and rust are different substances.

- 10 The paths of two air masses, X and Y, are shown in the diagram.



Air mass X is a cold air mass. Air mass Y is a warm air mass. When the air masses meet, winter storms may be produced.

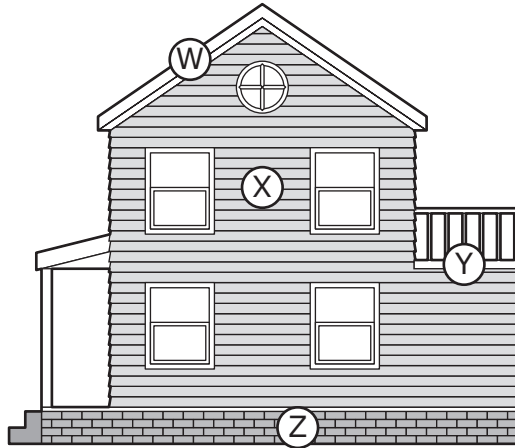
Which of the following **most likely** contributes to the formation of these storms?

- Ⓐ Cold air mass X moves over warm air mass Y, and evaporation occurs.
 - Ⓑ Warm air mass Y moves over cold air mass X, and condensation occurs.
 - Ⓒ Cold air mass X mixes with warm air mass Y, and the overall temperature increases.
 - Ⓓ Warm air mass Y mixes with cold air mass X, and the overall temperature decreases.
- 11 Which of the following describes what primarily causes the ocean tides in Massachusetts?
- Ⓐ convection from plate tectonics
 - Ⓑ gravity from the Moon and the Sun
 - Ⓒ convection from Earth's north and south poles
 - Ⓓ magnetism from Earth's north and south poles

This question has two parts.

12 Part A

The diagram shows a building with four parts labeled, W, X, Y, and Z.



Which part of the diagram represents the foundation of the building?

- (A) W
- (B) X
- (C) Y
- (D) Z

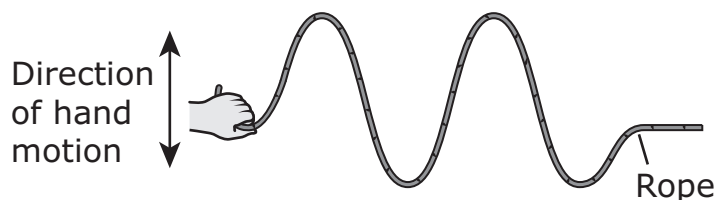
Part B

Which of the following describes the foundation?

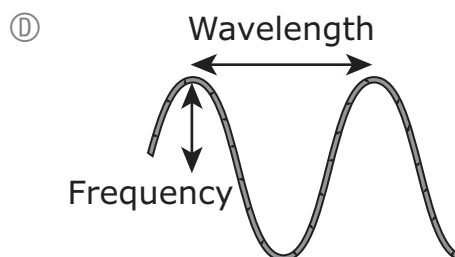
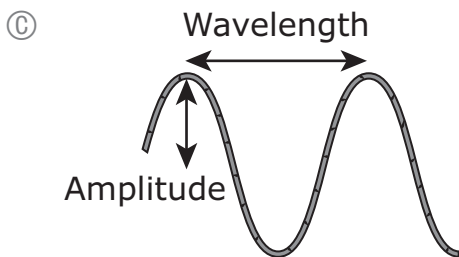
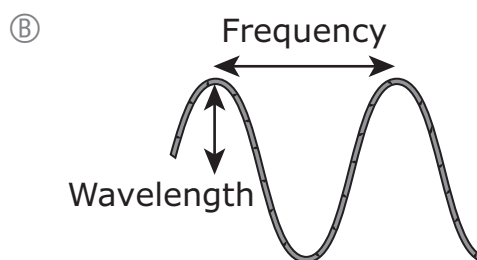
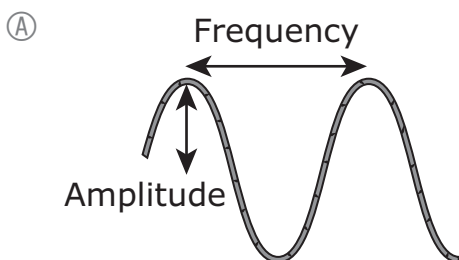
- (A) It is a flat surface that people can walk on, but it does not help to support the building.
- (B) It is a part that the entire building is built upon, and it keeps the building from sinking into the ground.
- (C) It is a vertical wall that blocks access and visibility, but it provides structural support for the building.
- (D) It is a cover that protects the building, and it shields anything inside from sunlight and precipitation.

This question has three parts. Mark your answer to Part A by filling in the correct circle and then write your response to Parts B and C on the next page. Be sure to label each part of your written response.

- 13** A student is investigating waves with a piece of rope. The student places the rope on the floor and then moves one end of the rope back and forth, as shown. The wave the student makes has a specific amplitude, frequency, and wavelength.



- A. Which of the following diagrams correctly identifies the different parts of the wave?



- B. Describe how the student's hand motion could be changed to make a wave with a greater frequency.
- C. Describe how the student's hand motion could be changed to make a wave that carries more energy in each wavelength. Explain your reasoning.

- 14 A student uses a keyboard on a laptop to type a message into an instant messaging program. The processor in the laptop runs the instant messaging program's commands. The laptop uses Wi-Fi to connect to the internet. Another student reads the message on a phone.

Which of the following correctly categorizes the parts of the communication system?

Ⓐ

Category	Part of System
source	Wi-Fi
encoder	phone
transmitter	keyboard
receiver	laptop's processor

Ⓑ

Category	Part of System
source	keyboard
encoder	laptop's processor
transmitter	Wi-Fi
receiver	phone

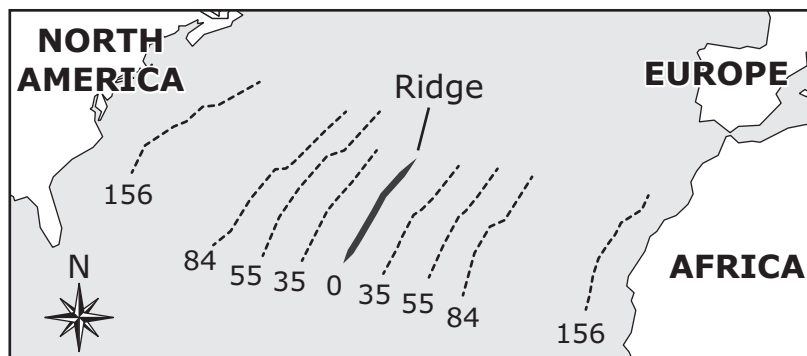
Ⓒ

Category	Part of System
source	keyboard
encoder	Wi-Fi
transmitter	laptop's processor
receiver	phone

Ⓓ

Category	Part of System
source	phone
encoder	Wi-Fi
transmitter	laptop's processor
receiver	keyboard

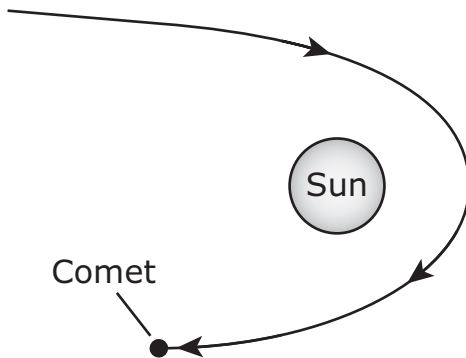
- 15 The map shows a ridge on the ocean floor. The dashed lines on either side of the ridge represent different parts of the ocean floor. The parts of the ocean floor are labeled with their ages in millions of years.



Based on the information in the map, which of the following best describes the ridge?

- (A) The ridge is a young volcanic mountain range formed by two plates colliding.
- (B) The ridge is a boundary between two plates that are moving away from the ridge.
- (C) The ridge is an ancient volcanic mountain range located in the middle of an oceanic plate.
- (D) The ridge is a boundary between two plates that are sliding back and forth along the ridge.

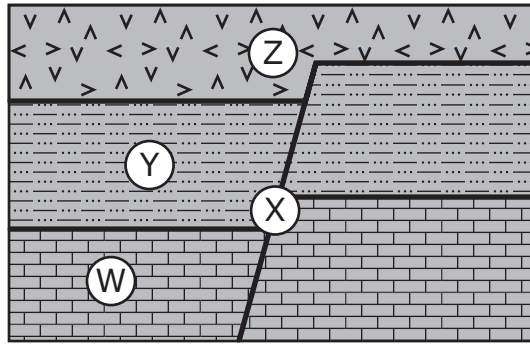
- 16 The diagram shows part of the path of a comet as it travels around the Sun.



Which of the following forces is most responsible for the comet's path?

- Ⓐ friction
- Ⓑ gravity
- Ⓒ lift
- Ⓓ magnetism

- 17 Rock layers W, Y, and Z and fault X are shown. The rock layers and the fault were formed at different times.



Which of the following shows the order of formation from oldest to youngest?

- (A) $W \rightarrow X \rightarrow Y \rightarrow Z$
- (B) $Z \rightarrow Y \rightarrow X \rightarrow W$
- (C) $W \rightarrow Y \rightarrow X \rightarrow Z$
- (D) $Z \rightarrow X \rightarrow Y \rightarrow W$

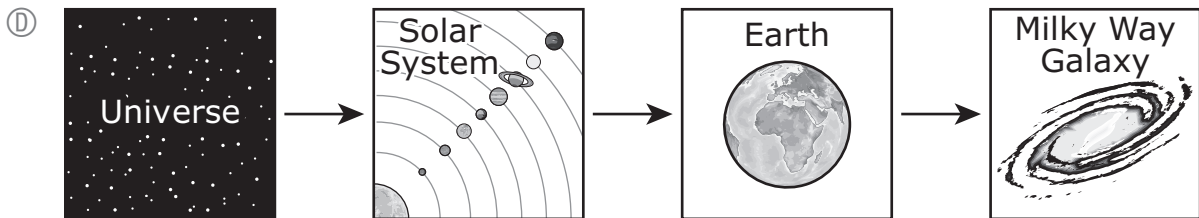
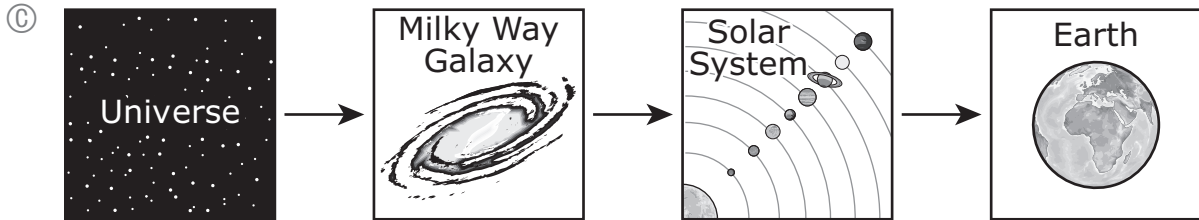
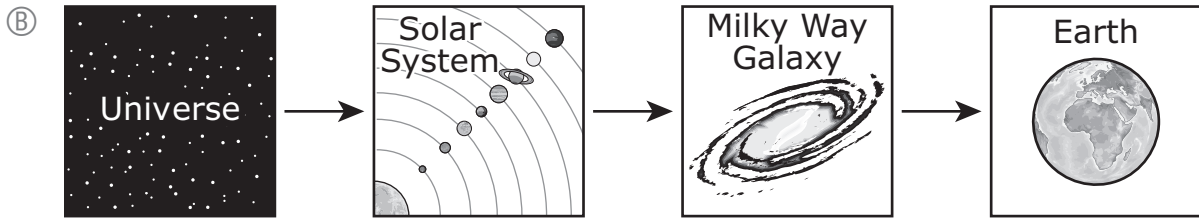
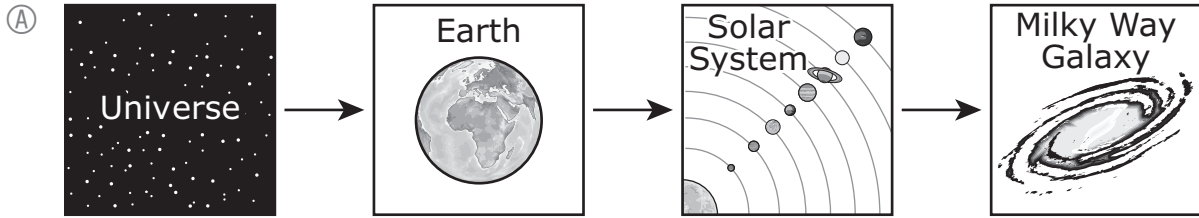
This question has two parts. Write your response on the next page. Be sure to label each part of your response.

- 18 A farmer tested the effect of fertilizer on the growth of 1000 pea plants. The farmer recorded the following observations.

	Plants without Fertilizer	Plants with Fertilizer
Number of Plants	500	500
Height (cm)	10–20	15–30
Flower Color	75% purple 25% white	75% purple 25% white

- A. Based on the observations, identify one characteristic of the pea plants that was mainly influenced by genetics. Support your answer with evidence from the information in the table.
- B. Based on the observations, identify one characteristic of the pea plants that was influenced by **both** genetics and the environment. Support your answer with evidence from the information in the table.

19 Which of the following best shows the structure of the universe?



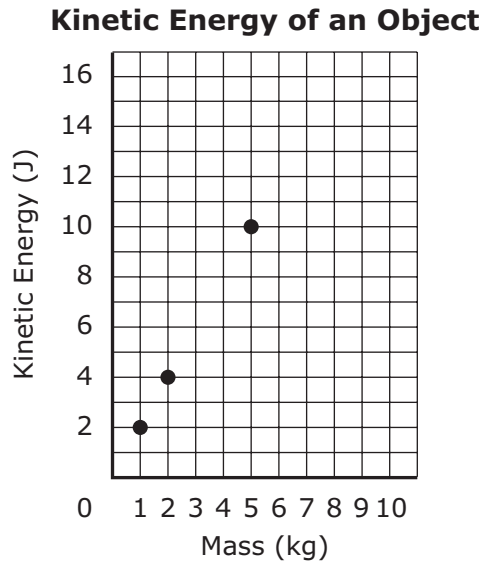
- 20 A manufacturer is considering using four different materials to construct a pan for cooking on a stove. The table shows the thermal conductivity and melting point of each material. A material with a higher thermal conductivity value conducts more thermal energy.

Material	Thermal Conductivity (W/K•m)	Melting Point (K)
aluminum	236	933
copper	400	1357
iron	68	1422
stainless steel	17	1783

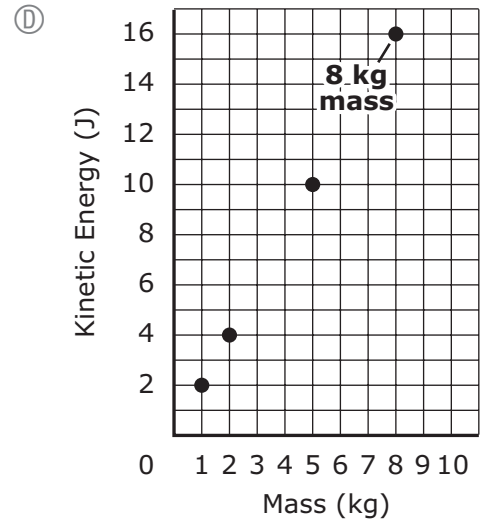
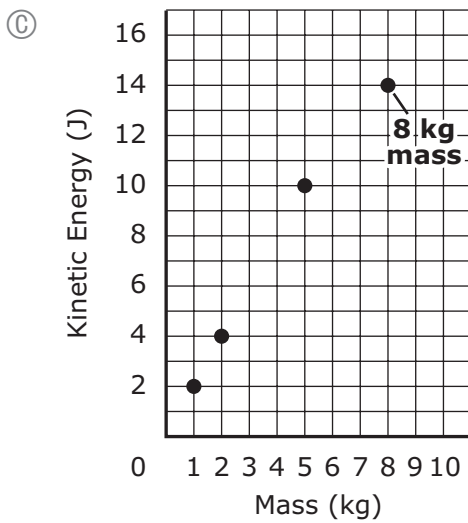
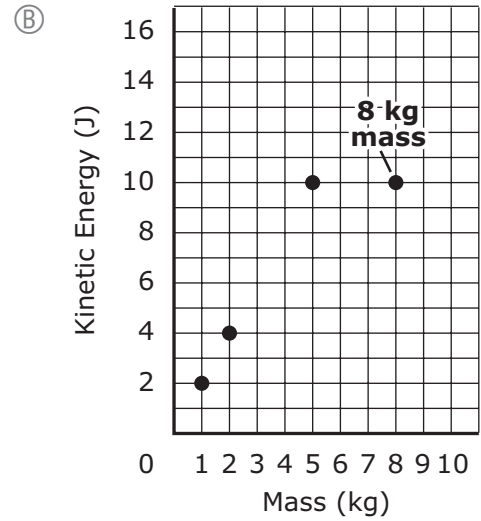
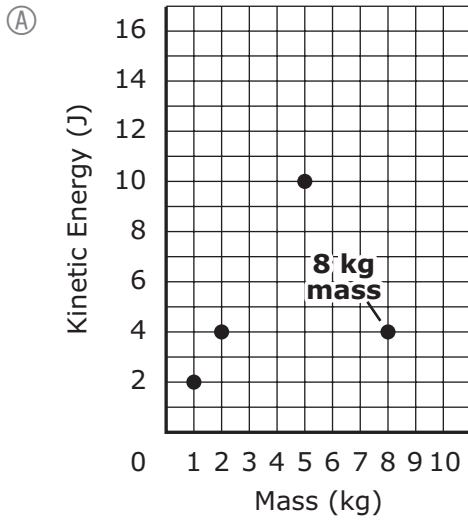
Which materials should be used for the pan?

- Ⓐ The manufacturer should use aluminum for the bottom of the pan and iron for the handle.
- Ⓑ The manufacturer should use aluminum for the bottom of the pan and copper for the handle.
- Ⓒ The manufacturer should use iron for the bottom of the pan and stainless steel for the handle.
- Ⓓ The manufacturer should use copper for the bottom of the pan and stainless steel for the handle.

- 21 A student used a computer simulation to investigate how the kinetic energy of an object changes as the object's mass changes. The object moves at a constant speed during the simulation. The graph shows the kinetic energy of the object with three different masses. The student also ran the simulation with a fourth mass of 8 kg, which is not shown on the graph.



Which graph shows the kinetic energy of the object with the 8 kg mass?



This question has two parts.

- 22 A plant species produces two types of seeds, rounded seeds and wrinkled seeds. The allele for rounded seeds (**R**) is dominant to the allele for wrinkled seeds (**r**). A plant heterozygous for this trait (**Rr**) is crossed with a homozygous plant (**rr**).

Part A

Which Punnett square correctly shows this cross?

Ⓐ

	R	r
r	Rr	rr
r	Rr	rr

Ⓑ

	R	R
r	Rr	Rr
r	Rr	Rr

Ⓒ

	R	r
r	Rr	rr
r	rr	rr

Ⓓ

	R	r
R	RR	Rr
r	Rr	rr

Part B

What is the probability that an offspring will have rounded seeds?

- Ⓐ 0
- Ⓑ $\frac{1}{4}$
- Ⓒ $\frac{1}{2}$
- Ⓓ $\frac{3}{4}$
- Ⓔ 1

- 23 A computer touch screen allows users to enter information. Users have complained that the touch screen is too difficult to operate because the system does not indicate when a choice has been selected.

The complaints are which element of the universal systems model?

- Ⓐ feedback
- Ⓑ goal
- Ⓒ inputs
- Ⓓ processes

