STUDENT NAME _____
(please print)

Grade
11

New Jersey Student Learning Assessment–Science (NJSLA–S) Practice Test

FORM
A

Grade 11

Sample Items

This test booklet contains several different types of test questions. See the samples below, which will help you understand how to respond to each question type.

When answering questions in this test, be sure to write your answers in your answer document. **Only the answers you write in your answer document will be scored.**

Sample Item 1. Multiple-Choice (Select one answer.)

Which claim about the Sun is accurate?

A. The Sun appears smaller and brighter than other stars because it is the closest star to Earth.

B. The Sun appears larger and brighter than any other star because it is the closest star to Earth.

C. The Sun appears larger and less bright than other stars because it is the farthest star from Earth.

D. The Sun appears smaller and less bright than any other star because it is the farthest star from Earth.

Sample Item 2. Multi-Select (Select multiple answers.)

Select **two** answers for this item. The risk of an earthquake happening is **higher**

A. in the South than in Alaska.

B. on the West Coast than in the Northeast.

C. on the East Coast than on the West Coast.

D. in Alaska than in the center of the country.

E. in the center of the country than on the West Coast.

Sample Item 3. Multi-Select Box Item (Select one answer for each box.)

A student claims that a soccer ball has less energy after it hits a wall. Select the correct word from each box to complete the statement that explains why this claim is true.

When a soccer ball hits the wall, [Y] of the soccer ball's energy is transferred to the air in the form of [Z].

Box Y

A. all

B. some

C. none

Box Z

A. light

B. sound

Sample Item 4. Constructed Response (Write out your answer.)

Many New Jersey towns have started programs to reduce the amount of traffic on roads as a means to help improve air quality. Give **two** examples of programs that would help reduce traffic and improve air quality.

Answers to Sample Questions

1. Ⓐ ● Ⓒ Ⓓ

2. Ⓐ ● Ⓒ ● Ⓔ

3. Box Y
Ⓐ ● Ⓒ

Box Z
Ⓐ ●

4. *Carpooling is one means to reduce the number of cars on the roads. Using public transit when available would also decrease the number of individual cars. Both of these measures would help improve air quality.*

STOP

Unit 2 Practice Test

Directions:

Today you will take Unit 2 of the Grade 11 New Jersey Student Learning Assessment - Science (NJSLA-S) Test.

Follow the directions to answer each question. Mark your answers by completely filling in the circles in your answer document. **Only answers you provide in your answer document will be scored.** Do not make any pencil marks outside the circles in your answer document. 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 your answer document. 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. If you finish early, you may review your answers and any questions you did not answer in this unit **ONLY**. Do not go past the stop sign.

Use the information below to answer questions 1-3.

Information about Earth's early history may be contained in materials from Mars, the Moon, and meteorites.

Various theories have been presented to explain the formation of the Moon during the early history of Earth:

Fission Theory: The Moon formed when a small, outer portion of the spinning Earth separated from the larger body and moved into space.

Capture Theory: The Moon formed elsewhere in the solar system, but in a similar manner to Earth. It then moved toward Earth and was captured by Earth's gravity.

Condensation Theory: The Moon formed separately from Earth, but in a similar manner and in the same vicinity.

Impact Theory: The Moon formed following a violent impact between Earth and a Mars-sized object. The impact caused the outer portion of molten Earth to be ejected. Gravity caused the debris to attract and eventually combine to form the Moon.

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GO ON →

1. The comparison of certain types of atoms, called isotopes, found on the Moon and elsewhere in the solar system may provide information about how the Moon formed. Ratios of specific oxygen isotopes present in rock vary with location in the solar system. The figure shows the oxygen isotope distribution trends in rock samples from the surfaces of Earth, Mars, the Moon, and Vesta.

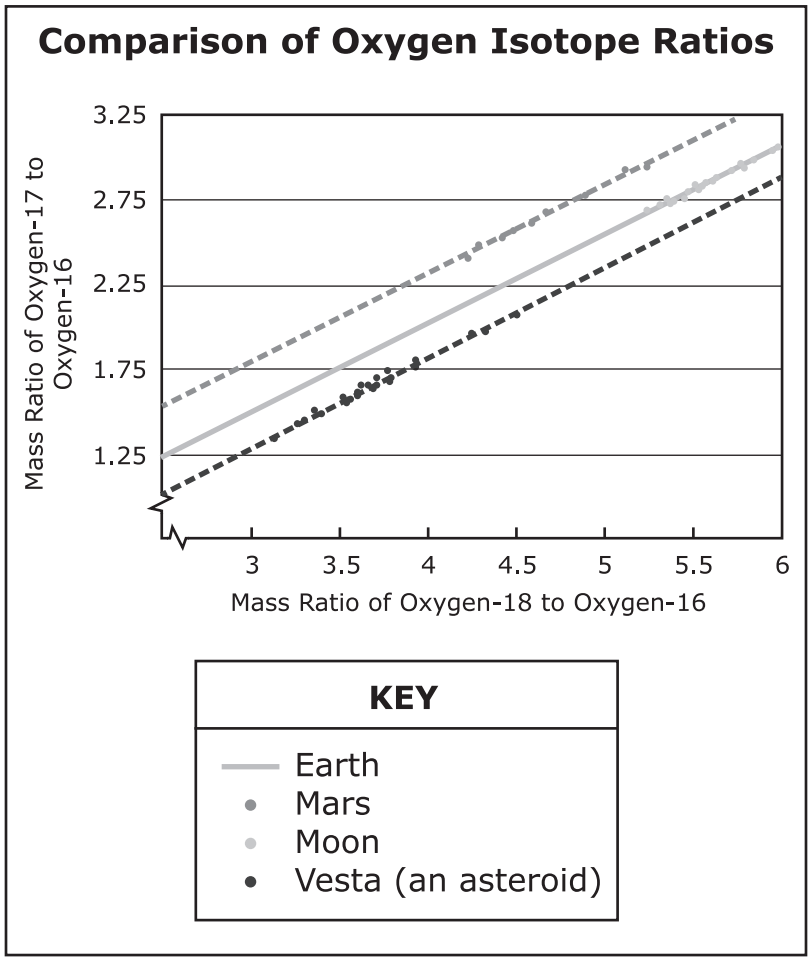

Figure 1.

GO ON →

(Item 1 continued)

Complete the statement that explains how oxygen isotope evidence could support the Fission or Impact theory.

Complete the sentence by choosing the correct answer from each box.

Based on Figure 1, for the Fission or Impact theory to be plausible, the composition of the foreign body would have had to be [Y] that of [Z].

Box Y

A. very different from

B. nearly identical to

Box Z

A. Earth

B. Mars

C. Vesta

2. Though Earth and the Moon have numerous common elements in their compositions, the Moon has fewer volatile materials. Scientist believe that temperatures on the Moon reached at least 1,400 °C at the time of its formation.

Table 2. Elements on Earth Also Found on the Moon

Element	Boiling Point (°C)
Potassium	765
Sodium	883
Zinc	910

Based on Table 2, correctly complete the statement that identifies which theory best accounts for the lack of volatile elements on the Moon.

Complete the sentence by choosing the correct answer from each box.

The **Y** theory best explains the lack of volatile elements on the Moon because the tremendous **Z** in pressure associated with this theory would generate the heat necessary to volatilize some elements.

Box Y

A. Fission

B. Capture

C. Impact

Box Z

A. increase

B. decrease

3. Every planetary body in the solar system has a specific composition and density. Based on the data, indicate which statement would support each formation theory.

Complete the table by selecting the correct answer from each box.

Theory	Statement
Fission	W
Capture	X
Condensation	Y
Impact	Z

Box W

A. Earth and the Moon have similar compositions.

B. Earth and the Moon have different compositions.

Box X

A. Earth and the Moon have similar compositions.

B. Earth and the Moon have different compositions.

Box Y

A. Earth and the Moon have similar compositions.

B. Earth and the Moon have different compositions.

Box Z

A. Earth and the Moon have similar compositions.

B. Earth and the Moon have different compositions.

Use the information below to answer questions 4-6.

Rubidium and bromine, elements located on opposite sides of the periodic table, readily form a product when combined, as shown in the equation.

$$2Rb + Br_2 \rightarrow 2RbBr$$

Atomic properties of an element can be related to the position of the element on the periodic table as shown in Figure 1.

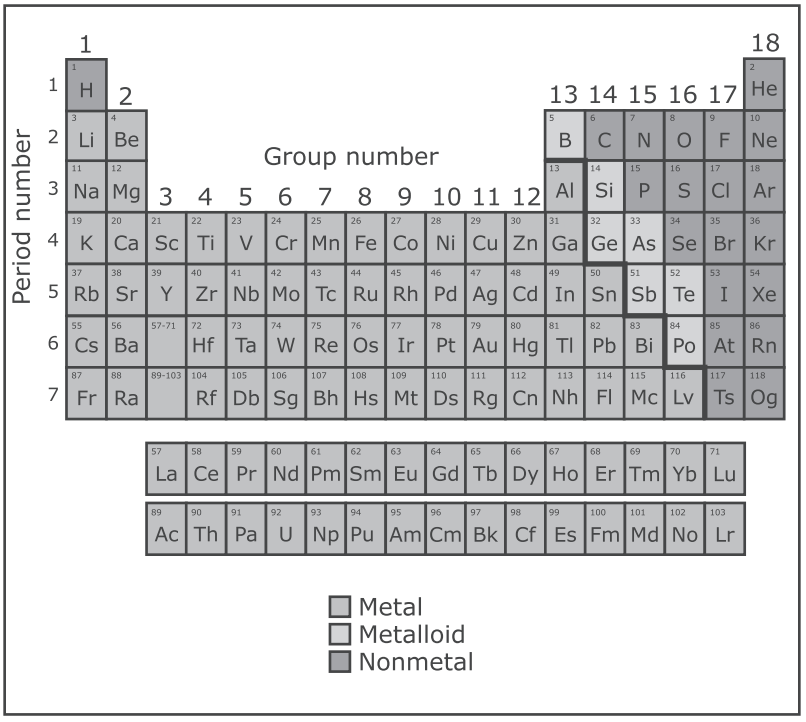

Figure 1. Periodic Table of the Elements

4. Which piece of information found in Figure 1 is **most** useful in determining the number of outer electrons present in an atom?

A. group number

B. period number

C. type of element

D. metal or nonmetal

5. Based on its position on the periodic table, predict the charge that strontium (Sr) will take when forming a compound.

Complete the sentence by choosing the correct answer from each box.

When strontium forms a compound, it will have a **Y** charge with a magnitude (number) of **Z**.

Box Y

A. positive

B. negative

Box Z

A. 1

B. 2

C. 3

6. Which is the correct formula for strontium chloride, based on the placement of each element in the periodic table?

A. SrCl

B. Sr_2Cl

C. $SrCl_2$

D. Sr_2Cl_3

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GO ON →

Use the information below to answer questions 7-9.

Large male salmon have the highest rates of reproduction, yet only small male salmon are observed mating in one river.

In male salmon, reproductive success is a measure of advantageous traits and fitness in terms of natural selection. Table 1 shows data on percentages of successful matings by adult male salmon from five different regions in Alaska.

Table 1. Reproductive Success (%) in Different Regions, by Size of Male Salmon

Region	Salmon Body Size (millimeters)				
	150 mm	200 mm	250 mm	300 mm	350 mm
A	13	20	30	40	66
B	20	23	30	43	66
C	23	27	33	43	70
D	27	27	37	43	70
E	33	37	37	47	77

The graph shows data on the probability of predation for male salmon in a fished Alaskan river and in a non-fished Alaskan river.

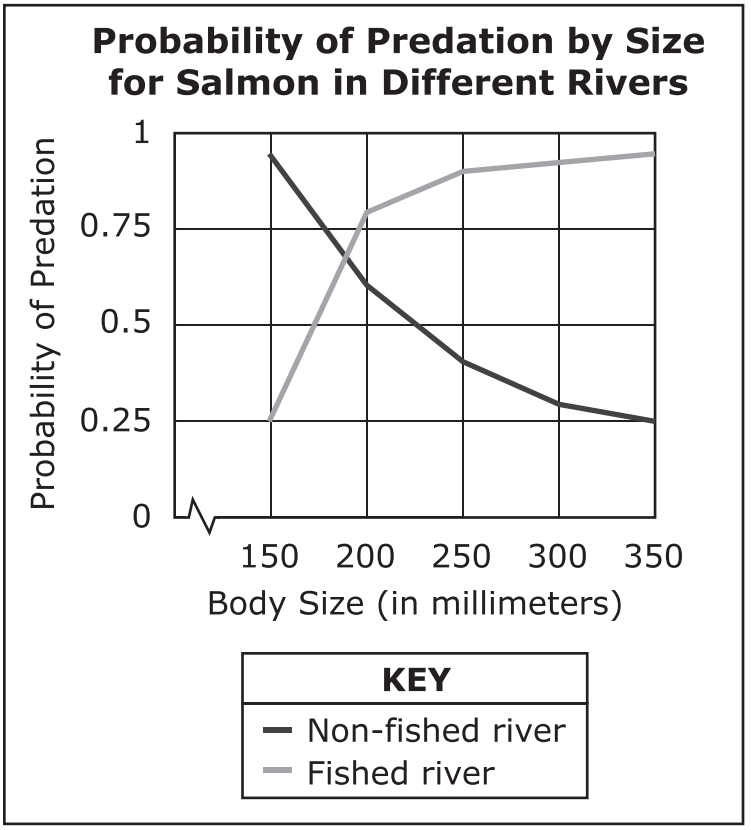
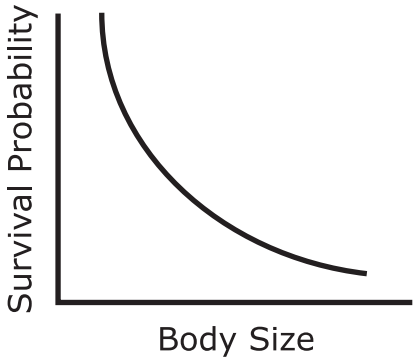


Figure 1.

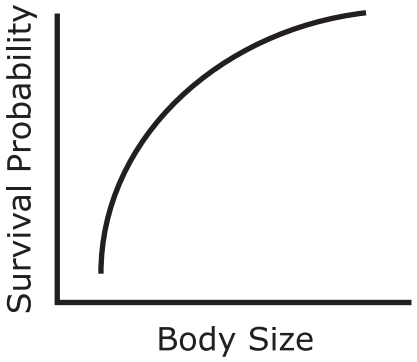
GO ON →

7. Based on Figure 1, which model describes the survival of salmon in the river where people do not fish?

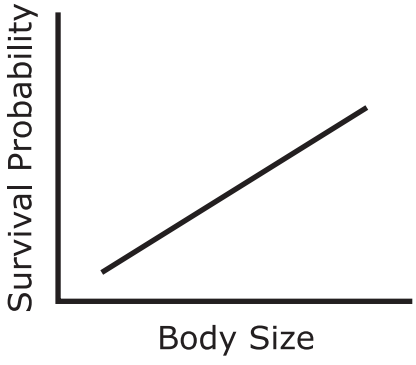
A.



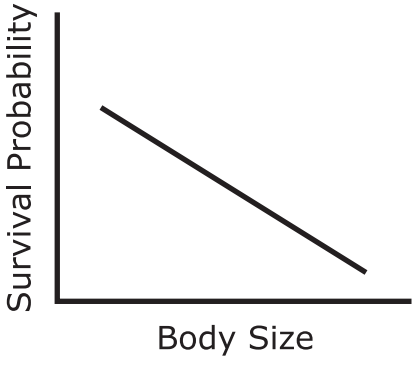
B.



C.



D.



8. Which **best** explains the selective pressure for size in the male salmon populations in the fished and non-fished rivers?

Select **two** of the five statements.

A. In both rivers, there is selective pressure for medium-sized fish.

B. In the river where people do not go fishing, reproductive success selects for larger fish.

C. In the river where people do not go fishing, reproductive success selects for smaller fish.

D. In the river where people catch fish, commercial fishing selects for the survival of larger fish.

E. In the river where people catch fish, commercial fishing selects for the survival of smaller fish.

9. In many species of fish, sexual selection primarily drives natural selection. Based on Table 1, predict how body size will change over time.

Complete the sentences by choosing the correct answer from each box.

Female salmon from [Y] regions preferred to reproduce with the largest males. Unless conditions change, salmon size in these populations is most likely to [Z].

Box Y

A. no

B. all

C. some

Box Z

A. decrease

B. increase

C. stay the same

Use the information below to answer questions 10-12.

A bicycle tire is filled with air. As the tire approaches its maximum volume, it begins to feel noticeably warmer and the pump handle becomes harder to push down as more air is added.

The figure illustrates a bicycle tire being inflated with air. The bicycle pump adds more gas molecules from the air to the tire each time the handle is pushed down.

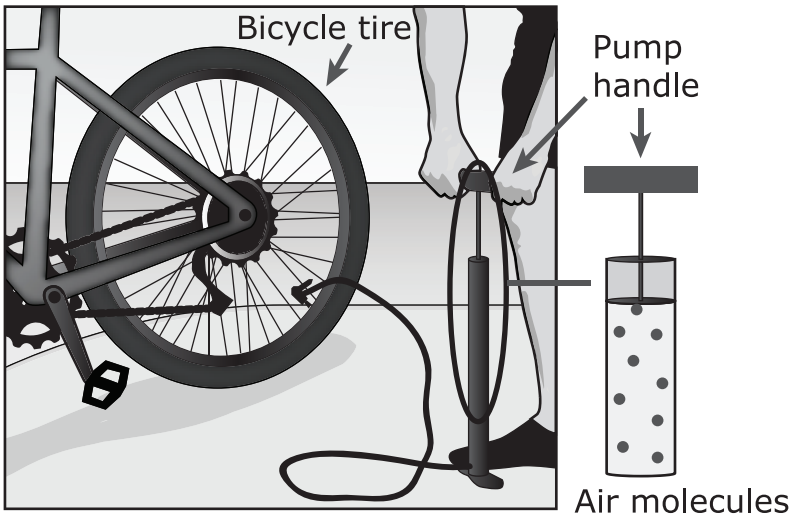


Figure 1. Filling a Bicycle Tire with Air

10. Which question, if answered, would **best** support an explanation of why the tire gets warmer as air is added?

A. How does adding more gas molecules affect the total chemical energy?

B. How does adding more gas molecules affect the total gravitational potential energy?

C. How does adding more gas molecules affect the total kinetic energy?

D. How does adding more gas molecules affect the total potential energy?

11. Identify the variables that should be measured to determine the relative change in energy within a bicycle tire if air molecules continue to be added once the pump handle becomes harder to push down.

Select **two** of the five variables.

A. the change in tire pressure

B. the volume of the bicycle tire

C. the shape of the air molecules

D. the dimensions of the bicycle pump

E. the change in temperature of the tire

12. Select from each box to correctly compare each given factor before and after air molecules are pumped into a bicycle tire.

Complete the table by choosing the correct answer from each box.

Factor	Before	After
Number of air molecules per unit volume	U	V
Total energy of air molecules in the tire	W	X
Number of collisions per second between the gas molecules and the tire	Y	Z

(Item 12 continued)

Box U

A. lower

B. higher

Box V

A. lower

B. higher

Box W

A. lower

B. higher

Box X

A. lower

B. higher

Box Y

A. lower

B. higher

Box Z

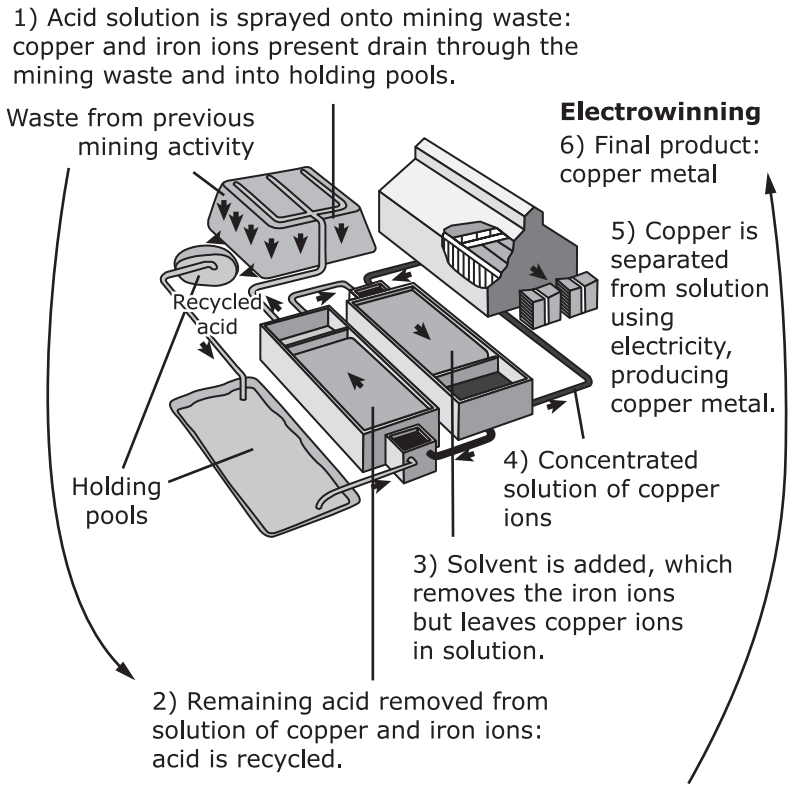
A. lower

B. higher

Use the information below to answer questions 13-15.

Traditional mining techniques used to extract materials such as copper are being abandoned in some cases in favor of other techniques that also produce these materials.

Removal of copper from Earth's crust through mining has reduced this nonrenewable resource over time. Increased use of improved technologies, such as solvent extraction and electrowinning shown in Figure 1, has reduced the reliance on standard raw copper ore. These technologies are used in a process to extract copper from waste materials previously produced from traditional mining. The amount of waste available from previous mining makes the use of these technologies efficient for many years.



Solvent Extraction - extracting and concentrating metals from waste by using solvents

Figure 1. Solvent Extraction and Electrowinning of Copper

GO ON →

13. Based on Figure 1, which questions, if answered, would **best** help scientists determine the long-term economic and environmental impacts of using this process for extracting copper?

Select **two** of the six questions.

A. Which part of the process is most energy efficient?

B. Will this process eventually be automated?

C. Can the products made from copper extracted with this process be recycled?

D. Does this process minimize the amount of pollution through recycling?

E. Does this process increase the supply of copper without the cost of additional mining?

F. Does this process recover metals other than copper and iron from the mining waste?

14. The solvent extraction-electrowinning technology has improved over time. Approximately 2.2 million tons of high-quality copper were produced using this technology in the year 2000. Table 1 shows the advancement of this technology, which includes how the solvent that extracts the copper has changed.

Table 1. Changes in Solvent Technology over Time

Property	1965	1970	1980	2000
Ability of solvent to remove copper ions from acid	Poor	Poor	Good	Excellent
Separation of copper ions from iron ions	Poor	Good	Good	Excellent
Speed of copper ion removal	Slow	Medium	Fast	Fast
Stability against decomposition	Excellent	Excellent	Good	Poor
Generation of impurities	Medium	Low	Medium	Low
Ability to chemically modify solvent to extract different metal ions	Poor	Fair	Good	Excellent

Which property of the solvent may be a limitation of the advancement of this technology in the future?

A. speed of copper ion removal

B. stability against decomposition

C. separation of copper ions from iron ions

D. ability to chemically modify solvent to extract different metal ions

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GO ON →

15. Along with using new technology to extract copper, conserving copper through recycling also has long-lasting benefits.

Table 2. Economic Benefits of Recycling Copper

	Extraction	Recycling
Energy Required (gigajoules per metric ton)	100	10
Cost (dollars per metric ton)	$16,200	$14,600
Air Pollution (metric tons per year)	400,000	56,000

Indicate which claims about the potential benefits of recycling copper are supported by Table 2 and which are not supported by Table 2.

Complete the table by choosing the correct answer from each box.

Claim	Supported or Not Supported
Extracted copper produces more energy.	V
Recycled copper is worth 10% more than raw copper ore.	W
Recycling requires only 10% of the energy needed for extraction.	X
It is cheaper to recycle old copper than to mine and extract new copper.	Y
Recycled copper produces the same amount of air pollution as raw copper ore.	Z

(Item 15 continued)

Box V

A. Supported

B. Not Supported

Box W

A. Supported

B. Not Supported

Box X

A. Supported

B. Not Supported

Box Y

A. Supported

B. Not Supported

Box Z

A. Supported

B. Not Supported

Use the information below to answer questions 16-18.

While planes fly in refueling formation as shown in the figure, the pilot of the tanker aircraft never adjusts the throttle[1], but the pilot of the receiver aircraft must constantly increase the throttle to keep up with the tanker aircraft.

Air-to-air refueling is used to increase the distance an aircraft can fly. Fuel flows from a tanker aircraft to a receiver aircraft through a device called a boom, as shown in the figure.

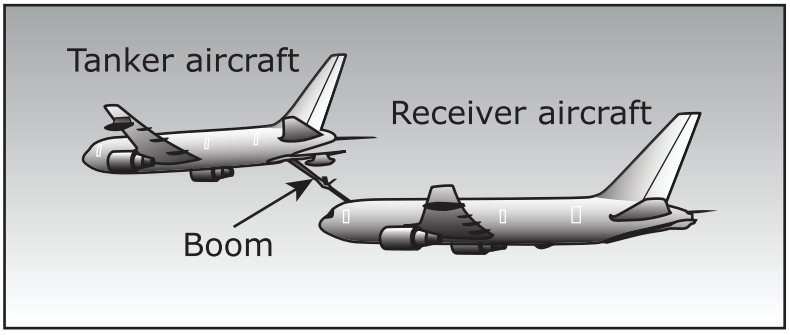

Figure 1. Air-to-Air Refueling

[1]throttle—A device that controls the flow of fuel or power to an engine.

16. Using Newton's second law ($F = ma$), select the option that best completes the table to describe the relationships between force, mass, and acceleration of airplanes.

Force ($\times 10^3$ N*)	Mass ($\times 10^3$ kg)	Acceleration (m/s^2)
500	125	?

***1 newton = 1 kg × 1 m/s^2**

A. 1

B. 2

C. 3

D. 4

17. According to Newton's second law ($F = ma$), which statement **best** explains why the pilot of the receiver aircraft must increase the throttle to keep up with the tanker aircraft?

A. The tanker aircraft is losing mass, resulting in increased acceleration.

B. The tanker aircraft is losing mass, resulting in decreased acceleration.

C. The tanker aircraft is gaining mass, resulting in increased acceleration.

D. The tanker aircraft is gaining mass, resulting in decreased acceleration.

18. The receiver aircraft has a mass of 110,000 kg and has an acceleration of 4.5 m/s^2 prior to refueling in flight. The receiver aircraft then receives 30,000 kg of fuel from the tanker aircraft. According to Newton's second law ($F = ma$), select the correct word or phrase from each box to correctly complete the statement.

After refueling in flight, acceleration of the receiver aircraft **Y**, from 4.5 m/s^2 to **Z** m/s^2.

Box Y

A. increases

B. decreases

C. remains the same

Box Z

A. greater than 4.5

B. 4.5

C. less than 4.5

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GO ON →

Use the information below to answer questions 19-23.

Two marathon runners of similar athletic capabilities are running a marathon. Runner 1 ate a large meal of pasta the night before the race. Runner 2 ate tuna fish and salad. After 100 minutes of the race, one runner is farther ahead than the other runner.

Proteins, carbohydrates, and fats are dietary components that are the three basic nutritional building blocks of food. All of these can be converted to glucose, which is the body's primary energy source.

Glucose can also be converted to glycogen, which is used as a source of energy while running when it is available, and stored in liver and muscle tissue.

Figure 1 shows the glycogen levels of the two runners and the distances they traveled during the first 100 minutes of the race.

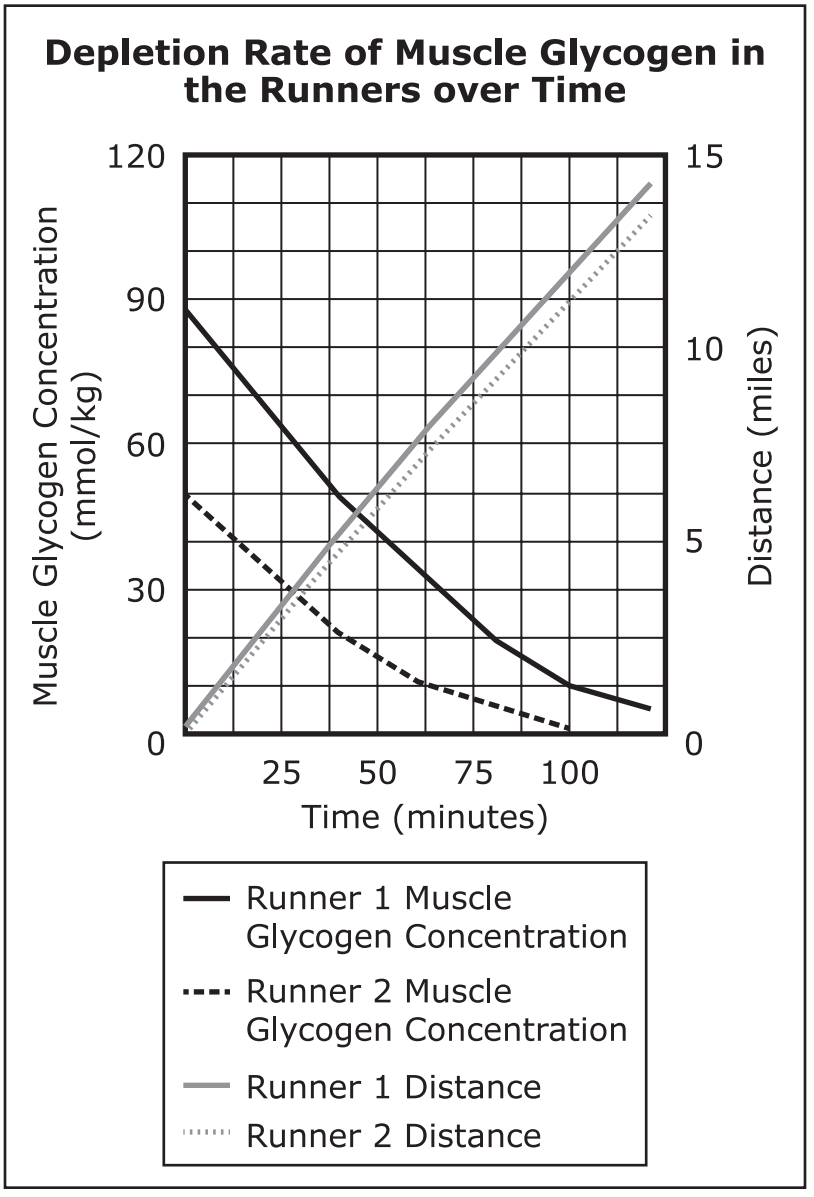

Figure 1.

GO ON →

The glycemic load of a food indicates how much blood glucose is produced by eating that food. A higher glycemic load represents a food having more carbohydrates. One unit of glycemic load approximates the effect of eating one gram of glucose. Table 1 and Table 2 show the glycemic load of each runners' meal.

Table 1. Glycemic Load of Runner 1's Meal

Food	Glycemic Load
Macaroni	23
Sauce	1
Cheese	2
Apple	3

Table 2. Glycemic Load of Runner 2's Meal

Food	Glycemic Load
Tuna fish	0
Lettuce	0
Tomato	3
Salad dressing	2

19. Based on Figure 1, which questions would **best** describe why the two runners' meals caused them to run different distances?

Select **two** of the five questions.

A. Why do runners use so much energy?

B. How much energy does each dietary component contain?

C. How much of each dietary component did each runner eat?

D. Which dietary components are found in the majority of foods?

E. Why do some foods have more of each dietary component than others?

20. Based on the data, explain how the change in glycogen levels was different for each runner in the first 100 minutes of the race.

Enter your response in your answer document. Support your answer with information from the data.

Based on the data, identify the runner who traveled the greater distance, and describe how the food the runners ate correlates with the difference in distance traveled over 100 minutes.

Enter your response in your answer document. Support your answer with information from the data.

Based on the data, predict if the rate of running for Runner 2 will be maintained after 100 minutes, and explain why.

Enter your response in your answer document. Support your answer with information from the data.

21. Cellular respiration can be represented by the following equation:

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + \text{Energy}$$

Based on Figure 1 and the cellular respiration equation, over the course of the race, identify how the inputs and outputs of cellular respiration change.

Complete the table by selecting the correct answer from each box.

Change	Increases or Decreases
Total Energy Production	W
Runner's Body Heat	X
Oxygen Consumption	Y
Glycogen Stored in Muscles	Z

Box W

A. Increases

B. Decreases

Box X

A. Increases

B. Decreases

Box Y

A. Increases

B. Decreases

Box Z

A. Increases

B. Decreases

22. Table 3 shows the nutrient content of the food eaten by the runners before the marathon.

Table 3. Nutrient Content of Runners' Food

	Protein (g)	Fat (g)	Carbohydrate (g)	Calories
Runner 1	18	12	40	?
Runner 2	38	14	16	?

1 gram of protein = 4 calories
1 gram of fat = 9 calories
1 gram of carbohydrate = 4 calories

A student claims that the amount of muscle glycogen is only based on the amount of calories consumed, not the type of food. Based on Figure 1 and Table 3, support or refute the student's claim.

Complete the sentence by choosing the correct answer from each box.

The runner that consumed more calories had [X] muscle glycogen concentration compared to the other runner. This means that when different types of food are digested and broken down, they are reassembled into [Y] products, which [Z] the claim.

Box X

A. a lower

B. a higher

C. the same

Box Y

A. the same

B. different

Box Z

A. refutes

B. supports

23. Table 4 shows the glycemic load of the meal a third runner ate before the race.

Table 4. Glycemic Load of Runner 3's Meal

Food	Glycemic Load
Chicken	0
Sweet Potatoes	10
Broccoli	0

Based on the data, predict how Runner 3 would be doing compared to Runners 1 and 2 after 100 minutes of the race.

Complete the sentences by choosing the correct answer from each box.

Runner 3's distance was **Y** Runner 1's distance.

Runner 3's distance was **Z** Runner 2's distance.

Box Y

A. >

B. <

C. =

Box Z

A. >

B. <

C. =

You have reached the end of Unit 2 of the test.

- **Review your answers from Unit 2.**