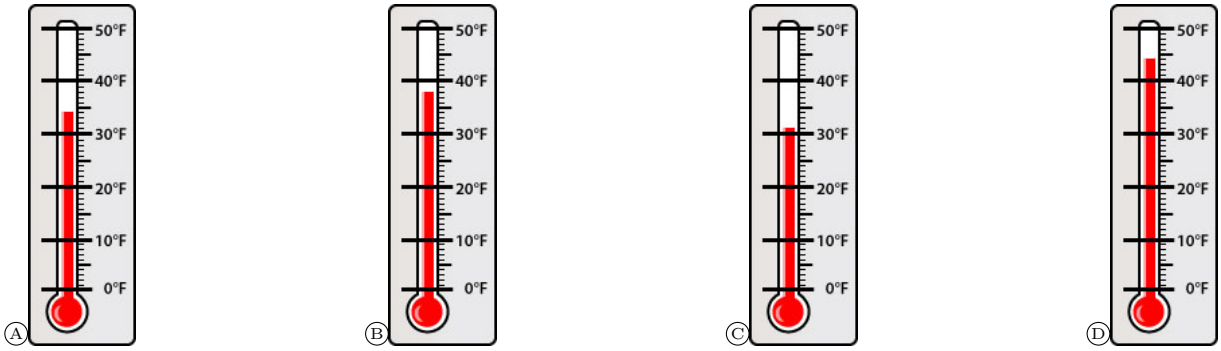
Question 1

The pictures below show thermometers with different temperatures. Which thermometer shows a temperature of 34 degrees Fahrenheit?



Question 2

This circle graph shows different pollutants that harm the ocean ecosystem.

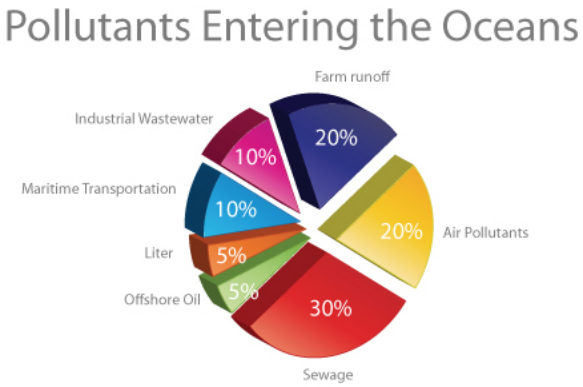
What can you conclude based on the graph?

Ⓐ Sewage, litter, and industrial wastewater provide half of all ocean pollution.

Ⓑ The combined threat of offshore oil and air pollutants is greater than the combined threat of maritime transportation and farm runoff.

Ⓒ Air pollution and farm runoff together pose a greater threat than any single pollutant.

Ⓓ Offshore oil and industrial wastewater together pose a greater threat than any single pollutant.



Question 3

A class wants to do an experiment to determine how walking up a flight of stairs affects a person's heart rate. What should they do to establish a control before they do the experiment?

Ⓐ measure the height of the flight of stairs

Ⓑ find out the weight of each person in the control group

Ⓒ estimate how long it will take for each person to walk up the stairs

Ⓓ determine the average heart rate of each person in the control group

Question 4

A group of students is investigating whether soil type affects the soil's ability to hold water. They are creating a data table to record their findings. What data should be included in the fifth column?

Ⓐ Color of soil after water has drained

Ⓑ Time it took for water to drain out

Ⓒ Amount of water left in soil

Ⓓ Number of times experiment was repeated

TYPE OF SOIL	AMOUNT OF SOIL	AMOUNT OF WATER POURED IN	AMOUNT OF WATER THAT CAME OUT	?

Question 5

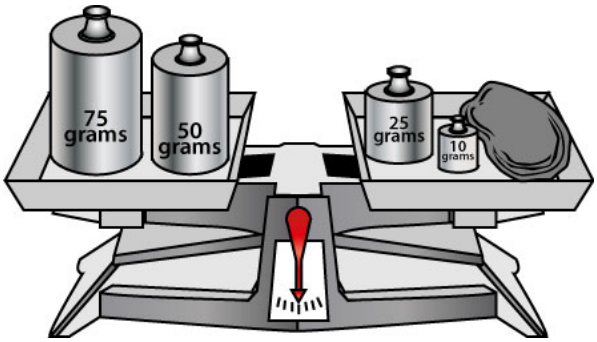
The pans in this balance are at the same height. According to this information, the mass of the rock sample is

Ⓐ 75 grams

Ⓑ 90 grams

Ⓒ 125 grams

Ⓓ 160 grams



Question 6

Mount St. Helens is an active volcano located in the state of Washington. It is one of many volcanoes that dot the edges of the Pacific Ocean Basin, known as the "Ring of Fire."

Which of the following is the **best** explanation for the existence of Mount St. Helens?

Ⓐ It formed due to erosion at the northern edge of the Rocky Mountain range.

Ⓑ It formed at the borders of moving tectonic plates.

Ⓒ It formed due to glaciation and extreme temperature changes.

Ⓓ It formed due to a fold in a rock layer.

Question 7

Some students are performing an experiment to learn about friction. They are using smooth wooden blocks that all have the same mass, as well as large pieces of carpet, foil, tile, and felt. Which question can be answered through their experiment?

Ⓐ What are the different types of friction?

Ⓑ When is the force of friction helpful?

Ⓒ How does the force of gravity affect friction?

Ⓓ How do different surfaces affect the force of friction?

Question 8

Some students are conducting an experiment to see how human heart rates change under different conditions. They are using a stethoscope, a stopwatch, and paper and pens to track their data. Which question can be answered through experimentation?

Ⓐ Why does the heart beat faster when a person does jumping jacks?

Ⓑ What effect does running in place have on a person's heart rate?

Ⓒ What is going on inside the heart when it beats faster?

Ⓓ Why do some students have faster resting heart rates than others?

Question 9

A student is performing an experiment to find out whether more condensation will form on a glass of water with ice or on a glass of soda with ice. She thinks that the CO_2 in the soda will affect condensation, but she is not sure how. In order to perform a fair experiment, the student should be sure to

Ⓐ use different types of soda.

Ⓑ add ice to the glasses first, then add the soda or water.

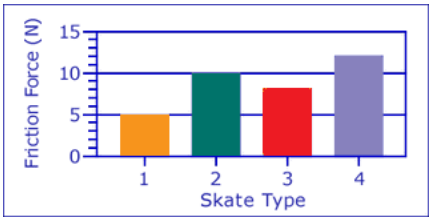
Ⓒ use glasses that are all the same shape and size.

Ⓓ use water and soda that are a different temperatures.

Question 10

An ice hockey team has hired you to test out four types of ice skates for the best speed. You know that skates that have the least amount of friction on ice can achieve the highest speed. Friction is the force that acts in the opposite direction to movement.

Using force sensors, you have measured the amount of force required to move the different skates on ice and entered the data into the table and graph below. Based on the table and graph, determine which type of skates is **best** suited for high speed skating.



Ⓐ Skate 1

Ⓑ Skate 2

Ⓒ Skate 3

Ⓓ Skate 4

Skate Type	Force required to move the skates, or friction force (Newton)
Skate 1	5
Skate 2	10
Skate 3	8
Skate 4	12

Question 11

Some students performed an experiment to find out how much water different types of soil absorb. They conducted three trials, using potting soil and sand. They recorded their data in this data table.

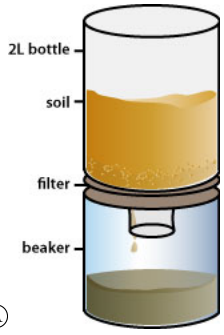
TRIAL	SOIL TYPE	SOIL AMOUNT (liters)	WATER POURED IN (mL)	WATER THAT CAME OUT (mL)	WATER LEFT IN SOIL (mL)
1	Sand	1	1	0.55	0.45
1	Potting Soil	1	1	0.3	0.7
2	Sand	1	1	0.65	0.35
2	Potting Soil	1	1	0.35	0.65
3	Sand	1	1	0.6	0.4
3	Potting Soil	1	1	0.4	0.6

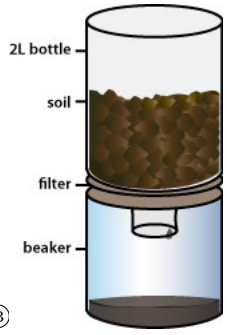
Find the average amount of water left in the potting soil during the three trials. Then find the average amount of water left in the sand. On average, how much more water was absorbed by the potting soil than by the sand?

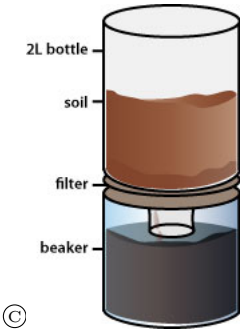
Ⓐ .25 mL Ⓑ .35 mL Ⓒ .4 mL Ⓓ .65 mL

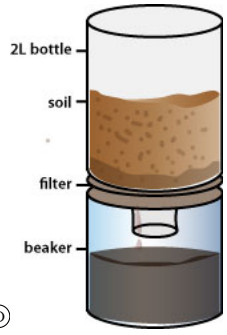
Question 12

MacKenzie tested four types of soil to find their absorbency, or how much water they absorb. She put each type of soil in a bottle with a filter in it and poured equal amounts of water into each bottle. She drew pictures of the results. Which soil has the greatest absorbency?

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

Question 13

In an experiment to determine how the length, or duration, of time spent climbing stairs affects heart rate, which factor should be graphed on the horizontal x axis?

Ⓐ the duration of time spent climbing stairs

Ⓑ the dependent variable

Ⓒ the starting heart rate

Ⓓ the ending heart rate

Question 14

An experiment is done to test how the height of an inclined plane affects the distance a ball rolls. What is the **independent variable** in this experiment?

Ⓐ the speed of the ball

Ⓑ the size of the ball

Ⓒ the distance the ball rolls

Ⓓ the height of the inclined plane

Question 15

A group of students conducted an experiment to find out how temperature affects the time it takes avocado seeds to germinate. They recorded their data in this table.

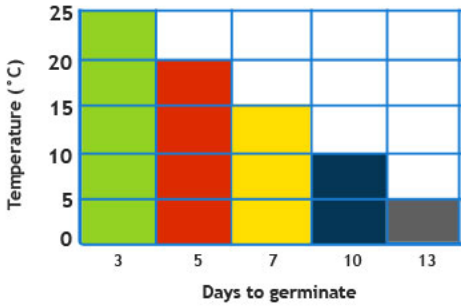
Based on the data, what is the difference in germination time between planted seeds at 20 degrees Celsius and planted seeds at 5 degrees Celsius?

Ⓐ 2 days

Ⓑ 5 days

Ⓒ 8 days

Ⓓ 10 days



Question 16

A student is investigating whether the chemical process of rusting affects temperature. Here are the steps of the experiment he has designed:

1. Soak a piece of steel wool in vinegar for one minute (the vinegar will make the steel wool rust).
2. Squeeze the vinegar out of the steel wool pad and wrap the pad around the thermometer's bulb.
3. Place the thermometer and steel wool in the jar and close the lid.
4. After 5 minutes, look at the temperature on the thermometer.

This experiment is missing an important step. What is the step?

Ⓐ After the last step, remove the thermometer and steel wool from the jar.

Ⓑ Before the first step, refrigerate the jar before beginning the experiment.

Ⓒ Before the first step, use the thermometer to measure the temperature in the jar.

Ⓓ After the third step, poke holes in the lid of the jar.

Question 17

In order to become more "**environmentally friendly,** " local businesses have decided to take action to reduce waste. Which of the following changes would be **best** for a business to make in order to become more "**environmentally friendly** "?

Ⓐ When making photocopies, print on only one side of the paper.

Ⓑ Purchase wood products manufactured only in other countries.

Ⓒ When packing boxes, use polystyrene foam filler instead of old newspapers.

Ⓓ Purchase and use products made from recycled paper.

Question 18

Olivia set up an experiment to compare the effect of hand-clapping on heart rate. She used five students for her experiment.

First, Olivia found the average heart rate for each student, and then she had the students clap for thirty seconds. Finally, she took the students' heart rates again and averaged the results.

Olivia repeated the experiment. Below are her results:

Experiment 1: The students' heart rates increased by an average of 16 beats per minute.
Experiment 2: The students' heart rates increased by an average of 2 beats per minute.

Since the results are very different, what is the next logical step?

Ⓐ throw out the results because they are incorrect

Ⓑ look for differences in the way the experiment was done

Ⓒ conclude that hand-clapping does not really affect heart rate

Ⓓ average the results and conclude that hand-clapping increases heart rate by 9 beats per minute

Question 19

In a beam bridge, tension is mostly found

Ⓐ at the ends of the beam.

Ⓑ in the center of the beam.

Ⓒ in the top portion of the beam.

Ⓓ in the bottom portion of the beam.

Question 20

A beam bridge is used as a highway overpass.

The bridge designers needed to make the bridge span a greater distance than most beam bridges must span. Which of the following properties of the bridge is **most** important to building a longer beam bridge that is still strong enough to carry cars and trucks?

Ⓐ flexibility

Ⓑ height

Ⓒ weight

Ⓓ hardness

Question 21

The famous Golden Gate Bridge is a suspension bridge in San Francisco, CA. When cars and trucks are on this bridge, the compression travels from the bridge surface to

Ⓐ the anchorages of the bridge.

Ⓑ the cables of the bridge.

Ⓒ the towers of the bridge.

Ⓓ the underside of the bridge.

Question 22

Trusses used in bridges help dissipate compression and tension by

Ⓐ carrying most of the weight of the bridge.

Ⓑ pushing the forces outward to the ends of the bridge.

Ⓒ receiving tension and transporting compression to the towers.

Ⓓ stiffening the beams that support the bridge and spreading out the forces.

Question 23

In a suspension bridge, tension forces are mostly carried by

Ⓐ girders.

Ⓑ cables.

Ⓒ arches.

Ⓓ beams.

Question 24

What type of bridge can span the longest distance?

Ⓐ Beam bridge

Ⓑ Truss bridge

Ⓒ Arch bridge

Ⓓ Suspension bridge

Question 25

Which of the following forces must be zero in order for a bridge design to be successful?

Ⓐ gravity force

Ⓑ tension force

Ⓒ compression force

Ⓓ net force

Question 26

How are the forces carried in a suspension bridge?

Ⓐ The cables carry compression and the towers carry tension.

Ⓑ The cables carry compression and the towers carry tension and compression.

Ⓒ The cables carry tension and the towers carry compression.

Ⓓ The cables and towers both carry tension and compression.

Question 27

In an arch bridge, the force of compression moves

Ⓐ from the ends to the middle.

Ⓑ from the middle to the ends.

Ⓒ from the top to the bottom.

Ⓓ from the bottom to the top.

Question 28

Truss bridges are designed so that

Ⓐ the upper bars experience tension forces, and the lower bars carry compression forces.

Ⓑ the outer bars experience tension forces, and the inner bars carry bending forces.

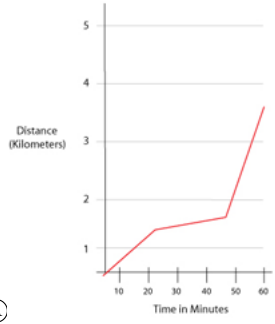
Ⓒ all the bars experience either tension or compression forces.

Ⓓ all the bars experience either tension or bending forces.

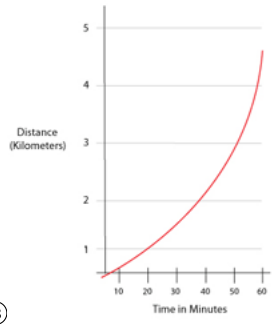
Question 29

Four runners competed against each other in a 5k race. The graphs shown reflect the speed of the runners. Which runner won the race?

Ⓐ



Ⓑ



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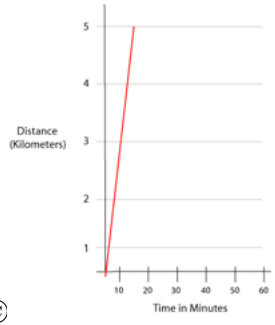

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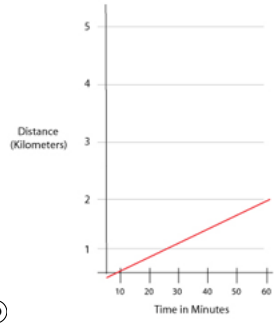


Question 30

A force of 4800 Newtons is applied to a 1200 kg car at rest. What is the car's acceleration?

Ⓐ 2 m/s^2

Ⓑ 4 m/s^2

Ⓒ 3600 m/s^2

Ⓓ 6000 m/s^2

Question 31

A train travels 30 meters in 6 seconds. What is its speed?

Ⓐ $\frac{1}{5}$ seconds per meter

Ⓑ 5 meters per second

Ⓒ 1.6 meter seconds

Ⓓ 6 meters per second

Question 32

A race car has a mass of 620 kg and accelerates at 20 m/s^2. How much net force is pushing the car?

Ⓐ 640 N

Ⓑ 31 N

Ⓒ 12,400 N

Ⓓ 600 N

Question 33

You attach a soccer ball to a rope and swing it in a circle. Then you attach a softball to the same rope and swing it in a circle. Which statement will be proven to be true?

Ⓐ The softball requires greater centripetal force, because it has less mass.

Ⓑ The soccer ball requires greater centripetal force, because it has less mass.

Ⓒ Both balls require the same amount of force, because inertia affects the movement.

Ⓓ The soccer ball requires greater centripetal force, because it has greater mass.

Question 34

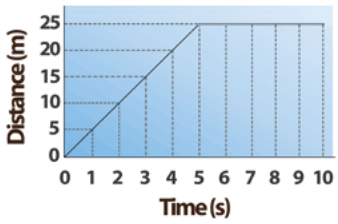
The graph shown represents a car's travel. Which description does the graph represent?

Ⓐ The car increased velocity to reach its top speed within five seconds, then stopped and remained at rest for five seconds.

Ⓑ The car drove up a hill at a constant velocity for five seconds, and then drove on flat ground for five seconds.

Ⓒ The car increased velocity to reach its top speed within five seconds, then maintained that speed for five seconds.

Ⓓ The car moved at a constant velocity of five meters per second for five seconds, suddenly stopped, and then remained at rest for five seconds.



Question 35

The SI unit of length is the

Ⓐ yard

Ⓑ meter

Ⓒ mile

Ⓓ inch

Question 36

If all the planets started at the same time and orbited the sun, which one would finish the trip first?

Ⓐ Jupiter

Ⓑ Earth

Ⓒ Saturn

Ⓓ Mercury

Question 37

Why do planets in our solar system orbit the sun rather than just orbit each other?

Ⓐ The sun is hotter than any of the planets, and that energy pulls the planets.

Ⓑ The sun has a very strong magnetic force, and it attracts the planets.

Ⓒ The sun's electrical energy keeps the planets moving around it.

Ⓓ The sun has the greatest mass, so it has the strongest gravitational pull.

Question 38

On August 16, 2008, there was a partial lunar eclipse. What happened to cause this eclipse?

Ⓐ The moon passed through Earth's penumbral shadow.

Ⓑ A portion of the moon passed through Earth's umbral shadow.

Ⓒ The entire moon passed through Earth's umbral shadow.

Ⓓ The moon passed through both the penumbral and the umbral shadow.

Question 39

A total solar eclipse will occur when

Ⓐ the moon passes directly between the sun and Earth.

Ⓑ Earth passes directly between the sun and the moon.

Ⓒ the sun passes directly between Earth and the moon.

Ⓓ the sun and moon are at perfect right angles with Earth.

Question 40

What keeps the planet Mercury in its orbit around the sun?

Ⓐ heat energy

Ⓑ magnetic forces

Ⓒ inertia

Ⓓ gravity

Question 41

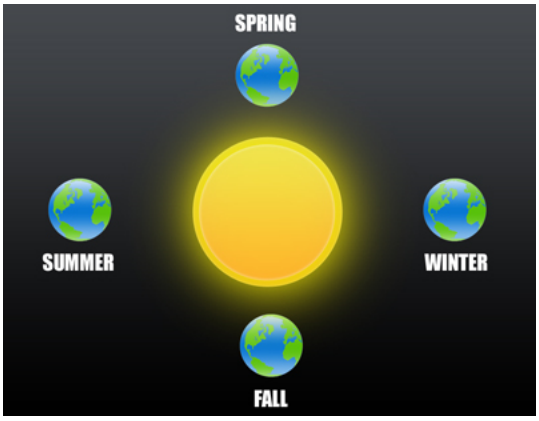
During the summer in the Northern Hemisphere, the sun's path is more directly overhead there than at any other time of the year. During the winter there, the sun's path is more at an angle overhead. This is because of Earth's

Ⓐ rotation and speed.

Ⓑ rotation and orbit.

Ⓒ orbit and tilt.

Ⓓ tilt and speed.



Question 42

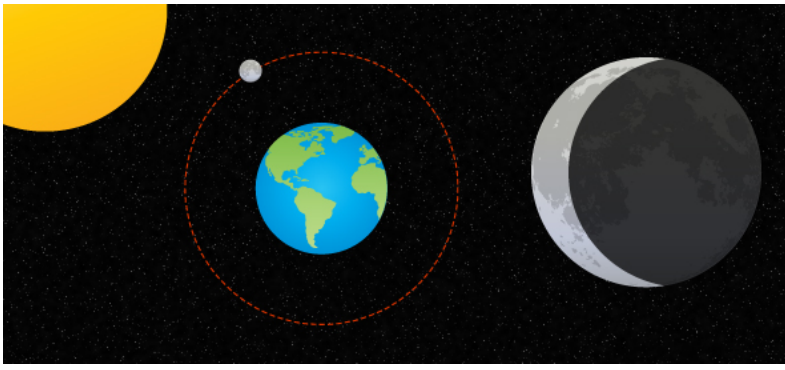
Based on the position of Earth, the moon, and the sun, which moon phase is represented by the enlarged image of the moon?

Ⓐ new moon

Ⓑ waning crescent

Ⓒ first quarter

Ⓓ waxing gibbous



Question 43

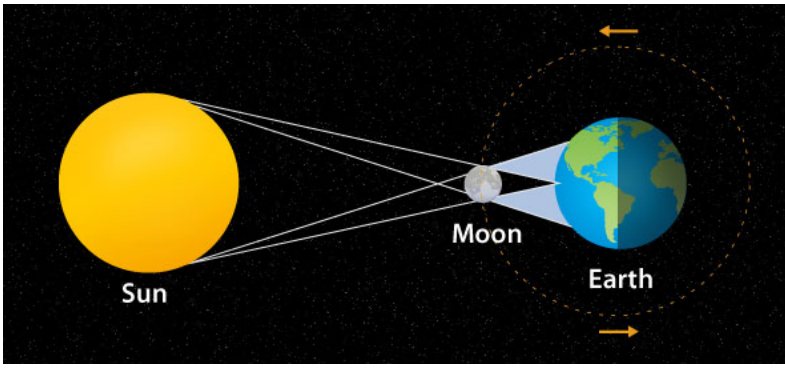
Which of these best describes what is shown in the diagram below?

Ⓐ waxing gibbous moon

Ⓑ solar eclipse

Ⓒ lunar eclipse

Ⓓ full moon



Question 44

In space, if there is little or no gravity, there is little or no

Ⓐ speed.

Ⓑ mass.

Ⓒ weight.

Ⓓ light.

Question 45

Which of these examples illustrates the principle that explains why Earth orbits the sun?

Ⓐ You turn a switch on a closed circuit and a lightbulb turns on.

Ⓑ Firewood is burned in your fireplace, and heat energy is released.

Ⓒ You jump off a diving board and land in a swimming pool.

Ⓓ You hold a magnet over paper clips, and the paper clips jump up to stick to the magnet.