

CONCEPTS AND PROCESSES SCALE

Unifying Concepts of Science

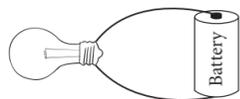
Students show understanding of the key ideas which make up the conceptual framework of the sciences, such as systems, order and organization, evidence, models and explanations, constancy, change, measurement, evolution and equilibrium, form and function.

below 181

What is the most likely cause of a plant being wilted?

- A. too much dirt
- B. clouds in the sky
- ✓ C. not enough water
- D. people standing nearby
- E. too much noise

181-190



In this drawing, the battery, wires, and bulb are an example of an electrical

- A. evolution.
- B. scale.
- C. probability.
- ✓ D. system.
- E. theory.

191-200

The weather forecast for the day was “30% chance of rain.” What would you expect?

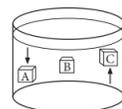
- A. It will definitely rain.
- B. It is likely to rain.
- C. There is an equal chance for rain or no rain.
- ✓ D. It is not likely to rain.
- E. It will definitely not rain.

201-210

A container of water has three objects in it. Object A is moving down. Object B is at rest, and Object C is moving up.

Which object is in equilibrium at this time?

- A. Object A
- ✓ B. Object B
- C. Object C
- D. Objects A and C
- E. Objects A, B and C



211-220

A ticket-purchasing line for a concert has 50 people in it when ticket sales begin. You decide to wait for a while before getting in line so that the line will be shorter. Much to your surprise, the line still has 50 people in it one hour later.

Since ticket sales were going on throughout the hour, the most probable explanation for the length of the line staying the same is

- A. it takes more than one hour to sell one ticket.
- B. a cause and effect relationship is present.
- C. ticket purchasing is an example of a cyclic phenomenon.
- ✓ D. the line has reached equilibrium.
- E. this is an example of a field causing no change.

221-230

In order to operate, the internal combustion engine of a car requires inputs and yields outputs. Oil, gasoline, air, and water are inputs.

Which is not an output?

- A. motion
- ✓ B. friction
- C. steam (water vapor)
- D. heat
- E. exhaust gases

231-240

Which is the best example of a situation where a person experiences a temperature gradient?

- ✓ A. Hiking up the side of a mountain.
- B. Walking outside from an air conditioned house.
- C. Diving into a cold lake on a cool day.
- D. Stepping from a sunny area into the shade of a tree.
- E. Jumping into a swimming pool on a hot day.

above 241

Which is not an example of evolutionary change?

- A. decrease over time in the tail length of a species of tropical bird
- ✓ B. increase over time in a person's shoe size
- C. increase over time in the size of airports
- D. decrease over time in the price of cell phones
- E. increase over time in the amount of memory in computers

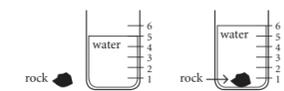
Scientific Inquiry

Students use the process skills required to do scientific inquiry, and show an understanding of the nature of science and technology. Key skills include generating questions and hypotheses, designing and implementing investigations, analyzing data and drawing conclusions.

While walking on the beach, you find a great rock. You really want to bring the rock to school, but it is too big to move. You decide to write about the rock in your log. Choose the best group of words to describe your rock.

- A. old, round, gray, funny
- B. purple, tall, happy, wet
- ✓ C. hard, smooth, well-rounded, large
- D. young, happy, lonely, windy
- E. smelly, sad, sorry, sandy

A rock is put into a pail that has some water in it. Before the rock is put into the pail, the water is at the five-liter line. After the rock is added, the water rises to the six-liter line.



The space taken up by the rock is

- A. 1/2 liter.
- B. 1 liter.
- C. 2 liters.
- D. 3 liters.
- E. 4 liters.

Someone said that if you mix salt and sugar with water and let the mixture stand, you get saltwater taffy - a kind of candy. Which would be the best way for you to test the idea?

- A. Take a vote among your friends.
- B. Buy some saltwater taffy and see if it has salt in it.
- C. Find out if salt and sugar have the same chemicals in them.
- D. Grind up some saltwater taffy to see if you get salt, sugar, and water.
- ✓ E. Mix salt, sugar, and water, let them stand, and see what happens.

Different types of insects have different kinds of mouth parts. Mouth part types may relate to the insect's diet. Which would be a testable hypothesis to help explain this?

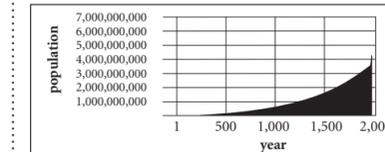
- ✓ A. Insects with similar mouth parts will have similar diets.
- B. Insects use sharp mouth parts for protection.
- C. Bigger insects have bigger mouth parts.
- D. Climate affects the insects' diet.
- E. Tropical climates have insects with sucking mouth parts.

You want to compare the height of a waterfall to other waterfalls in the area. Which would be the best observation for this purpose?

- A. It is about 1/2 the size of your house.
- ✓ B. It is 5 trees tall. Each tree is about 3 meters high.
- C. It takes 16 minutes to climb from the bottom to the top.
- D. The splash of water at the bottom of the fall is 1 meter high.
- E. Your name echoes 7 times when shouted from the top.

Density is, by definition, the ratio of mass to volume ($D=M/V$). If a sample of material has a measured density of 6.0 grams/cm³ and you then heat the sample until its volume has increased, the measured density of the sample will be

- A. 0.0 grams/cm³.
- ✓ B. less than 6.0 grams/cm³.
- C. 6.0 grams/cm³.
- D. more than 6.0 grams/cm³.
- E. More information is needed in order to determine an answer.



Based on the above graph, which prediction could be made about conditions in the year 2000?

- A. There will be no more room on this planet.
- B. Food will be in critical short supply.
- ✓ C. The population level will reach 7,000,000,000.
- D. Population level will take a sharp decrease because of awareness.
- E. Population level will stabilize at 5,000,000,000.

Mary recorded the following data for moonrise for five consecutive days:

	Mon.	Tues.	Wed.
Moonrise	6:29 pm	7:20 pm	8:11 pm

	Thurs.	Fri.	Sat.	Sun.
Moonrise	9:02 pm	9:53 pm	?	?

At what time would you predict the moon to rise on Sunday?

- A. 10:04
- B. 10:44
- C. 11:44
- ✓ D. 11:35
- E. 11:04

GENERAL SCIENCE SCALE

Life Sciences

Students understand concepts related to the form, function and organization of body systems, the cell and molecules within the cell, diversity and evolution of life on Earth, and ecological interactions and interdependence of living things.

below 181

The arrow points to the



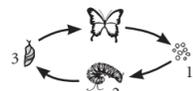
- A. stem.
- B. leaf.
- C. flower.
- ✓ D. root.
- E. seed.

181-190

A predator

- ✓ A. hunts other animals for food.
- B. will only eat plants.
- C. cannot be prey for other animals.
- D. will only eat parasites.
- E. is a warm-blooded animal.

191-200



Stages 1, 2, 3 of the butterfly's life cycle are called

- A. egg, pupa, larva.
- B. larva, egg, pupa.
- ✓ C. egg, larva, pupa.
- D. pupa, larva, egg.
- E. larva, pupa, egg.

201-210

The respiratory system helps an animal

- A. circulate blood.
- B. hear sounds.
- ✓ C. obtain oxygen.
- D. obtain protein.
- E. fight disease.

211-220

Photosynthesis takes place in the

- ✓ A. chloroplasts.
- B. epidermis.
- C. guard cells.
- D. stomates.
- E. veins.

221-230

In guinea pigs, fur color is dependent on only one pair of genes, and black is dominant over white.

If no mutations occur, what will happen if a purebred black guinea pig is crossed with a white guinea pig?

- A. 1/2 of the offspring will be black; 1/2 will be white.
- B. 3/4 of the offspring will be black; 1/4 will be white.
- C. 9/16 of the offspring will be black; 7/16 will be white.
- ✓ D. All of the offspring will be black.
- E. All of the offspring will be white.

231-240

When a cell containing 10 chromosomes divides by mitosis, each new daughter cell will contain

- A. 5 chromosomes.
- B. 15 chromosomes.
- C. 20 chromosomes.
- D. 30 chromosomes.
- ✓ E. none of these

above 241

Which statement did Darwin not accept in forming his theories?

- ✓ A. Acquired characteristics can be passed on to offspring.
- B. Organisms tend to produce more offspring than the environment can support.
- C. Species of today are modified descendants of those found on the Earth in previous times.
- D. There is a tendency for the best adapted individuals to survive and reproduce.
- E. Variation is a characteristic of all living things.

Earth/Space Sciences

Students understand concepts related to the dynamic Earth, such as the structure of Earth, plate tectonics, geochemical cycles, and atmospheric processes, as well as concepts related to Earth in space, such as the effects of Earth's rotation and revolution, the structure of the solar system and universe, and unique characteristics of Earth.

Earth is shaped most like

- A. an egg.
- ✓ B. a round ball.
- C. a pancake.
- D. a block.
- E. a tree.

When it is raining, which must be true?

- A. It is spring.
- B. The Sun is shining.
- C. The wind is blowing.
- ✓ D. There are clouds in the sky.
- E. It is warm outside.

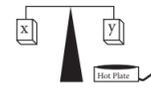
During winter, your part of the Earth is

- A. tilting toward the Sun.
- B. not tilting at all.
- ✓ C. tilting away from the Sun.
- D. getting direct sunlight.
- E. getting no sunlight.

As shown in the drawing, two identical paper bags (X and Y) are fastened upside down to a balance.

What will probably happen after the hot plate below Y is turned on?

- A. Bag X will rise as Y falls.
- ✓ B. Bag Y will rise as X falls.
- C. Neither of the bags will move.
- D. Drops of water will form on the outside of bag Y.
- E. Bag X will catch on fire.



Suppose the Earth were in the same path as it is now, but traveling at half its present speed around the Sun.

This would cause the

- A. days to be twice as long.
- B. days to be half as long.
- ✓ C. year to be twice as long.
- D. year to be half as long.
- E. year to be the same length.

If a mineral sample contains large crystals, geologists think that the mineral probably

- A. was formed in a volcano.
- B. contains a valuable metal.
- C. cooled instantly under water.
- D. has cleavage in three directions.
- ✓ E. solidified slowly from hot liquid.

Physical Sciences

Students understand concepts related to the structure and interaction of matter, forces and motion, forms of energy, and the transfer and transformations of energy.

Which is a solid?

- ✓ A. rock
- B. air
- C. water
- D. milk
- E. oxygen

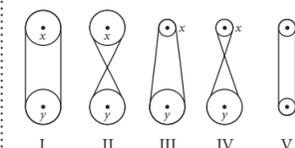
Which is an example of melting?

- A. stirring some sugar in water until you cannot see the sugar
- B. heating a pan of water until the water is all gone
- ✓ C. heating a block of ice until the ice turns to water
- D. cooling water in the freezer until the water becomes solid
- E. drops of water running down a cold glass

- I. **S N N S N S**
- II. **N S S N N S**
- III. **S N S N S N**
- IV. **N S N S N S**
- V. **S N N S N S**

If you laid three bar magnets on a table and allowed them to line up according to their polar attraction, which combinations would you most likely see?

- A. I and II
- B. II and III
- ✓ C. III and IV
- D. III and V
- E. I and V



In which arrangements would pulley “y” move slower than pulley “x”?

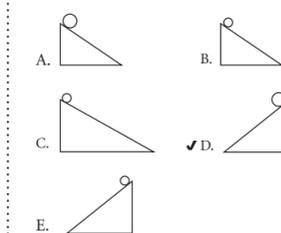
- A. I and II
- B. II and III
- ✓ C. III and IV
- D. III and V
- E. I and V

A mixture can be defined as a substance that can be separated into its parts by physical means such as a filter.

Which observation would indicate the substance being studied is a mixture?

- ✓ A. It separates into two layers after 24 hours.
- B. It breaks into four pieces when hit with a hammer.
- C. It turns black and gives off smoke when it burns.
- D. Three different-sized crystals can be seen using a hand lens.
- E. When it is cut in half, both parts look the same.

Which marble has the most potential energy?



The pH of a solution which is basic could be

- A. -6.0.
- B. -8.0.
- C. 5.0.
- D. 7.0.
- E. 9.0.

When an acid is combined with a base, the resulting substance will be

- A. a base.
- B. a mixture.
- ✓ C. a salt and water.
- D. a metal.
- E. a nonmetal.