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Florida Coach, Gold Edition
Standards-Based Instruction
Science, Grade 8

PRACTICE TESTS

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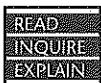
Florida Coach, Gold Edition, Standards-Based
Instruction, Science, Grade 8

PRETEST

Name: _____

There are different types of questions found on the test: multiple choice, short response, extended response, and gridded response.

- ☐ **Multiple Choice** For multiple-choice items, choose the best answer from a set of answer choices. On the actual test, you will fill in a bubble in the test booklet to indicate the best answer.



Short Response For short-response items, you will show how you found the solution to a problem. Short-response problems can take as long as five minutes to complete.



Extended Response For extended-response items, you will also show how you solved a problem. Extended-response items can take as long as 15 minutes to answer, and often require more complex thinking than multiple-choice and gridded-response items.

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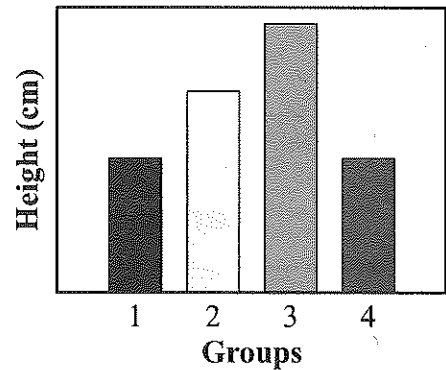
Gridded Response For gridded-response items, you will solve a problem or give an answer in number form. The numbers are bubbled in on the grid on your answer sheet.

You will be able to use a calculator on the Science portion of the test, so you are encouraged to use a calculator to work through the problems in the *Coach* book. You will not be able to use dictionaries or other reference materials unless they are provided in the *Coach* book itself, such as the Periodic Table of the Elements.

Harriet wanted to investigate the effects of fertilizer on the growth of plants. She grew four groups in identical conditions, except as described in the table below. She recorded the heights of the plants after four weeks and graphed the average height of each group.

FERTILIZER TREATMENTS

Group	Fertilizer
1	None
2	Once a month
3	Twice a month
4	Once a week



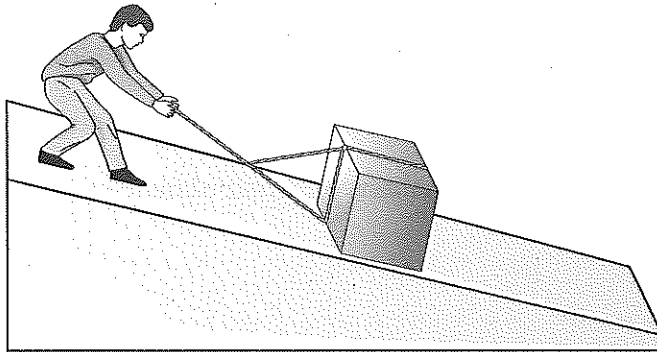
1 In the experiment described above, which group is the control group?

- A. Group 1
- B. Group 2
- C. Group 3
- D. Group 4

2 What is the independent variable in Harriet's experiment?

- F. the kind of fertilizer
- G. the number of plants
- H. the amount of light
- I. the frequency of fertilizer use

- 3 The picture below shows Diego using a rope to pull a box up a ramp.

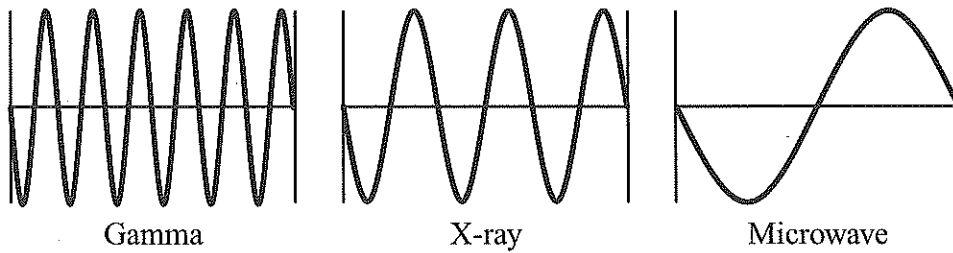


Which of the following forces is NOT acting on the box?

- A. friction
 - B. buoyant force
 - C. gravity
 - D. tension
- 4 How do scientists learn about organisms such as dinosaurs that disappeared from Earth long ago?
- F. by examining igneous rocks
 - G. by studying decaying organisms
 - H. by examining fossils
 - I. by using only their imaginations

- 5 What is a seed?
- A. a reproductive cell that contains all of the parent's genetic information
 - B. a reproductive plant part that forms without fertilization
 - C. a reproductive plant part that forms after fertilization
 - D. a reproductive cell that contains only half of the parent's genetic information
- 6 You set up an experiment to see how the amount of sunlight affects plant growth. You give two plants the same amount of water every day, but you put one plant in the sunlight, and the other plant in the shade. What is the dependent variable?
- F. amount of sunlight
 - G. amount of water
 - H. plant height
 - I. watering can used
- 7 An angstrom is the **best** unit of measure for describing the distance between which of the following objects?
- A. galaxies in a universe
 - B. trees in a forest
 - C. moons orbiting Jupiter
 - D. atoms in a carbon dioxide molecule

- 8 The graphs below compare the wavelength and frequency of three kinds of light in the electromagnetic spectrum.



Of these choices, which kind has the highest energy?

- F. gamma
 - G. X-ray
 - H. microwave
 - I. none of the above; all forms of light have the same energy
- 9 Over time, the amount of energy unavailable to do work in the universe increases. What term is used to describe the amount of that unavailable energy?
- A. meiosis
 - B. kinetics
 - C. entropy
 - D. conservation

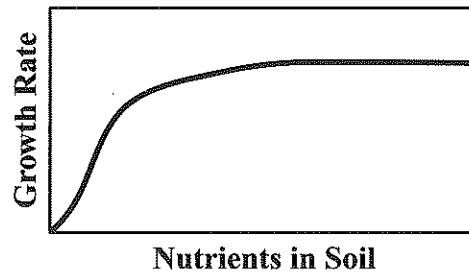
- 10 A scientist plans to run experiments to test the effectiveness of a new medicine on human subjects. She must submit a proposal to a review board. As she designs the experiment and writes the proposal, what is the guiding principle of scientific ethics that she must keep in mind?
- F. Scientists should perform the most accurate experiments possible.
 - G. Scientists should minimize risk and damage to subjects and the environment.
 - H. Scientists should share all of their information by publishing it.
 - I. Scientists should accept new theories if there is evidence to support them.
- 11 Biological evolution means that groups of organisms undergo changes in their traits over time. Which information would provide the **least** convincing evidence for the process of evolution?
- A. The fossil record shows that humans have developed a smaller chin in the last few hundred thousand years.
 - B. Genetic evidence suggests that chimpanzees and humans shared a common ancestor about five million years ago.
 - C. The human hand and whale flipper share a basic common form.
 - D. In response to cold weather, humans have moved to areas with warmer climates.
- 12 A bacterium is made of a single cell; the human body coordinates the activities of tens of trillions of cells. In what way are all cells alike?
- F. the structures they contain
 - G. their size and shape
 - H. the specific functions they serve within a system
 - I. their ability to perform basic life functions

- 13 A bromine atom has 35 protons in its nucleus. What is the minimum number of electrons that can orbit the nucleus to give the atom an overall negative charge?

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- 14 Which statement **best** compares biology and physics?
- A. The goal of both is to answer questions about the natural world.
 - B. The goal of both is to understand the nature and structure of living things.
 - C. The goal of both is to understand the nature and interaction of matter and energy.
 - D. Only physics involves seeking information through experimentation.

- 15 The graph below compares the growth rate of pine trees to the level of nutrients in the soil.



What does the graph show?

- F. The growth rate does not depend on the level of nutrients.
 - G. Making the pine trees grow faster improves soil quality.
 - H. Pine trees always grow faster in soil with more nutrients.
 - I. Up to a point, increased nutrients result in faster growth.
- 16 A chef plunges a hot pot into a sink of cold water. What is the primary way the heat transfers from the pot to the water?
- A. conduction
 - B. convection
 - C. radiation
 - D. reflection
- 17 What is a moon?
- F. an object that orbits a star
 - G. any object that revolves around another object
 - H. an object that orbits a planet
 - I. a collection of billions of stars

- A. by anchoring soil and preventing erosion
- B. by decaying organic matter
- C. by weathering rocks
- D. by making soil more porous

- B. by decaying organic matter

- C. by weathering rocks

- D. by making soil more porous

19 The solar system is believed to have formed from a rotating disc of gas and dust. Identify two pieces of physical evidence that support this theory.

READ
INQUIRE
EXPLAIN

INQUIRE

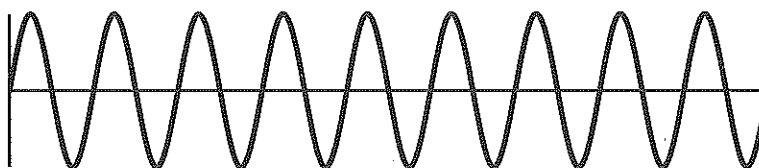
EXPLAIN

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

20 What elements are needed for a virus to make a new virus?

- F. a single virus
- G. two viruses
- H. the virus and a living cell
- I. the virus and a dead cell

21 The portion of a wave shown below passed a single point in 2 seconds. What is the frequency of the wave in hertz (cycles per second)?



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22 Chlorofluorocarbons, or CFCs, are chemicals used in a variety of household and industrial applications. Which of the following is a negative consequence of using CFCs?

- A. greenhouse effect
- B. soil erosion
- C. ozone depletion
- D. acid rain

23 A hybrid brown-eyed parent and a pure brown-eyed parent produce offspring. Complete the Punnett square below. Then determine the percentage of offspring that will have brown eyes and the percentage that will have blue eyes. Remember, in humans, brown eyes (B) are dominant over blue eyes (b).

READ
INQUIRE
EXPLAIN

- 24 There are over 3,000 identified minerals on Earth. A student finds a mineral at a construction site and wants to identify it. Which of the following mineral properties will be **least** helpful?
- F. luster
 - G. streak
 - H. size
 - I. hardness
- 25 A researcher investigating the behavior of rabbits disrupts their natural habitat without repairing the damage. Which of the following does the researcher practice?
- A. unethical scientific behavior
 - B. ethical scientific behavior
 - C. ineffective technological design
 - D. effective technological design
- 26 What form of cell reproduction creates gametes (reproductive cells)?
- F. binary fission
 - G. mitosis
 - H. spore
 - I. meiosis

- 27 Shelby and Diane perform the same experiment in their lab, but collect very different results. How can they determine which set of results (if either) is correct?
- I check their lab notes for a mistake in procedure or data collection
 - II each perform the experiment again
 - III have a third student perform the experiment and compare the results
- A. I only
 - B. I and II
 - C. II and III
 - D. I, II, and III
- 28 Blue stars are the hottest, followed by white and red. If three stars of the same size have these different colors, which one will burn the brightest?
- F. blue
 - G. white
 - H. red
 - I. none of the above; they will all burn with the same brightness
- 29 What is the circulatory system?
- A. groups of cells involved in transferring nutrients and removing waste
 - B. the group of all animals that have blood
 - C. any single cell that transports blood through the body
 - D. a description of how nutrients cycle through Earth

30 Which statement about pollution is **most accurate**?

- F. Only "developed" nations contribute to the pollution problem.
- G. Only the quality of life in "developing" nations is threatened by pollution.
- H. It poses a serious threat only to land organisms and their quality of life.
- I. It poses a serious threat to many organisms and their quality of life.

31 Carmen wants to know how salt affects the boiling point of water. She sets up a control group by boiling 1.5 liters of 20°C water with no salt over a fixed flame. Describe the conditions she should use for the experimental group.

READ
INQUIRE
EXPLAIN

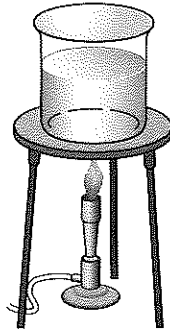
32 A train accelerated from 0 km/h to 160 km/h in 40 seconds. What was its average acceleration in kilometers/hour/second?

- A. 4
- B. 12
- C. 40
- D. 64

33 Which of the following is true about advances in science and technology?

- F. Only scientists in certain cultures are responsible for them.
- G. Only chemists are responsible for them.
- H. They do not affect nonscientists.
- I. They contribute to the development of human culture.

- 34 The diagram below shows a sample of alcohol placed in a closed glass container at room temperature with a flame beneath it.



- If the alcohol comes to a boil, how has the energy of the alcohol-container system changed?
- A. Energy has been added to the system.
 - B. Energy has been removed from the system.
 - C. The energy in the system is unchanged.
 - D. There is not enough information to decide.
- 35 Which of the following examples of technology helps scientists communicate and share research more quickly and easily?
- F. assembly line
 - G. telescope
 - H. computer
 - I. sonar

- 36 Which sentence describes a chemical change in matter?
- A. An ice cube melts.
 - B. A metal bolt rusts.
 - C. A glass window shatters.
 - D. Sugar dissolves in a cup of tea.
- 37 Which of the following is the **best** question to ask when evaluating a technological design?
- E. How many people worked on its development?
 - G. Does its development involve a minimum impact on living things and resources?
 - H. How long did it take to develop?
 - I. In what country and climate was it developed?

Some engine builders today are experimenting with creating ceramic engines. Ceramic engines are more brittle than metal ones, but much more heat-resistant. These engines are examples of technological design because they apply scientific principles, such as thermodynamics, to problems of society. Like ceramic engines, which have both benefits and disadvantages, all designs are limited by a number of factors. Identify and explain four different constraints on new technological designs.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

- 39** Which of the following statements about fossil fuels is **false**?
- A. Fossil fuels contribute to air pollution and acid rain.
 - B. Fossil fuels can be renewed as the supply is used up.
 - C. Fossil fuels form when dead organisms change over time.
 - D. Fossil fuels supply most of the energy people use in industrial societies.

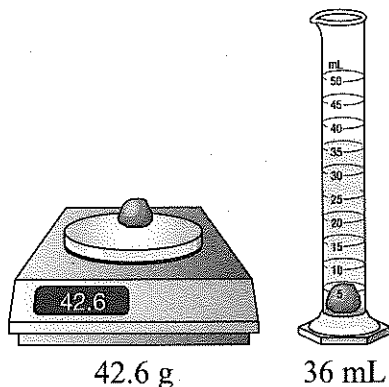
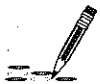
40 Stars are burning balls of hot gas. What do all stars have in common?

- F. They are made of the same basic chemical elements.
- G. They are all about the same size.
- H. They are the same color.
- I. They are equally bright.

41 A scientist claims that the beaks of a local bird species are becoming shorter and stouter. Which evidence would **best** support this claim?

- A. measurements of the size of the birds
- B. measurements of the birds' beaks in April
- C. measurements of the beaks during the same month for several years
- D. a population count of the species each April for five years

42 The graduated cylinder shown below had 30 milliliters of water in it before a chunk of metal was added to it. What is the density of this chunk in grams/milliliter?

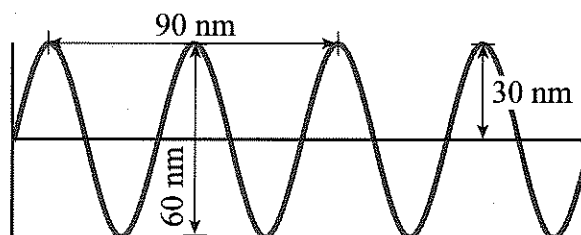


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- 43 Groups of cells are organized into systems that control functions in the body. Examples in the human body include the digestive and respiratory systems. By what main characteristic are cells organized into systems?

F. by similar age
 G. by similar size
 H. by similar location
 I. by similar function

- 44 What is the wavelength of this wave in nanometers?

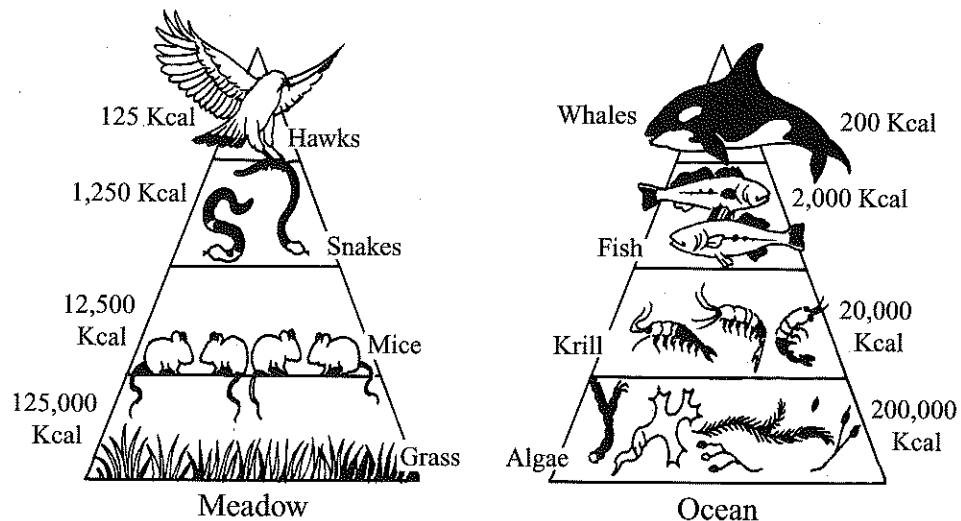


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- 45 What kind of rock forms directly from cooling magma or lava?
- A. igneous
 - B. sedimentary
 - C. metamorphic
 - D. all of the above
- 46 Which of these organisms is most likely to reproduce asexually?
- F. gorilla
 - G. rose
 - H. bacteria
 - I. fish
- 47 Which of the following is a standard of scientific ethics?
- A. Human subjects should never be used.
 - B. The privacy of human subjects should be preserved at all times.
 - C. The need for maintaining the privacy of human subjects should be weighed against the cost of maintaining that privacy.
 - D. Animal subjects should always be used instead of human subjects.

- 48 A certain bird species feeds on the seeds of a particular tree. A drought causes the outer covering of the seeds to become thicker and harder. After many generations, what is the **most likely** effect of this change on the birds?
- F. There will be no physical or behavioral change in the birds.
 - G. All of the birds will starve, and the species will become extinct.
 - H. The birds will have stronger beaks.
 - I. Some of the birds will be larger and some will be smaller.

- 49 The pyramids below show how energy transfers when one organism consumes another.



What do these pyramids show about the efficiency of energy transfers?

- A. All of the useful energy is converted from one form to another.
- B. Some useful energy is lost during an energy transfer.
- C. All useful energy is converted to heat during an energy transfer.
- D. All useful energy is lost during an energy transfer.

- 50 A researcher collected the data shown below to see how the concentration of thiosulfate in water affects the reaction time with hydrochloric acid. Which conclusion can the researcher draw?

CONCENTRATION OF THIOSULFATE AND REACTION
TIME WITH HYDROCHLORIC ACID

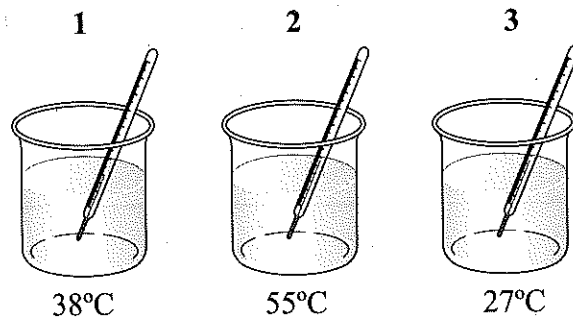
	Thiosulfate (mL)	Water (mL)	Reaction Time(s)
Flask 1	10	30	163.0
Flask 2	20	20	64.5
Flask 3	30	10	37.5
Flask 4	40	0	29.0

- F. As concentration increases, reaction time increases.
- G. As concentration increases, reaction time decreases.
- H. As concentration decreases, reaction time decreases.
- I. There is no obvious mathematical relationship.
- 51 What must an object have in order to be affected by gravity?
- A. force
- B. mass
- C. energy
- D. electric charge

52 Evolution is the process of species changing over time. Natural selection is a mechanism by which this process occurs. Suppose that the temperature in the local environment of a colony of worms rises. Describe how this environmental change is **likely** to lead to changes in the traits of the worm population.

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper appears to be a standard notebook page or a sheet of stationery. There is no handwriting or other markings on the page.

- 53 Water in each of these three containers has reached a different temperature through the addition of thermal energy. In which container are the water molecules moving fastest?



- F. container 1
- G. container 2
- H. container 3
- I. none of the above; molecules always move at the same speed
- 54 An astronaut in space sometimes wears a specialized backpack that has small rocket boosters in it. Those rockets can be fired in a specific direction. If an astronaut in the vacuum of space fires the rockets in one direction, he or she will be pushed back in the opposite direction. After the rockets are turned off, what will happen to the motion of the astronaut?
- A. The astronaut will gradually slow down and eventually stop moving.
- B. The astronaut will continue to accelerate forever.
- C. The astronaut will move at the same speed until another force stops the motion.
- D. The astronaut will immediately stop moving, and then move backward.

55

A farmer divides her farm into five sections. She plants only four of those sections and lets the fifth plot rest. Each year, she rotates which plot holds no crops so that the land rests once every five years.

READ
INQUIRE
EXPLAIN

How does this practice confirm that soil is a renewable, but threatened, resource? Explain why soil is considered a renewable resource. Then identify a way that human actions threaten it.

STOP

Florida Coach, Gold Edition, Standards-Based
Instruction, Science, Grade 8

POSTTEST

Name: _____

There are different types of questions found on the test: multiple choice, short response, extended response, and gridded response.

- ☐ **Multiple Choice** For multiple-choice items, choose the best answer from a set of answer choices. On the actual test, you will fill in a bubble in the test booklet to indicate the best answer.



Short Response For short-response items, you will show how you found the solution to a problem. Short-response problems can take as long as five minutes to complete.



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Gridded Response For gridded-response items, you will solve a problem or give an answer in number form. The numbers are bubbled in on the grid on your answer sheet.

You will be able to use a calculator on the Science portion of the test, so you are encouraged to use a calculator to work through the problems in the *Coach* book. You will not be able to use dictionaries or other reference materials unless they are provided in the *Coach* book itself, such as the Periodic Table of the Elements.

Some frogs hatch from eggs as tiny frogs without going through the tadpole stage. A scientist studied how thyroid hormones influenced that pattern of development.

There were three groups in the experiment. One group received a dose of *met*, which stops frogs from making thyroid hormones. One group received *met* and *sto*, a different chemical that blocks *met*. The third group received neither *met* nor *sto*.

After three weeks, the investigators measured the size of different body parts. The table shows the ratio of the length to the width of those parts.

RATIO OF LENGTH TO WIDTH OF FROG BODY PARTS

Body Part	Control	<i>Met</i> Added	<i>Met</i> and <i>Sto</i> Added
Upper jaw	0.3	0.6	0.4
Lower jaw	2.5	1.4	2.3
Calf	2.7	2.1	2.7
Thigh	2.8	5.6	2.7

- 1 What is the independent variable in the experiment described above?
 - A. the development of frogs lacking a tadpole stage
 - B. the introduction of thyroid hormones during frog development
 - C. the ratio of length to width of the body parts of frogs
 - D. whether *met* stops hormone production and *sto* restores it

- 2 What evidence suggests that *sto* reversed the effect of *met* on the embryos?
 - F. The *met/sto* group's ratios are similar to those of the control group.
 - G. The *met* group's ratios are different from those of the control group.
 - H. The *met* and *met/sto* groups' ratios both increase as you go down the table.
 - I. The thigh ratio is much larger in the *met* group than in either of the other groups.

- 3 What is an extinct organism?
- A. an individual organism that has died
 - B. a species that has died and disappeared from Earth
 - C. the imprints or remains of an organism that was once alive
 - D. a species in danger of disappearing from Earth
- 4 Which statement correctly describes a pattern that occurs in nature?
- F. The moon orbits Earth about once every month.
 - G. The Earth orbits the moon about once every month.
 - H. Our solar system orbits the center of our galaxy about once every year.
 - I. A star changes color about once every 2 million years.
- 5 What is a spore?
- A. a reproductive plant part that forms without fertilization
 - B. an animal embryo that forms without fertilization
 - C. a reproductive plant part that forms after fertilization
 - D. a cell that contains only half of the parent's genetic information
- 6 How are gravity (a noncontact force) and friction (a contact force) alike?
- F. Both can act at a distance.
 - G. Both require physical contact to exert their force.
 - H. Both decrease in strength as distance between objects increases.
 - I. Both can change the motion of objects.

- 7 Events on Earth and throughout the universe occur in some period of time. Which of these events occurs over the **shortest** period of time?
- A. A bristlecone pine passes through its entire life cycle.
 - B. Light travels 300,000 meters.
 - C. Rocks weather and form soil.
 - D. A bacterium passes through its entire life cycle.
- 8 In what way are the scientific disciplines of geology and chemistry alike?
- F. They both use field testing instead of laboratory work to gather data.
 - G. The goal of both is to understand the composition and structure of matter.
 - H. The goal of both is to understand Earth's history and processes.
 - I. They both use observation and experimentation to gather information about the natural world.
- 9 How does the entropy (amount of energy unavailable to do work) in the universe change over time?
- A. Entropy increases.
 - B. Entropy decreases.
 - C. Entropy stays the same.
 - D. none of the above (entropy cannot be measured)

- 10 A scientist plans an experiment that involves human subjects to test the effectiveness of a new medicine. Which of the following precautions can the scientist **ignore** if she follows the principles of scientific ethics?

F. She must give the subjects the opportunity to withdraw from the study.
 G. She must try to use animals as subjects instead of humans.
 H. She must minimize the potential dangers.
 I. She must tell the subjects about the potential risks involved.

- 11 Some kinds of *Staphylococcus aureus* bacteria are resistant to antibiotics. According to the theory of natural selection, what is their resistance an example of?

A. extinction
 B. asexual reproduction
 C. mutation
 D. adaptation

- 12 Plant cells differ from animal cells in certain ways. What structures do plant cells have that animal cells do not have?

F. cell wall and chloroplasts
 G. chloroplasts and nucleus
 H. cell wall and nucleus
 I. cell membrane and chloroplasts

- 13 A lead atom has 82 protons in its nucleus. What is the maximum number of electrons that can orbit the nucleus to give the atom an overall positive charge?



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9	9	9	9	9

- 14 Which organisms help increase soil fertility by breaking down organic matter?
- A. fungi
 - B. carnivores
 - C. moles
 - D. bean plants
- 15 What are variations within a species usually the result of?
- F. mitosis and asexual reproduction
 - G. mutation and sexual reproduction
 - H. mutation and asexual reproduction
 - I. mitosis and sexual reproduction
- 16 What is the primary way the sun's energy transfers from the sun to Earth?
- A. conduction
 - B. convection
 - C. radiation
 - D. transmission
- 17 Mars has two small moons named Phobos and Deimos. Around what object does Phobos have a primary orbit?
- F. Deimos
 - G. Mars
 - H. Earth
 - I. the sun

- 18 In 1916, Charles Robertson worked as a naturalist in the Carlinville, IL, area. He kept careful records of the plant species he found and the bees that visited them. Eighty years later, some scientists returned to the area and repeated Robertson's procedures. They found 74 fewer bee species than Robertson found. Predict what they found when they counted the number of plant species.

- A. fewer than Robertson counted
- B. more than Robertson counted
- C. about the same number as Robertson counted
- D. more than 74, but the exact number cannot be predicted

- 19 All of the planets in the solar system revolve around the sun in elliptical (oval-shaped) orbits. The motions of all or most of the planets have other features in common.

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Identify two of those similarities.

- 20 Suppose that a virus invades an animal population and spreads as an epidemic. As a result, the entire animal host population dies. What will be the most likely effect on the virus population?

- F. The population will decrease because viruses can reproduce in only one kind of animal.
- G. The population will decrease because viruses need living cells to reproduce.
- H. The population will increase by using the dead animal cells to reproduce.
- I. The population will increase because viruses can reproduce on their own.

- 21 Suppose that the frequency of a wave is 480 hertz (cycles per second). How many waves will pass a given point in 4 seconds?



	7	7	7	
•	•	•	•	•
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

- 22 An offspring of two pea plants has flowers that are lavender. The plant inherited only one gene for lavender flowers from the parent plants. What kind of trait is the trait for lavender flowers in pea plants?

- A. dominant
- B. recessive
- C. hybrid
- D. mutated

- 23** Suppose a flowering plant has a dominant trait for smooth seeds (S) and a recessive trait for wrinkled seeds (s). After reproducing many times, the plants have 50% offspring with smooth seeds and 50% with wrinkled seeds. What must be the alleles of each parent plant and why? Complete the Punnett square to justify your answer.

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- 24** Potholes in roads often develop during the winter. What is this a result of?

- F. chemical weathering
- G. mechanical weathering
- H. wind erosion
- I. gravity erosion

25

Concerns about depletion of the world's petroleum reserves have led many scientists and others to encourage the use of renewable resources as sources of energy. Explain the difference between renewable and nonrenewable resources. Give an example of each.

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26

Which statement accurately describes how the processes of mitosis and meiosis compare to each other?

- A. Both mitosis and meiosis create cells that are genetically identical to the parent cell.
- B. Both mitosis and meiosis form cells that have half of the parent's genetic information.
- C. In mitosis, a single cell produces two cells, but in meiosis a single cell creates four cells.
- D. Meiosis creates cells identical to the parent, but mitosis forms cells with half the genetic information as the parent.

27

Which of the following statements about scientific evidence is true?

- F. The more independent data that support a claim, the more reliable the claim.
- G. If an investigation takes a long time to complete, it is more reliable.
- H. A good investigation is based solely on observations.
- I. The results of an experiment conducted in a lab are always reliable.

28 The Milky Way contains billions of stars that have some features in common. Of the choices shown here, which one **best** identifies a common feature of all Milky Way stars?

- A. age
- B. temperature
- C. size
- D. chemical composition

29 The human stomach is an organ involved in breaking down food to release energy. Which of the following choices coordinates more kinds of cells than the stomach?

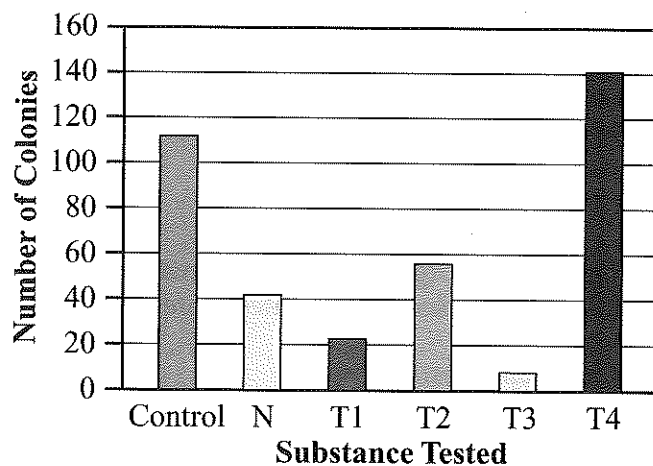
- F. a cell in the small intestine
- G. stomach tissue
- H. small intestine tissue
- I. the digestive system

30 Which of the following is the **best** question to ask when evaluating a technological design?

- A. How long ago was it developed?
- B. Does it adequately satisfy a need?
- C. In what kind of laboratory was it developed?
- D. Was it developed by scientists or mathematicians?

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- 31 Glass can be coated with substances to inhibit bacteria growth. A chemical engineer developed four new coatings, called T1, T2, T3, and T4. She then sprayed bacteria onto glass plates coated with each substance, put the plates in a nutrient bath, and counted the number of bacteria colonies after 48 hours. The results were compared to plates coated with substance N, a commonly used coating. Describe how the engineer could best design a control group for this experiment.



- 32 Which of the following is the most accurate statement about computers?
- F. They lower health-care costs.
 - G. They poison our air and water.
 - H. They reduce our ability to collect and analyze data.
 - I. They extend our ability to collect and analyze data.

- 33 Ursula uses a wheelbarrow as shown below when she works for a landscaping agency. She uses it to move large amounts of dirt and rocks.



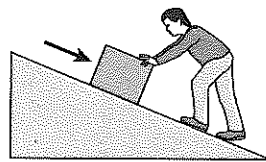
As she pushes the wheelbarrow, why does it move?

- A. The forces acting on the wheelbarrow are unbalanced.
 - B. The wheelbarrow has no weight on Earth.
 - C. The wheelbarrow pushes back on Ursula when she pushes it.
 - D. The wheelbarrow has a lot of inertia.
- 34 Who is responsible for advancements in science and technology?
- F. different kinds of people from different cultures
 - G. different kinds of people from one culture
 - H. only scientists from different cultures
 - I. different kinds of scientists from one culture
- 35 The sun releases energy that travels through space. Some of the energy that reaches Earth's atmosphere is blocked before it reaches Earth's surface. Which type of energy from the sun is **least** likely to reach a sunbather lying on the beach?
- A. visible light
 - B. infrared light
 - C. ultraviolet light
 - D. radio waves

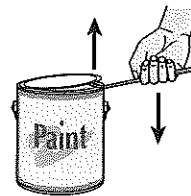
36 Which of the following processes involves a physical change in matter?

- F. wood burning
- G. rust forming
- H. photosynthesis
- I. water evaporating

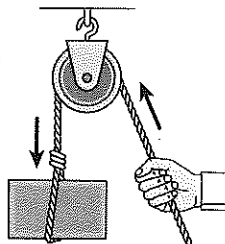
37 A doorknob like the one shown below is an example of a wheel and axle system—a kind of simple machine.



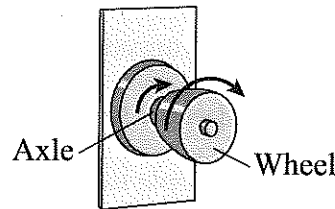
Inclined plane



Lever



Pulley

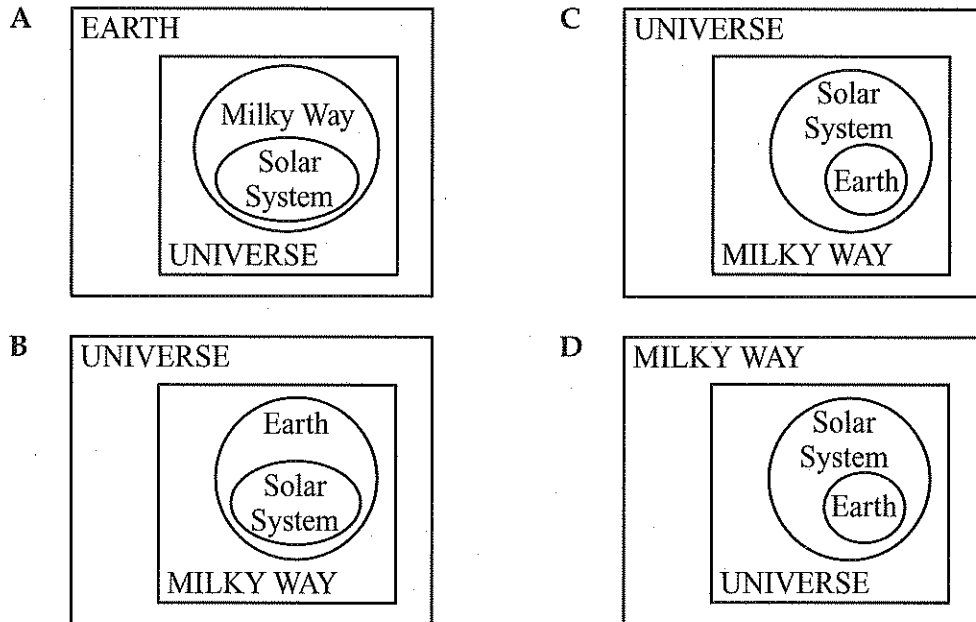


Wheel and axle

What is the main purpose of the doorknob?

- A. to limit the amount of force applied to the axle
- B. to change the size of a force
- C. to reduce the energy in the doorknob system
- D. to add energy to the doorknob system

- 40 Which of the following concept maps shows the correct relationship of Earth, the Milky Way, the universe, and the solar system?



- A. concept map A
- B. concept map B
- C. concept map C
- D. concept map D
- 41 A comparative biologist observes that the flipper of a whale and the arm of a human are similar. What do these similarities **best** illustrate?
- F. that humans originally lived in the ocean
- G. that humans and whales share a common ancestor
- H. that whales evolved from humans
- I. that species do not evolve

- 42 Gregory measured the mass and volume of a rock. The table below records the measurements. What is the density of the rock in grams per milliliter?

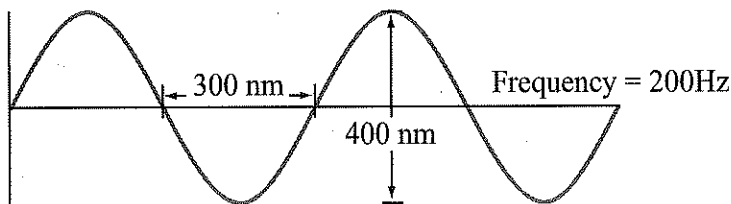


Volume	14 mL
Mass	56 g

/	/	/	/	/
.
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

- 43 What is the main purpose of a system of cells in a multicellular organism?
- A. to coordinate related functions C. to aid reproduction
- B. to create new cells D. to organize related species

- 44 What is the amplitude of this wave in nanometers?



/	/	/	/	/
.
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

45 Which process is most responsible for forming metamorphic rocks?

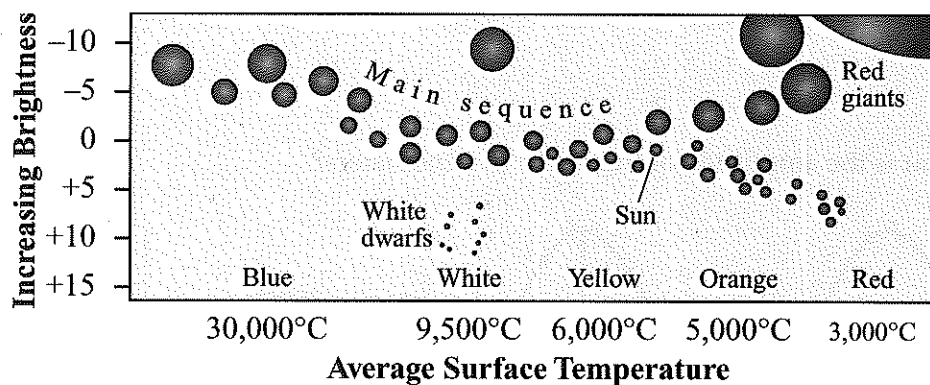
- F. cementing and crystallization of sediments
- G. melting and cooling of magma
- H. application of intense heat and pressure
- I. weathering and erosion

46 Which of these organisms reproduces sexually?

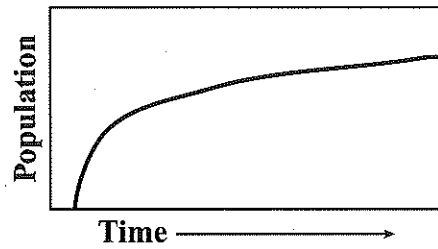
- A. virus
- B. amoeba
- C. bacterium
- D. daffodil

47 Astronomers use the H-R diagram, shown below, to compare the characteristics of stars. Explain how the sun compares to a star in the upper right corner of the diagram in terms of brightness, temperature, color, and size.

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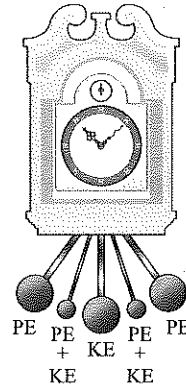
- 48 The graph below represents the growth of the algae population in a pond.



What assumption can you make about the pond ecosystem?

- F. No primary consumers eat algae.
- G. The energy produced by the algae cannot sustain primary consumer populations.
- H. There are no secondary consumers in the pond.
- I. Primary consumers eat the algae.

- 49 The diagram below shows a swinging pendulum. When a pendulum swings, the value of the kinetic energy plus the potential energy is the same at any place along the path of the pendulum.



Which conclusion can you draw from this information?

- A. The total energy of the system is constant.
 - B. The energy of the pendulum does not change form.
 - C. All of the useful energy converts to heat as the pendulum swings.
 - D. Kinetic energy always equals the amount of potential energy.
- 50 The table below shows the speed of sound as it passes through air, water, and glass.

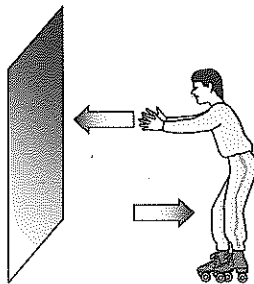
SPEED OF SOUND IN DIFFERENT MEDIA

Medium	Speed of Sound (m/sec)
Air (0°C)	331
Air (20°C)	343
Air (100°C)	366
Water (20°C)	1,482
Glass	5,640

Which of these conclusions is supported by the data in the table?

- F. The speed of sound increases with temperature in a gas.
- G. The speed of sound decreases with temperature in a gas.
- H. The speed of sound is slowest in solids.
- I. The speed of sound decreases as it moves from air to glass.

- 51 Which property of matter is a measure of the pull of gravity on an object?
- A. mass
B. weight
C. energy
D. electric charge
- 52 Which of the following choices correctly describes what happens to liquid water if its molecules slow down enough?
- F. A physical change takes place as energy is removed, and it changes to a solid.
G. A physical change takes place as energy is added, and it changes to a gas.
H. A chemical change takes place as energy is added, and its temperature rises.
I. A chemical change takes place as energy is removed, and it changes to a solid.
- 53 The boy shown below is on roller skates.



If he pushes against the wall, he will begin to roll along the floor. What will happen to his motion after that?

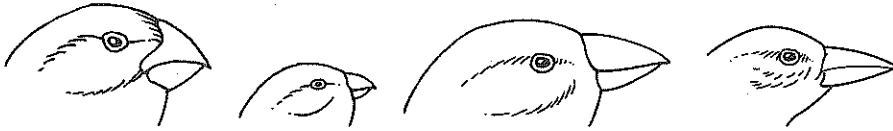
- A. He will start slowing down because objects in motion tend to come to rest.
B. He will continue to roll forever because he has a lot of inertia.
C. He will continue to move until friction stops his movement.
D. He will stop moving immediately because he has a lot of inertia.

- 54 Technological solutions attempt to use scientific principles to solve problems in society. Which of the following statements about technology is true?
- F. Technology always provides perfect solutions to problems in society.
 - G. Technology provides perfect solutions to problems if scientists work hard enough.
 - H. Technology provides solutions but is limited by scientific and social considerations.
 - I. Technology cannot help solve any problems in society.

55

Imagine that you are one of Charles Darwin's assistants. You note that on each of four separate islands, a different species of finch lives, as shown below.

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How did the variations arise? Describe Darwin's ideas about the emergence of new species. How can you account for the different-shaped beaks displayed by the finches?

STOP

Grade 8 Science Reference Sheet

Equations

Acceleration (a)	= $\frac{\text{change in velocity (m/s)}}{\text{time taken for this change (s)}}$	a = $\frac{v_f - v_i}{t_f - t_i}$
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Average speed (v)	= $\frac{\text{distance}}{\text{time}}$	v = $\frac{d}{t}$
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Density (D)	= $\frac{\text{mass (g)}}{\text{Volume (cm}^3\text{)}}$	D = $\frac{m}{V}$
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Percent Efficiency (e)	= $\frac{\text{Work out (J)}}{\text{Work in (J)}} \times 100$	%e = $\frac{W_{\text{out}}}{W_{\text{in}}} \times 100$
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Force (F)	= mass (kg) \times acceleration (m/s ²)	F = ma
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Frequency (f)	= $\frac{\text{number of events (waves)}}{\text{time (s)}}$	f = $\frac{n \text{ of events}}{t}$
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Momentum (p)	= mass (kg) \times velocity (m/s)	p = mv
--------------	-------------------------------------	--------

Wavelength (λ)	= $\frac{\text{velocity (m/s)}}{\text{frequency (Hz)}}$	λ = $\frac{v}{f}$
--------------------------	---	---------------------------

Work (W)	= Force (N) \times distance (m)	W = Fd
----------	-----------------------------------	--------

Units of Measure

m = meter	g = gram	s = second
cm = centimeter	kg = kilogram	Hz = hertz (waves per second)
J = joule (newton-meter)		
N = newton (kilogram-meter per second squared)		

Periodic Table of the Elements

(based on $^{12}\text{C} = 12.0000$)

Representative
Elements

Group

14	Atomic number
Si	Symbol
Silicon	Name
28.086	Atomic Mass

18
8A

Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1A H Hydrogen 1.008	2A He Helium 4.003																
2	Li Lithium 6.941	Be Beryllium 9.012																
3	Na Sodium 22.990	Mg Magnesium 24.305																
4	K Potassium 39.098	Ca Calcium 40.078	Sc Scandium 44.956	Ti Titanium 47.88	V Vanadium 50.942	Cr Chromium 51.996	Mn Manganese 54.938	Fe Iron 55.847	Co Cobalt 58.933	Ni Nickel 58.693	Cu Copper 63.546	Zn Zinc 65.39	Al Aluminum 26.982	Si Silicon 28.086	P Phosphorus 30.974	S Sulfur 32.06	Cl Chlorine 35.453	Ar Argon 39.948
5	Rb Rubidium 85.468	Sr Strontium 87.62	Y Yttrium 88.906	Zr Zirconium 91.224	Nb Niobium 92.906	Mo Molybdenum 95.94	Tc Technetium 98	Ru Ruthenium 101.07	Rh Rhodium 102.906	Pd Palladium 106.42	Ag Silver 107.868	Cd Cadmium 112.411	In Indium 114.82	Sn Tin 118.710	Sb Antimony 121.757	Te Tellurium 127.60	I Iodine 126.905	Xe Xenon 131.29
6	Cs Cesium 132.905	Ba Barium 137.327	La Lanthanum 138.905	Hf Hafnium 178.49	Ta Tantalum 180.948	W Tungsten 183.85	Re Rhenium 186.207	Os Osmium 190.2	Ir Iridium 192.22	Pt Platinum 195.08	Au Gold 196.967	Hg Mercury 200.59	Tl Thallium 204.383	Pb Lead 207.2	Bi Bismuth 208.980	Po Polonium 209	At Astatine 210	Rn Radon 222
7	Fr Francium 223	Ra Radium 226.025	Ac Actinium 227.028	Rf Rutherfordium (261)	Db Dubnium (262)	Sg Seaborgium (263)	Bh Bohrium (264)	Hs Hassium (265)	Mt Meitnerium (268)									

Metals
Nonmetals

Inner Transition Metals

Lanthanide series

58	Ce Cerium 140.12	59	Pr Praseodymium 140.908	60	Nd Neodymium 144.24	61	Pm Promethium 144.913	62	Sm Samarium 150.36	63	Eu Europium 151.96	64	Gd Gadolinium 157.25	65	Tb Terbium 158.925	66	Dy Dysprosium 162.50	67	Ho Holmium 164.930	68	Er Erbium 167.26	69	Tm Thulium 168.934	70	Yb Ytterbium 173.04	71	Lu Lutetium 174.967
90	Th Thorium 232.038	91	Pa Protactinium 231.036	92	U Uranium 238.029	93	Np Neptunium 237.048	94	Pu Plutonium 244.064	95	Am Americium 243.061	96	Cm Curium 247.070	97	Bk Berkelium 247.070	98	Cf Californium 251.080	99	Es Einsteinium 252.083	100	Fm Fermium 257.095	101	Md Mendelevium 258.099	102	No Nobelium 259.101	103	Lr Lawrencium 260.105

Actinide series