

End-of-Year Assessment Practice A

Fill in the correct answer bubble, or write your answer in the space provided.

Use the following information and the table shown to answer questions 1 through 5.

Imagine you are a scientist who is working with local gardeners to develop dwarf tomato plants that can be grown in small spaces. You want to select the shortest plants, and then breed these plants together. As part of your study, you measure the heights of 10 different plants. Your results are shown in the table below.

Height of Dwarf Tomato Plants

	Plant A	Plant B	Plant C	Plant D	Plant E	Plant F	Plant G	Plant H	Plant I	Plant J
Height of plant (cm)	42.2	33.7	54.3	58.1	35.6	30.2	61.4	44.9	32.8	39.6

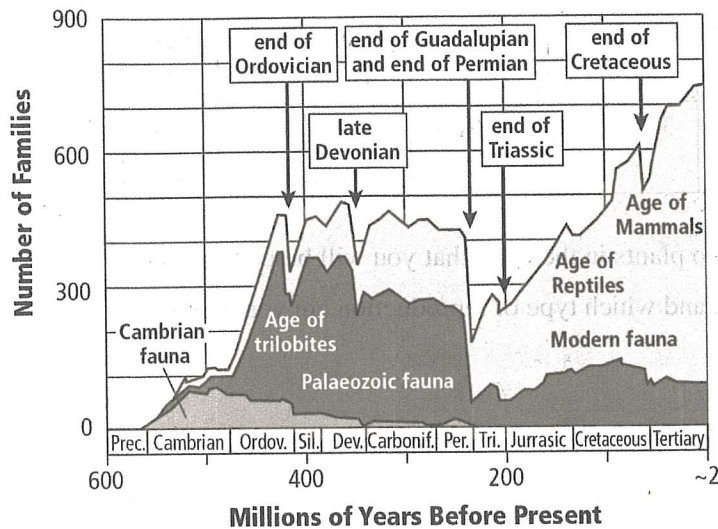
- Based on the goal of your study, circle the two plants in the chart that you will breed together.
- Which process produces the plants' sex cells, and which type of reproduction are you using to breed the plants?
 - mitosis; asexual reproduction
 - meiosis; sexual reproduction
 - mitosis; sexual reproduction
 - meiosis; asexual reproduction
- The allele for tall tomato plants is represented by a capital T . It shows complete dominance over the allele for dwarf tomato plants, represented by a lowercase t . Based on this information, what is the genotype of the two plants you have selected? _____
- You breed the two plants and distribute the seeds of the offspring to local gardeners. During the next flowering season, one gardener's dwarf plant is pollinated by a tall tomato plant with a genotype of Tt . Complete the Punnett square to show the possible genotypes of the offspring.

5. Based on the Punnett square in the previous question, what is the percentage probability that the offspring will be dwarf tomato plants?

(A) 25%
 (B) 50%
 (C) 75%
 (D) 100%

Use the graph to answer questions 6 and 7.

Major Mass Extinctions



6. The graph shows major mass extinctions over the last 600 million years. What can you infer from the graph about the time between 600 and 500 million years ago?
- (A) A mass extinction occurred during the early part of this time period.
 (B) Life forms were the same at that time as they are today.
 (C) Relatively few life forms existed during that time.
 (D) Most of the types of life forms from that time still exist today.
7. What can you infer about mammals based on the graph?
- (A) They have been around for most of Earth's history.
 (B) They nearly went extinct during the late Devonian period.
 (C) They caused the extinction of reptiles.
 (D) They became the dominant fauna following the last mass extinction.

8. In the table shown here, place a checkmark next to the type of cell division that occurs in humans for each of the life functions listed.

Cell Division

	Mitosis	Meiosis
Growth		
Reproduction		
Development		
Repair		

9. Study the table again. How would it differ if you completed it for an organism that underwent asexual reproduction?
- (A) All checks would be placed under mitosis.
- (B) Only growth would be checked under mitosis.
- (C) All checks would be placed under meiosis.
- (D) Only reproduction would be checked under meiosis.

10. The table shows the characteristics of a generation of guinea pigs that are being bred for certain traits.

Based on the data in the table, the guinea pigs are most likely being bred for

_____ hair color,
 _____ coat texture, and
 _____ hair length.

Characteristics of Guinea Pig Offspring from Controlled Breeding

Hair Color	Coat Texture	Hair Length	Number of Guinea Pigs
Black	Rough	Short	27
		Long	9
	Smooth	Short	9
		Long	3
White	Rough	Short	9
		Long	3
	Smooth	Short	3
		Long	1

11. During a drought in a grassland environment, scientists measured the lengths of root systems of a species of grass. Some members of the species were thriving while others were dying. The table shows the results of the study.

Measurement of Root Systems

Description of plants	Range of length of roots (m)
Thriving	2.4 to 2.7
Dying	2.1 to 2.4

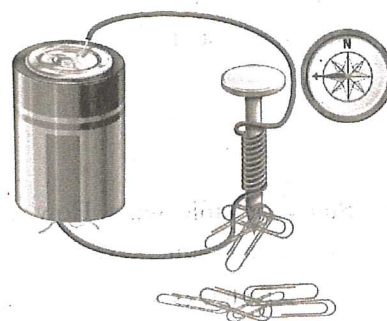
What can you infer about the species of grass?

- (A) It will soon become extinct because of the drought.
- (B) Its population will increase because some plants are thriving.
- (C) If the drought continues, most plants will have root systems between 2.4 and 2.7 m in length.
- (D) If the drought ends, the root systems will soon exceed 2.7 m in length.

Use the information and the diagram to answer questions 12 through 16.

A student performed an investigation using a compass and an electromagnet. The electromagnet was made of a battery, wires, and a steel nail, as shown in the illustration.

When the wires were attached to the battery, paper clips moved from the table top to the nail. The student varied the number of coils, the height of the nail above the table top, and the position of the nail in the coil. She observed the number of paper clips attracted to the nail with each variation. Data were recorded in this table.



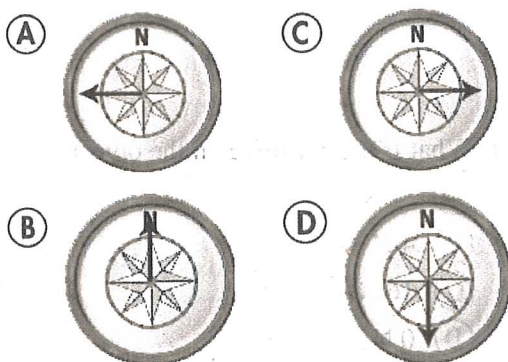
Electromagnet Experiment			
Test	Number of coils	Height above table	Number of paper clips attracted
A	10	10 mm	5
B	10	20 mm	3
C	10	30 mm	2
D	20	10 mm	11
E	20	20 mm	
F	20	30 mm	4
G	30	10 mm	
H	30	20 mm	10
I	30	30 mm	

12. In the space below, graph the data in the table. Based on the data in the table, and on your graph, evaluate the effect of changing variables on the strength of the magnetic field produced by the electromagnet. Use your evaluation to fill in the blank cells of the table.

13. Which is the best prediction for the number of paper clips that would be picked up by a 40-coil electromagnet that is 20 mm above the table?

(A) 4 (B) 8 (C) 15 (D) 23

14. When a compass was placed near the head of the nail as shown in the illustration, the compass needle pointed toward the nail. Predict which direction the needle will point if the compass is placed near the point of the nail.



15. Predict how reversing the direction of the battery in this investigation would change the appearance of the compass.

16. Place an X in the boxes next to the types of energy involved in this investigation.

<input type="checkbox"/> elastic potential energy	<input type="checkbox"/> gravitational potential energy
<input type="checkbox"/> thermal energy	<input type="checkbox"/> electrical energy
<input type="checkbox"/> chemical energy	<input type="checkbox"/> magnetic energy

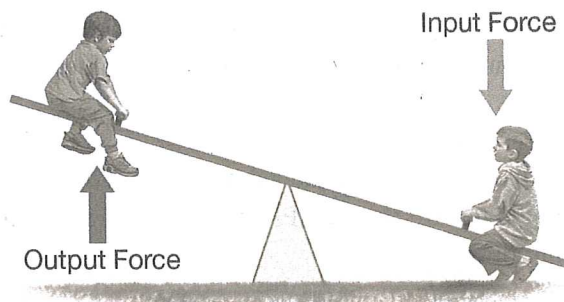
17. A student is comparing brands of hair bands for her soccer team. One of the variables she tested was elastic potential energy. The brands of hair bands, their average maximum stretch, and average percentage of breaking are shown in the table below.

Hair band brands	Average maximum stretch (cm)	Average breakage rate (%)
Brand A	18	5
Brand B	29	5
Brand C	17	10
Brand D	22	25

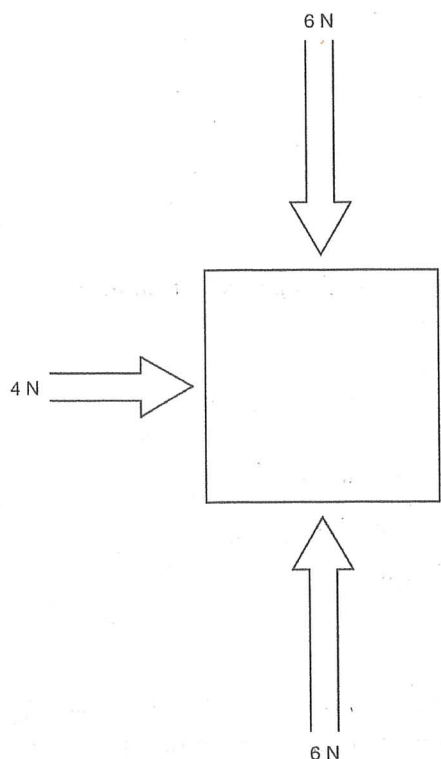
Which brand of hair band has the greatest elastic potential energy?

(A) Brand A
(B) Brand B
(C) Brand C
(D) Brand D

18. In the illustration shown here, two children are playing on a seesaw. Draw a circle around the child who has the greater gravitational potential energy.



Use the simple force diagram to answer questions 19 and 20.

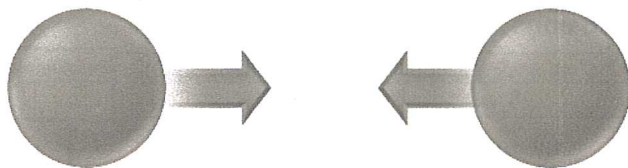


19. What is the net force on the object?

- (A) 4 N →
- (B) 4 N ←
- (C) 16 N →
- (D) 0 N ←

20. Beside the diagram, draw and label a force arrow showing the force that would be required for the forces on the box to be balanced.

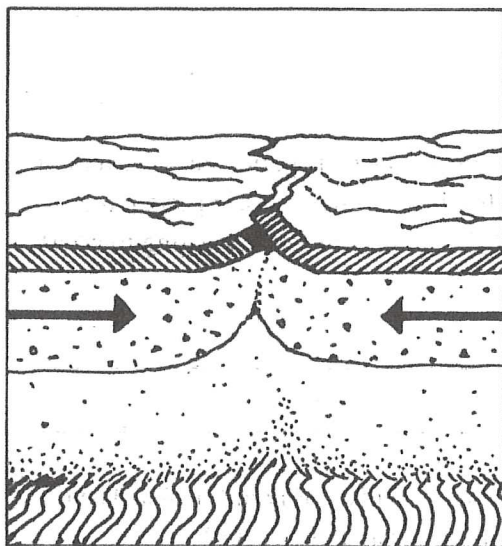
21. This illustration shows two charged particles exerting a force on one another.



Which conclusion can you reach based on the illustration?

- (A) The charged particles are attracting each other.
- (B) The charged particles are repelling each other.
- (C) You cannot determine the direction of the forces exerted by the charged particles.
- (D) You can determine that the magnitude of the force to the right is twice the magnitude of the force to the left.

Use the figure to answer questions 22–23.



22. This figure shows the motion of two continental plates. Which feature is often associated with this type of plate boundary?

- (A) broad rift valley
- (B) deep ocean trench
- (C) mid-ocean ridge
- (D) tall mountain chain

23. Name one feature that could form if one plate in the diagram was an oceanic plate and the other was a continental plate.

24. Which geological process and resulting feature are associated with divergent plate boundaries?

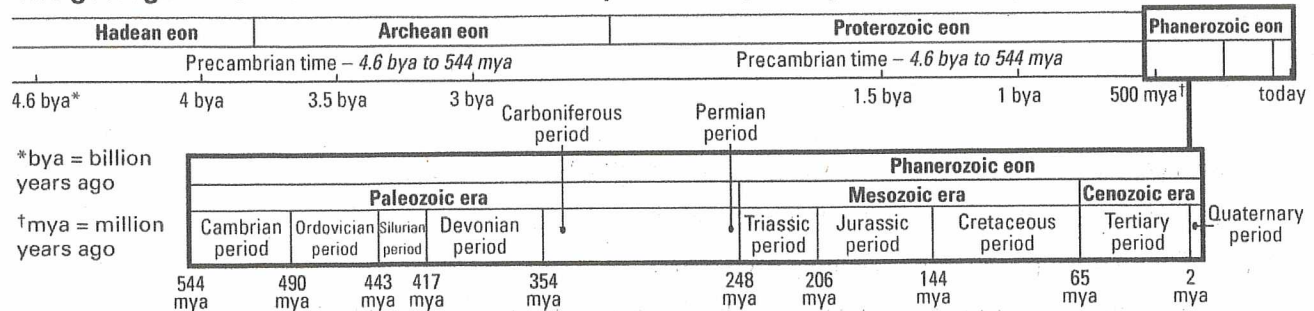
- (A) erosion and valleys
- (B) flooding and floodplains
- (C) rifting and rift valleys
- (D) deposition and alluvial fans

25. Scientists have determined that the outer core of Earth is made of molten metal but that the inner core is composed of solid metal. What causes this difference?

- (A) The inner core is under much higher pressure from material above it.
- (B) The outer core receives much more energy by convection from the mantle.
- (C) The inner core has existed longer, so it has cooled more than the outer core.
- (D) The outer core is composed of metals with a lower melting point than those of the inner core.

Use the figure to answer questions 26 and 27.

The geologic time scale divides Earth's history into eons, eras, periods, and epochs.



26. Humans appeared on Earth during the Cenozoic era. Which concept explains why, in undisturbed layers, dinosaur fossils will always be found in layers of rock below layers containing human remains?

- (A) uniformitarianism
- (B) gravity
- (C) superposition
- (D) absolute dating

27. A geologist has identified index fossils from the Tertiary period, the Cretaceous period, and the Jurassic period in two core samples. A third core sample contains index fossils from the Jurassic period, the Triassic period, and the Permian period. Use your knowledge of the concept of relative dating to briefly state what the geologist knows about the third core sample.

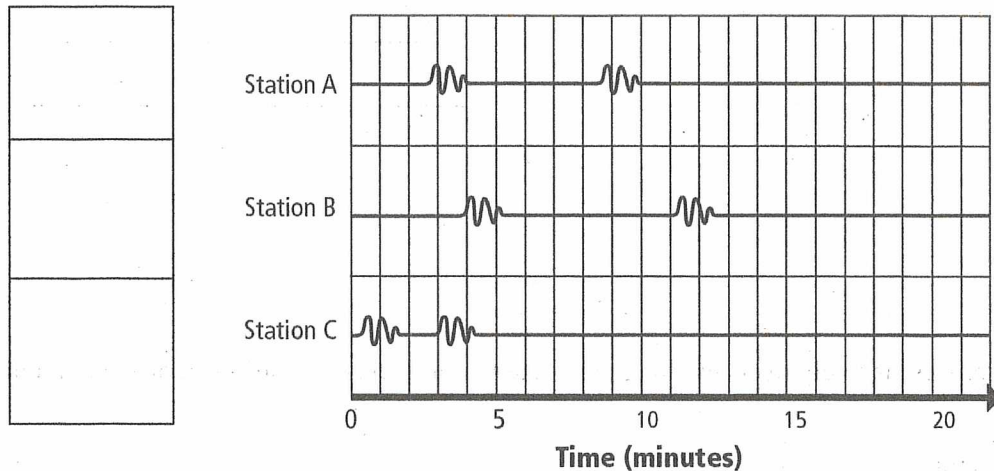
28. Scientists have determined the ages of certain rocks along the shore of Hudson Bay in Canada. The rocks are more than 4 billion years old. What technique did scientists used to date these rocks?

- (A) superposition
- (B) uniformitarianism
- (C) absolute dating
- (D) relative dating

Use this illustration to answer questions 29 through 31.

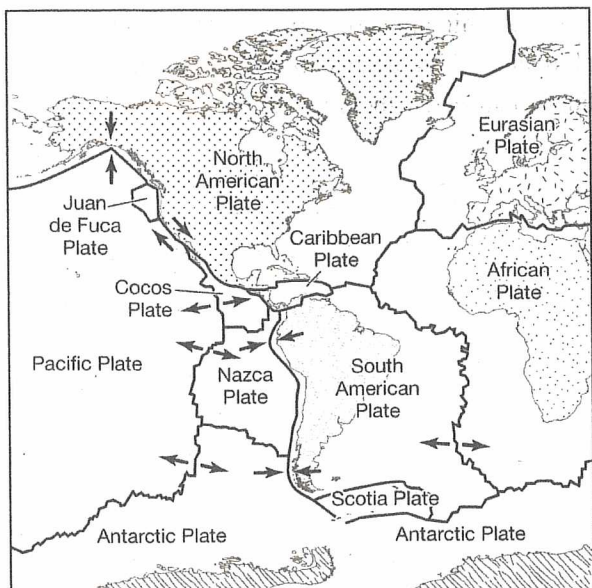
The data from three seismograph stations taken during a period of 20 min are shown below. The seismographs recorded information from a seismic event located an unequal distance from each station. In a seismogram, the first reading is caused by the P wave and the second reading is caused by the S wave.

Seismograms From Three Earthquake Monitoring Stations



29. Label each box beside the station names with numbers to indicate the relative distance of the station from the location of the earthquake, with 1 being closest and 3 being farthest away.
30. Why does the difference between arrival time of the P wave and arrival time of the S wave vary from station to station?
 - (A) P and S waves occur at different locations within the earthquake zone.
 - (B) P and S waves travel at different speeds, so the arrival time difference increases with distance from the earthquake.
 - (C) P waves have greater magnitude than S waves, so instruments register P-wave arrival time faster.
 - (D) P waves travel directly to the station, but S waves are reflections from Earth's core.
31. Which information is needed for scientists to calculate the distance between the location of the earthquake and a station?
 - (A) difference in arrival time between the P waves and the S waves
 - (B) the number of pen deflections made as the P wave passes the station
 - (C) length of time between the beginning of the P wave and the end of the P wave
 - (D) difference in amount of deflection of the recorder by the P waves and the S waves

Use the figure to answer questions 32–34



32. Why are volcanoes common along the west coast of South America but not along the east coast of South America?

33. Which process is likely to occur along the western boundaries of North America and South America?

- (A) floods
- (B) earthquakes
- (C) glaciation
- (D) rifting

34. The Nazca Plate consists mostly of which type of crust?

- (A) oceanic crust
- (B) continental crust
- (C) lithospheric crust
- (D) frozen crust

35. Based on the information on this topographical map, describe the direction in which the river flows.

