

Maine High School Assessment

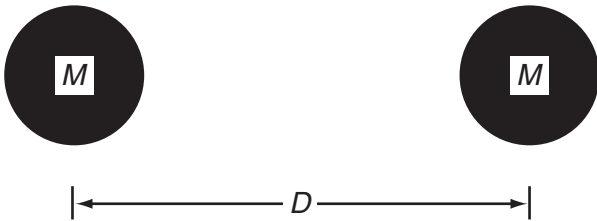
STUDENT PRACTICE TEST BOOKLET

RELEASED 2011 SCIENCE ITEMS

Maine Department of Education

Directions: Read questions 1 through 20 and decide which is the best of the choices given. Fill in the corresponding circle on page 2 in your practice test answer booklet. You may use any available space in your practice test booklet for scratchwork.

1. The diagram below shows two balls with the same mass, M , placed a distance, D , apart.



When is the gravitational force between the two balls the greatest?

- (A) when M increases and D decreases
(B) when M stays the same and D increases
(C) when M decreases and D stays the same
(D) when M decreases and D increases
2. Light-years are often used for measurement in astronomy. What other unit could be used to make similar measurements?
- (A) kilometers per second
(B) kilometers
(C) degrees Celsius
(D) seconds

3. Which type of species is most likely to become extinct?

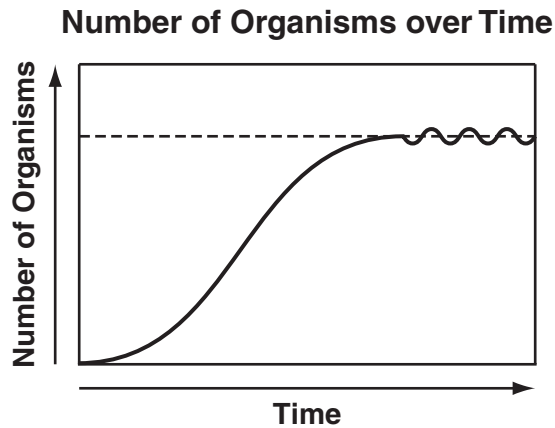
- (A) a species that eats a very specialized diet
(B) a species that has a high reproductive rate
(C) a species that has a high population density
(D) a species that lives in a large habitat area

4. What is the relative size and location of a proton according to the Bohr-Rutherford model of the atom?

- (A) A proton is 2000 times more massive than an electron and is located in the nucleus.
(B) A proton is 2000 times less massive than an electron and is located in the nucleus.
(C) A proton is 2000 times more massive than an electron and is located in orbit around the nucleus.
(D) A proton is 2000 times less massive than an electron and is located in orbit around the nucleus.

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5. The graph below shows the number of organisms in an ecosystem over time.



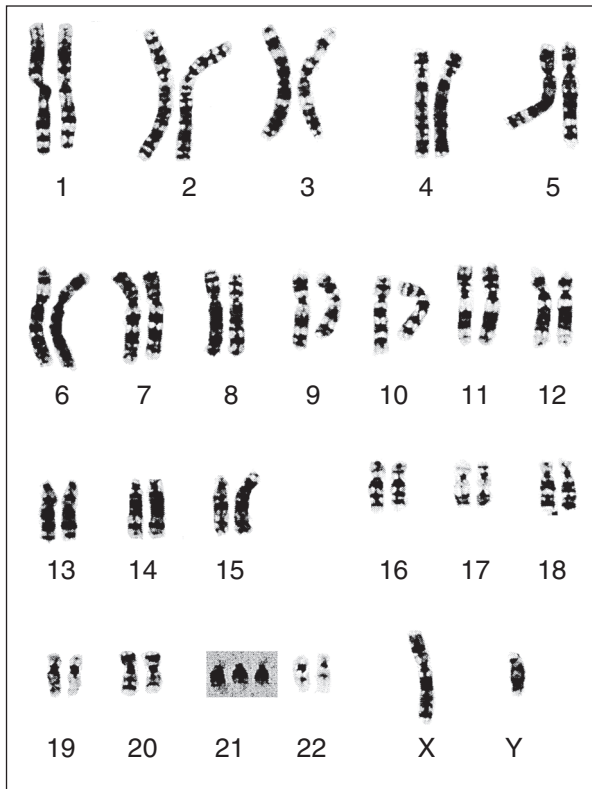
Which biological concept is best illustrated by the graph?

- (A) natural selection
 (B) carrying capacity
 (C) geographic isolation
 (D) predator-prey relationships
6. Unicellular organisms carry out all the necessary life processes in one cell. In multicellular organisms, each cell is specialized to perform a specific function. How do the cells in multicellular organisms become specialized?
- (A) Cells develop specific functions through the expression of different genes as they mature.
 (B) A single nucleus coordinates the function performed by each cell.
 (C) The brain communicates the function required for each cell.
 (D) Each cell carries a unique set of genes.

7. Which statement reflects the current theory of the origin of the universe?
- (A) A small, ancient solar system increased in size.
 (B) Huge clouds of gas and dust cooled and condensed.
 (C) Two giant balls of matter collided and broke apart.
 (D) An extremely small, dense ball of energy expanded.
8. What happens to the water (H_2O) molecules as a pan of water is heated from $20^{\circ}C$ to $75^{\circ}C$?
- (A) The motion of the water molecules increases.
 (B) The motion of the water molecules decreases.
 (C) The bonds between the hydrogen and oxygen atoms break.
 (D) The bonds between the hydrogen and oxygen atoms become less polar.

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9. The picture below shows the chromosomes of a human.



What caused the chromosomal alteration in number 21?

- (A) part of one chromosome attached to another chromosome (translocation)
- (B) some of the genes on a chromosome were reversed (inversion)
- (C) a duplicated chromosome failed to separate (nondisjunction)
- (D) a part of a chromosome was lost (deletion)

10. People in the southern United States imported the plant kudzu from Japan to control erosion along highways. Kudzu now spreads so quickly that it kills many other plants. How have humans directly impacted the environment in this example?

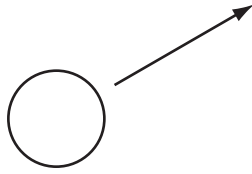
- (A) overexploitation
- (B) destruction of habitat
- (C) introduction of a non-native species
- (D) disruption of a food chain

11. Which statement best describes the role of gravity in maintaining the solar system?





- (A) Gravity keeps the planets in orbit around the Sun.
- (B) Gravity protects the planets from solar winds.
- (C) Gravity supplies energy for the planets.
- (D) Gravity holds objects on the planets.

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12. A ball is traveling through the air in the direction of the arrow as shown in the diagram below.



In which direction does the force of air friction push on the ball?

- (A) 
- (B) 
- (C) 
- (D) 

13. Evidence supports the theory that whales are descendants of land mammals. How did land mammals evolve into sea mammals?

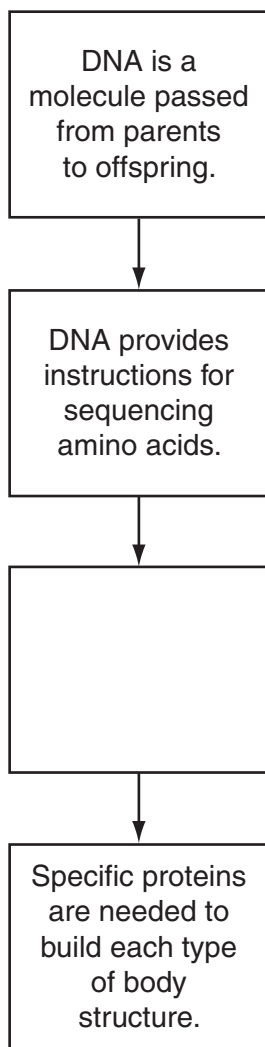
- (A) The end of the ice age forced many land mammals to live in the sea.
- (B) Sea mammals evolved through interbreeding of land mammals and fish.
- (C) There was less competition for food among sea mammals.
- (D) Land mammals inherited mutations that helped them survive in water.

14. Which statement best describes the difference between a substance at 50°C and at 20°C ?

- (A) The mass of the substance is greater at 50°C .
- (B) The density of the substance is higher at 50°C .
- (C) The average kinetic energy of the particles is higher at 50°C .
- (D) The average electrical energy of the particles is higher at 50°C .

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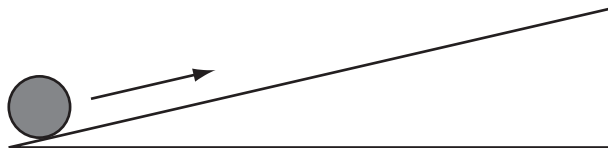
15. The diagram below explains why offspring are more similar to their parents than to other organisms, even though all organisms are made of the same basic substances.



Which statement is the best information to include in the third box in the diagram?

- (A) RNA is a substance that forms a copy of the DNA.
 (B) Every different sequence of amino acids makes a unique protein.
 (C) Proteins vary in structure more than any other type of organic molecule.
 (D) DNA consists of carbon, hydrogen, oxygen, nitrogen, and phosphorus atoms.

16. The diagram below shows a ball rolling up a ramp with an initial speed of 10 m/s.

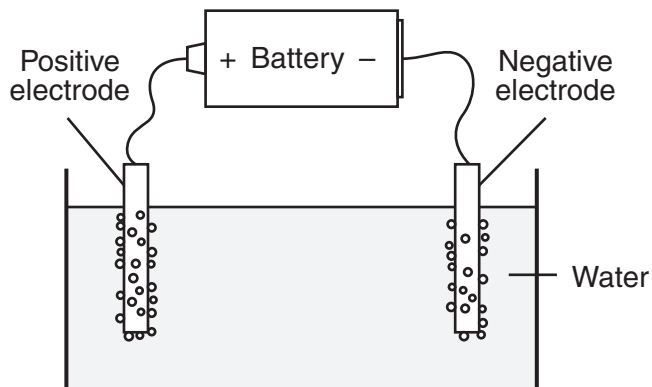


When will the ball have maximum potential energy?

- (A) when the ball reaches its maximum height
 (B) when the ball reaches its maximum speed
 (C) when the friction on the ramp becomes 0 N
 (D) when the slope of the ramp becomes 45°
17. In the 1500s, Nicolaus Copernicus introduced the Sun-centered model of the solar system. How did this model help scientists of the time better understand the solar system?
- (A) Scientists were able to explain solar flares on the Sun.
 (B) Scientists were able to accurately measure the Sun's gravitational field.
 (C) Scientists were able to discover planets outside the solar system.
 (D) Scientists were able to explain the motion of planets more accurately.

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18. The apparatus shown below uses an electric current to break down water molecules into the simpler substances of which they are made.



Electrolysis Apparatus

The positive and negative electrodes each attract a different substance. Which substances, represented by the small circles, form at each electrode?

- (A) chlorine and sodium
(B) electrons and protons
(C) hydrogen and oxygen
(D) carbon dioxide and water

19. Which statement describes evidence that whales and hippos are closely related species?

- (A) Both are large in size.
(B) Both have similar milk proteins.
(C) Both retain body heat with a layer of fat.
(D) Both are herbivores.

20. A person is sitting on a train that is moving 100 km/h. From which frame of reference is the person moving 0 km/h?

- (A) the ground
(B) the train
(C) a train passing in the opposite direction
(D) a car stopped at a crossing

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Directions: Write your answers to constructed-response questions 21 and 22 in the boxes provided on pages 2 and 3 of your practice test answer booklet. Be sure to answer and label all parts (a, b, c, etc.) of the questions.

21. During growth, a skin cell prepares to divide into two new cells.
- Describe how a skin cell prepares for division.
 - Describe what happens in the skin cell during division.
 - Explain why the two new skin cells carry the same genetic information as the original skin cell.
22. Plant life has existed on Earth for millions of years.
- Describe one way plant life currently affects Earth's atmosphere and one way plant life affected Earth's atmosphere millions of years ago.
 - Describe one way the existence of plant life currently affects Earth's geosphere and one way plant life affected Earth's geosphere millions of years ago.

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