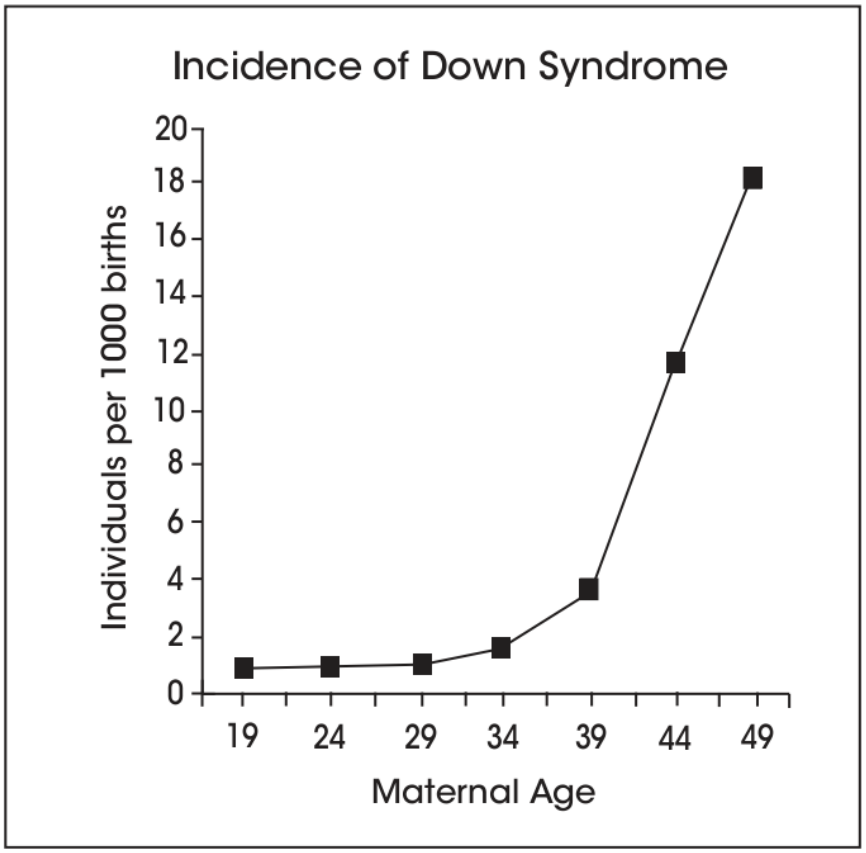
GRAPH QUESTIONS

All questions appeared on previous OGT Science exams or the public "practice test".

1. The graph below shows the relationship between maternal age and the incidence of children born with Down syndrome (a condition that results in an individual having an extra chromosome 21).



What conclusion is best supported by the data? (2008 #19 / SI A)

A. There is no risk of Down syndrome in children born to mothers under age 34.

B. The risk of Down syndrome increases dramatically in children born to mothers after age 34.

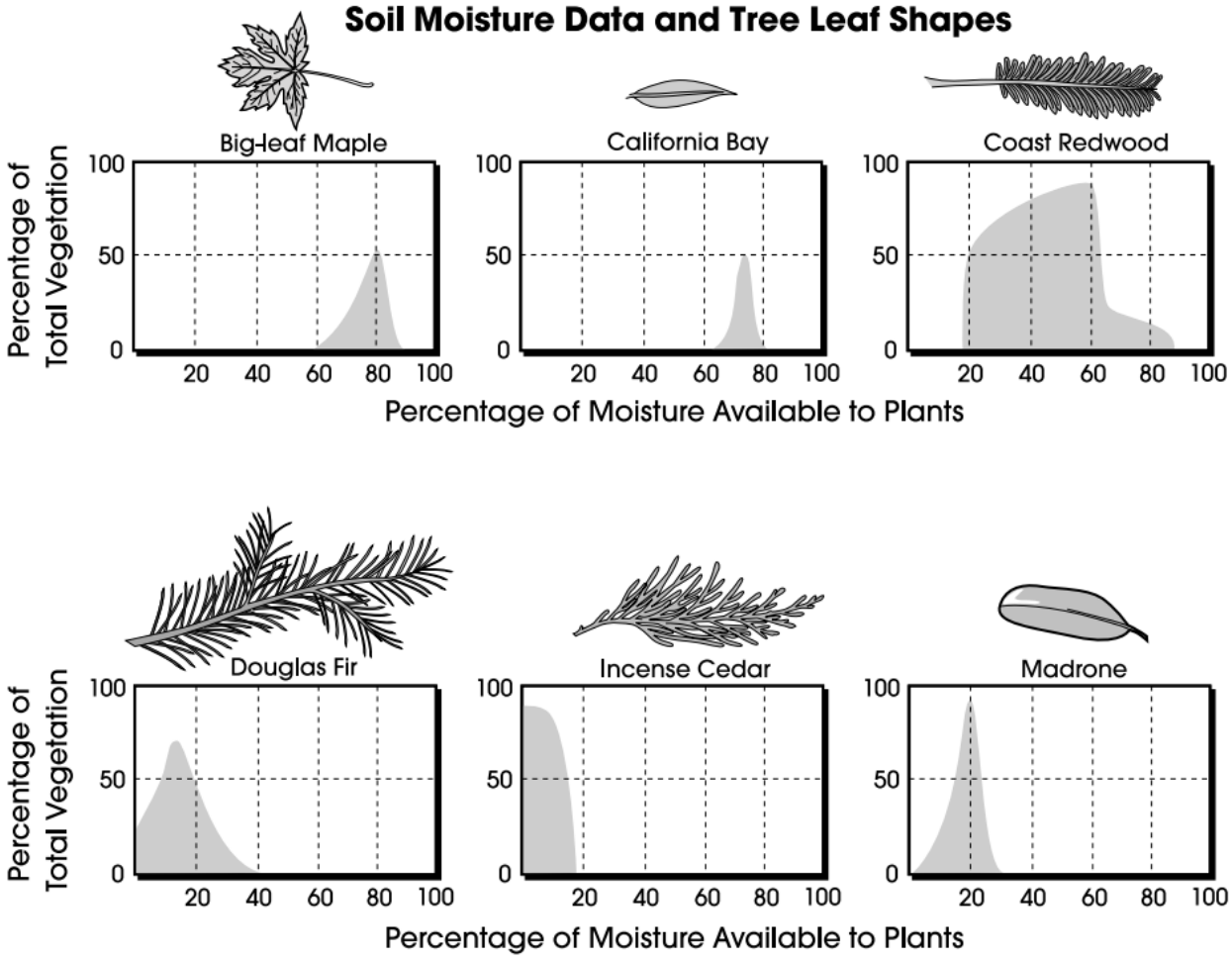
C. The risk of Down syndrome doubles in children born to mothers for each year over the age of 34.

D. There is no correlation between the number of Down syndrome births and age.

Use the information and map to answer questions 2 – 4.

Plant Distribution

The distribution of plant species depends on many factors, including climate, topography, soil conditions and biological interactions. Data on moisture availability were collected along the coast of Northern California. In this area, each plant community has a dominant tree. The graphs below illustrate a dominant tree's percentage of the total vegetation compared to the percentage of soil moisture available. Each tree species studied has a distinct preference for a certain kind of habitat.



2. An ecologist observes that an area in California has experienced an increase in average soil moisture content. The area was once dominated by incense cedar but is now home to a greater variety of trees. Which types of trees would the ecologist most likely observe in this area if the soil moisture content has risen to 30%? (Practice Test #8 / SI A)

   A. madrone and California bay

   B. Douglas fir and madrone

   C. incense cedar and big-leaf maple

   D. coast redwood and big-leaf maple

3. A survey of a small coastal valley in California finds only Douglas fir, madrone, and coast redwood. The soil moisture availability in this valley is most likely to be (Practice Test #11 / SI A)

   A. 0 – 20%.

   B. 20 – 40%.

   C. 40 – 80%.

   D. 60 – 80%.

4. A scientist observes that Douglas fir trees survive better than broadleaf species such as big-leaf maple in a certain area. Which is the best explanation for her observation? (Practice Test #9 / LS F)

   A. Big-leaf maple trees require less soil moisture than Douglas fir trees.

   B. Douglas fir trees are better at conserving water than big-leaf maple trees.

   C. Douglas firs and big-leaf maples are often found in overlapping habitats.

   D. The big-leaf maple trees are experiencing competition with California Bay trees.

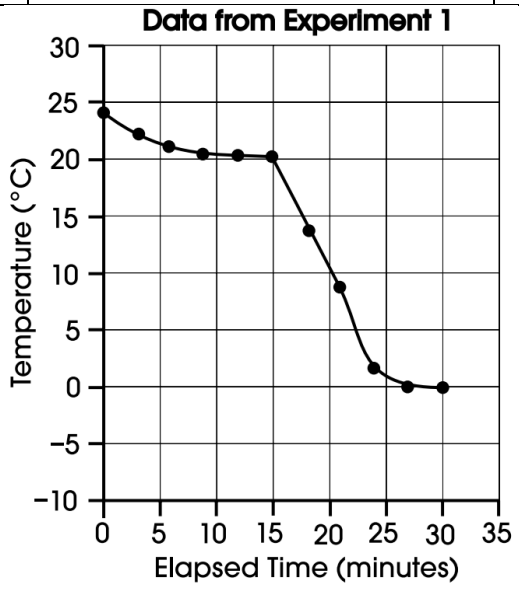
Use the following information to answer question 5.

Temperature Experiment

Students pour 250.0 g of water into an open insulated container. The initial temperature of the water inside the container is recorded. The temperature of the contents of the container is recorded every 3.0 minutes. When 73.0 g of ice (at melting point) is added to the container, the students continue to collect temperature data and the mixture is gently stirred. The data from Experiment 1 are listed in the chart below. The data are also plotted on the following graph.

Chart for Experiment 1

Elapsed Time (minutes)	Temperature of System (°C)	Observations
0	24.3	water added
3	22.1	
6	21.0	
9	20.5	
12	20.3	
15	20.2	ice added
18	13.7	
21	8.2	
24	2.2	
27	0.0	
30	0.0	ice still present



5. During the first 15 minutes of Experiment 1, the water molecules in the container (Practice Test #7 / PS F)

   A. decreased in average speed.

   B. changed the type of bonds present in the water.

   C. changed shape because the temperature changed.

   D. increased in oxygen content compared to the hydrogen content.

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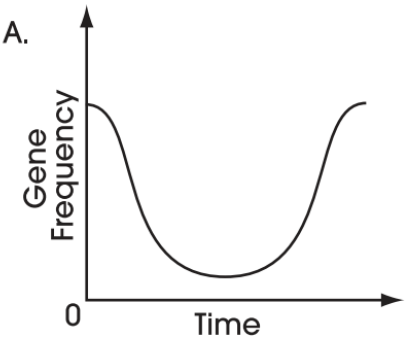
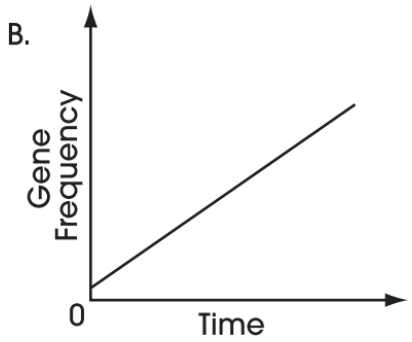
6. A single weed in a garden has a genetic mutation that makes it immune to weed-killing herbicides. Suppose the gardener periodically treats the area with herbicide.

   Which graph best represents the expected frequency of the mutant gene in the weed population over time? (Modified from 2006 #38 / LS H)

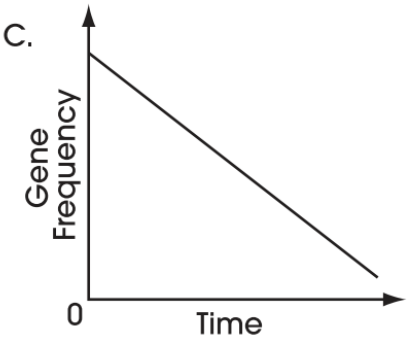
A.



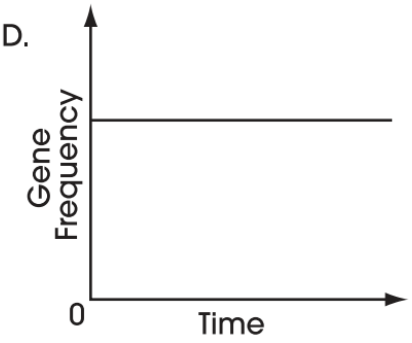
B.



C.

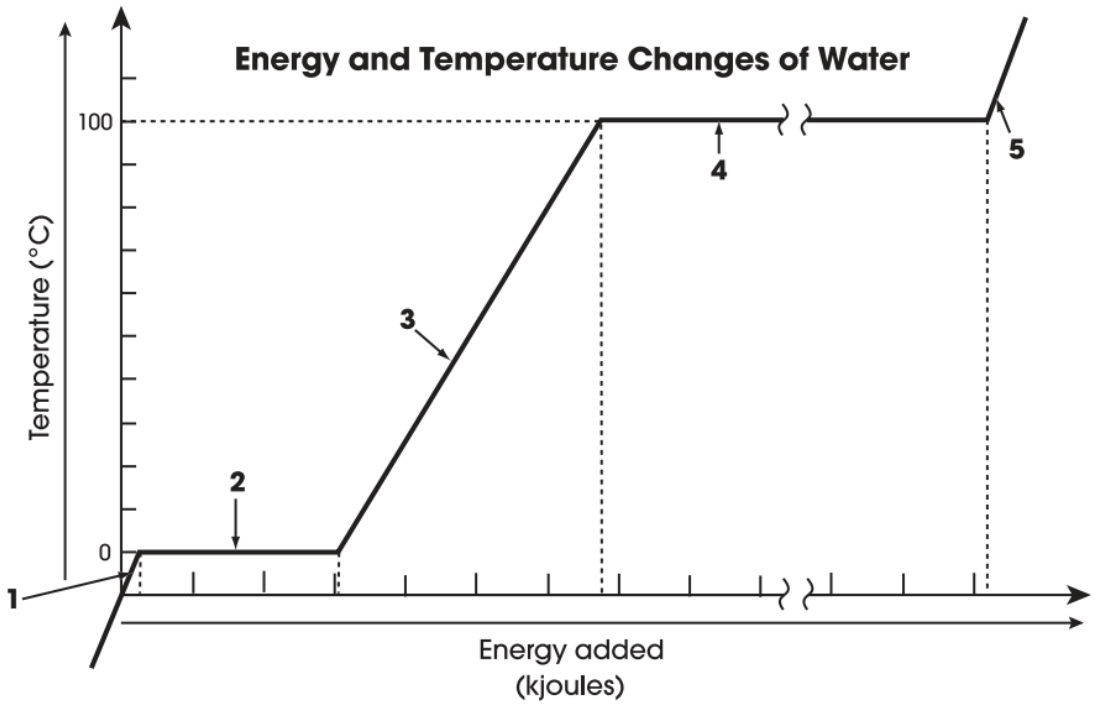


D.



Use the information to answer question 7.

The following graph shows the change in temperature of a sample of H_2O, which begins as ice, as thermal energy is added.



7. Which region of the graph represents water (H_2O) in the liquid form only? (2006 #22 / PS F)

   A. 1

   B. 2

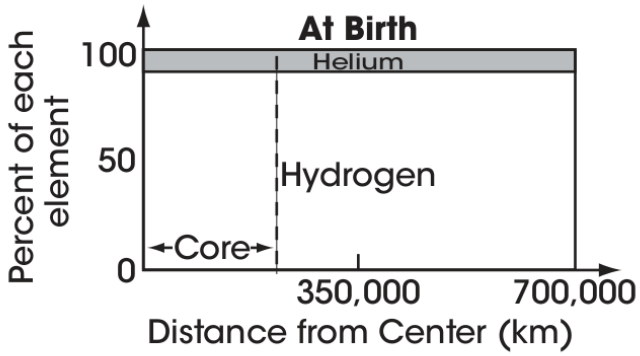
   C. 3

   D. 4

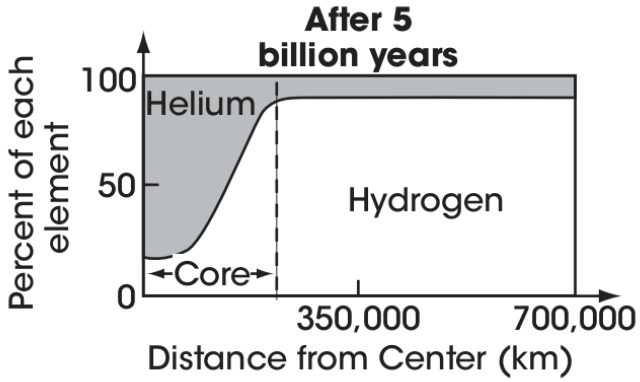
8. According to some theories, Earth's sun is approximately 5 billion years old. After about 10 billion years, this type of star runs out of fuel. The hydrogen in the core becomes depleted and cannot be fused to form helium. The graphs below illustrate the chemical changes that occur inside a star at specific times.

Chemical Changes in a Star

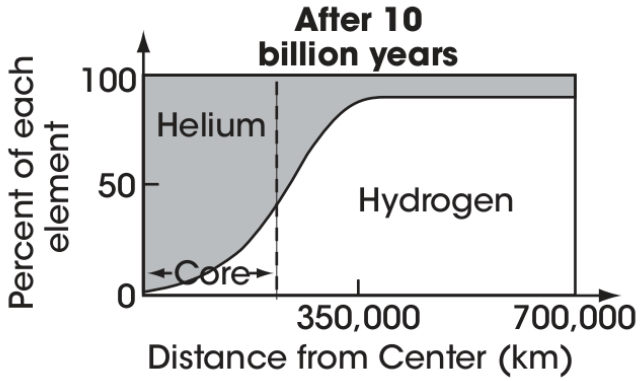
(1)



(2)



(3)



Using the information provided, what is the hydrogen/helium content inside a star that is the approximate age of our sun? (2008 #20 / ESS A)

A. The hydrogen content decreases as it reaches the outer edge of the star.

B. The helium content is higher at the outer portion of the star than it is in the core of the star.

C. The hydrogen content is higher at the center of the star and then decreases towards the outer edge of the star.

D. The helium content is greatest at the center of the star and then decreases towards the outer edge of the star.

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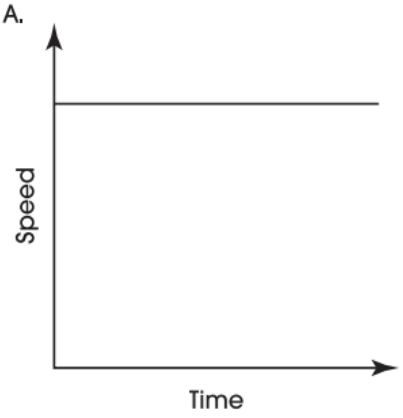
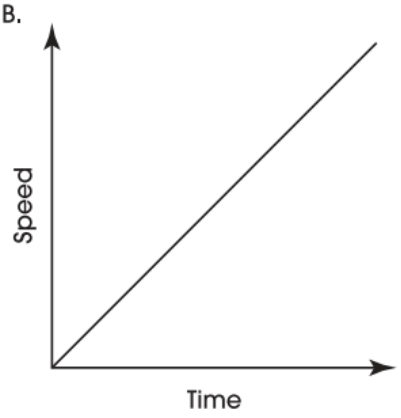
9. Which graph best represents the speed of a snowboarder as he moves down a steep, icy slope? (Modified from 2006 #44 / PS D)

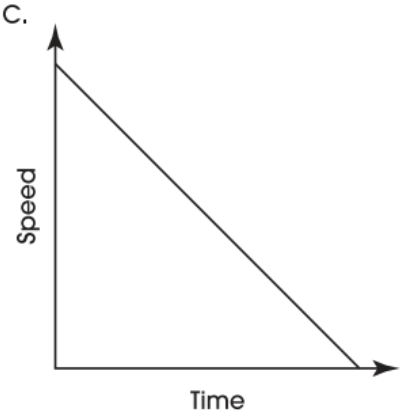
A.



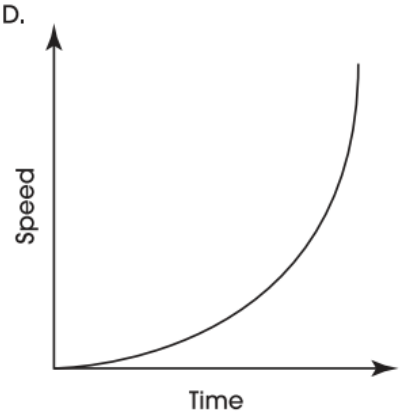
B.



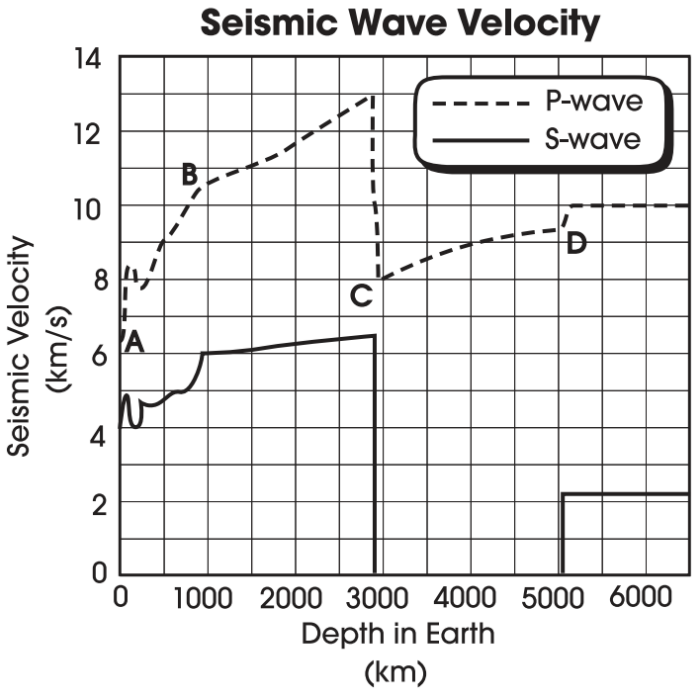
C.



D.



10. The graph below shows the seismic wave velocities at various depths within Earth.



Based on the graph, which point marks the beginning of Earth's liquid outer core? (2008 #21 / PS G)

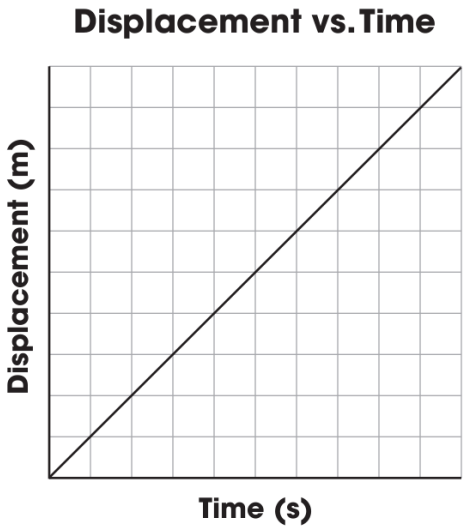
A. A

B. B

C. C

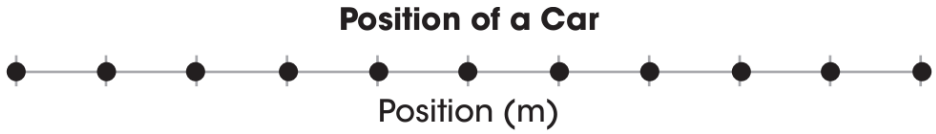
D. D

11. A student records the position of a car every second for a period of time and plots the following displacement and time graph.

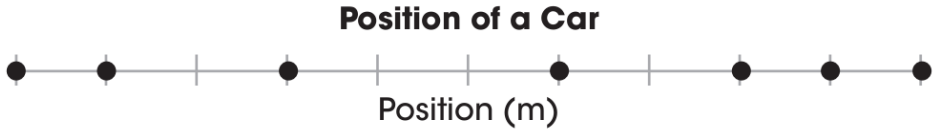


Illustrated below is the change in position of a car every second. Which observation of an object moving from left to right did the student record? (2009 #14 / PS D)

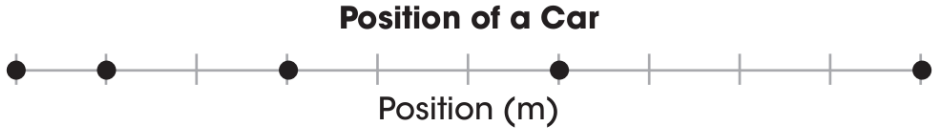
A.



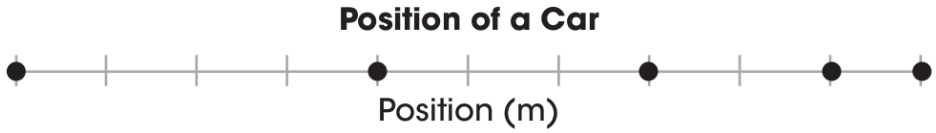
B.



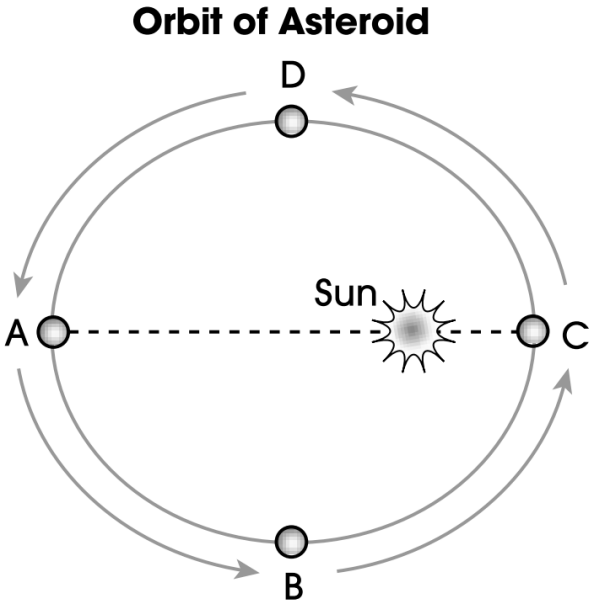
C.



D.

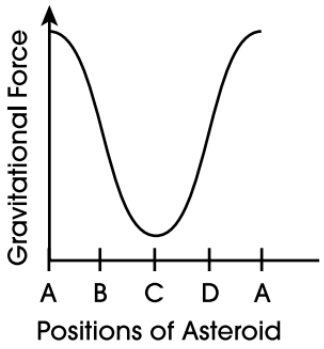


12. Points A, B, C and D in the drawing below represent an asteroid's position during its orbit around the sun.

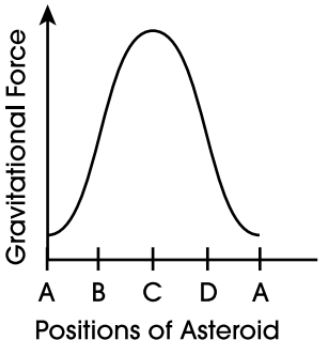


Which graph shows how the gravitational force between the sun and the asteroid varies with the asteroid's distance from the sun? (Practice Test #15 / ESS C)

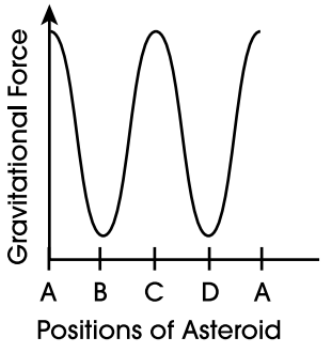
A.



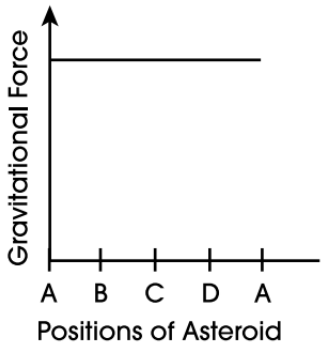
B.



C.



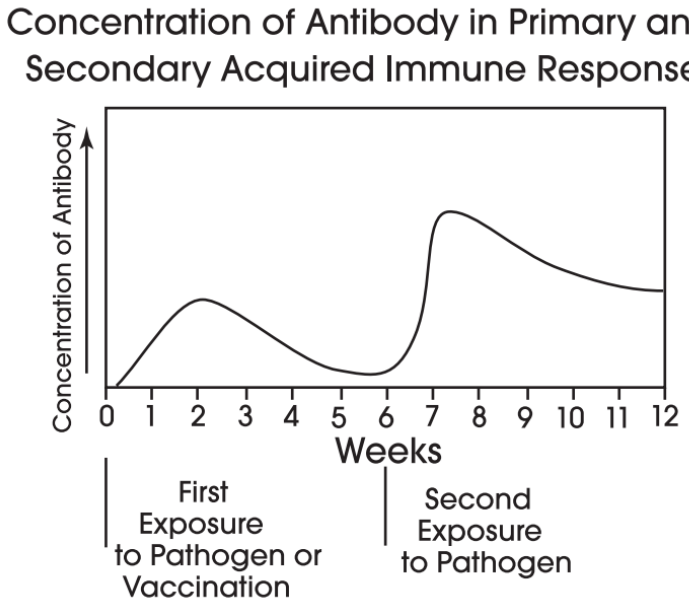
D.



Use the following information and graph to answer question 13.

A medical researcher is investigating immune response in patients exposed to a specific pathogen. The graph below shows the concentration of a particular antibody in the bloodstream produced during the process of acquired immunity. One curve shows the primary immune response (after the first exposure to the pathogen), and the other curve shows the secondary immune response (after the second exposure to the pathogen).

A vaccination serves as the first exposure to a pathogen and triggers the body's primary immune response. Some vaccines contain weakened or inactive pathogens. Other vaccines contain highly similar but nonpathogenic forms.



13. Describe two benefits of receiving a vaccine, such as the polio vaccine, in protecting the body against disease, and include data from the graph to support each benefit. Respond in the space provided **below**. (4 points) (2005 #36 / SWOK D)