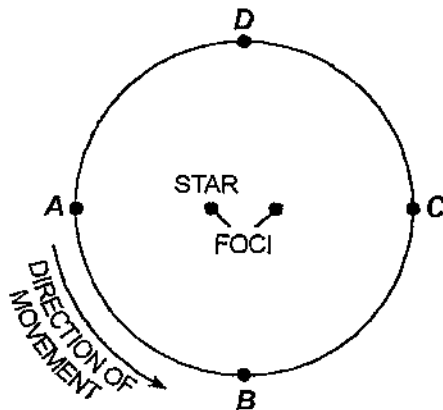


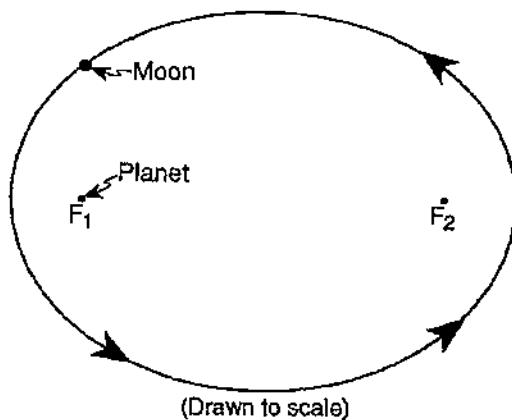
Name: KEY 2012-2013

- 1) The diagram below represents the elliptical orbit of a planet traveling around a star. Points A, B, C, and D are four positions of this planet in its orbit.



The calculated eccentricity of this orbit is approximately

- A) 0.3  
B) 0.1  
C) 0.2  
D) 0.4
- 2) The diagram below represents the elliptical orbit of a moon revolving around a planet. The foci of this orbit are the points labeled  $F_1$  and  $F_2$ .

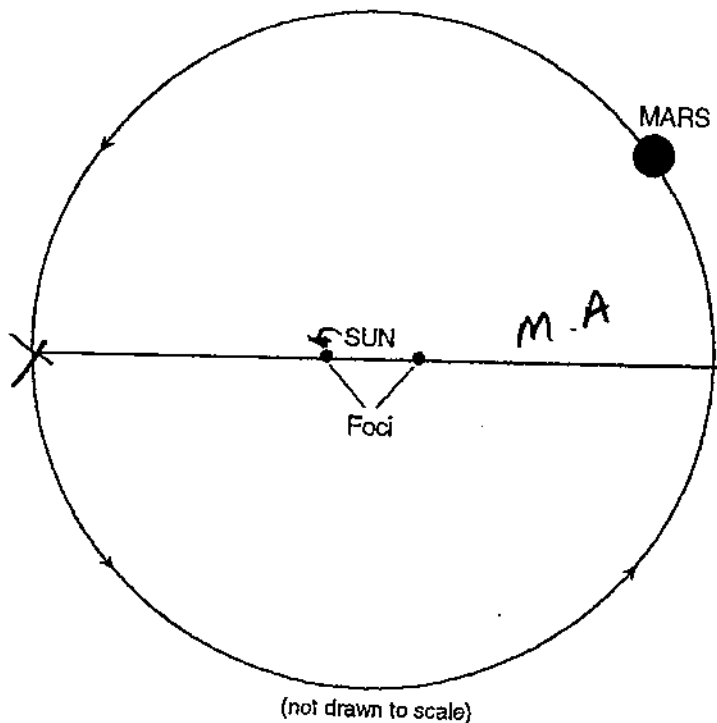


What is the approximate eccentricity of this elliptical orbit?

- A) 0.3  
B) 1.4  
C) 0.7  
D) 0.5

- 3) Which planet has an orbit with an eccentricity most similar to the eccentricity of the Moon's orbit around Earth?
- A) Saturn  
B) Earth  
C) Pluto  
D) Jupiter
- 4) Which object is located at one foci of the elliptical orbit of Mars?
- A) Jupiter  
B) Earth  
C) Betelgeuse  
D) the Sun
- 5) Which planet takes more time to complete one rotation on its axis than to complete one revolution around the Sun?
- A) Mercury  
B) Venus  
C) Mars  
D) Jupiter
- 6) Which planet has an orbital eccentricity most like the orbital eccentricity of the Moon?
- A) Mercury  
B) Pluto  
C) Mars  
D) Saturn
- 7) Which planet's orbit around the Sun is most nearly circular?
- A) Pluto  
B) Neptune  
C) Venus  
D) Mercury

The diagram below represents Mars orbit around the Sun.

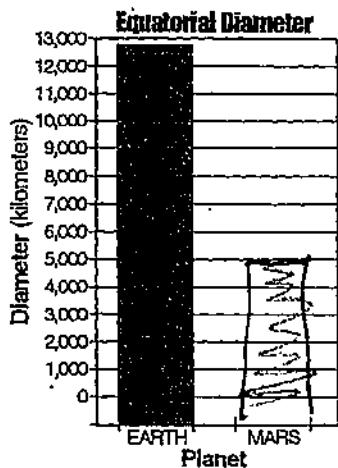


- 8) On the given diagram:  
 (1) Draw and label the major axis of Mars orbit.  
 (2) Place an X on the orbit to show the location of Mars greatest orbital velocity.

- 9) State the difference between the shape (not the size) of Earth's orbit and the shape of Mars orbit in the given diagram.

Earth is more round.

- 10) The bar graph below shows the equatorial diameter of Earth.

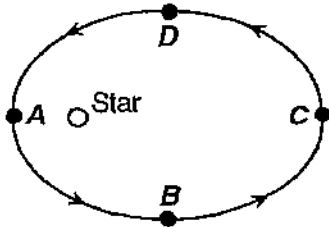


MERCURY

On the grid above, construct the bar that represents the equatorial diameter of Mars.

Name: \_\_\_\_\_

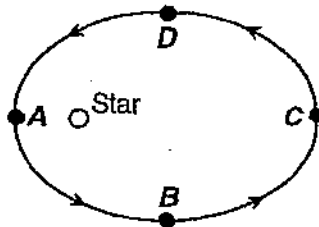
- 1) The diagram below represents the path of a planet orbiting a star. Points A, B, C, and D indicate four orbital positions of the planet.



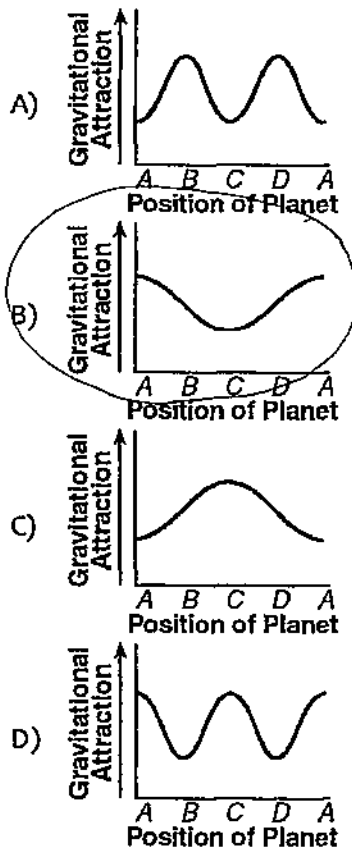
When viewed by an observer on the planet, the star has the largest apparent diameter at position

- A) A                      C) B  
 B) D                      D) C
- 2) The speed of a planet in its orbit around the Sun depends primarily on the planet's
- A) polar circumference  
 B) axial tilt  
 C) distance from the Sun  
 D) direction of revolution

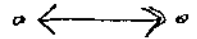
- 3) The diagram below represents the path of a planet orbiting a star. Points A, B, C, and D indicate four orbital positions of the planet.



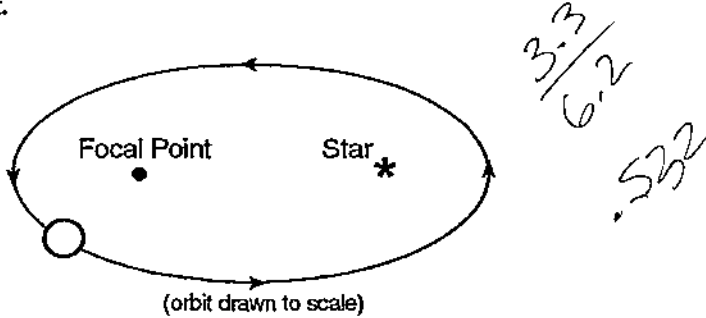
Which graph best represents the gravitational attraction between the star and the planet?



- 4) When the distance between the foci of an ellipse is increased, the eccentricity of the ellipse will
- A) remain the same  
 B) increase  
 C) decrease



- 5) The diagram below represents the elliptical orbit of a planet traveling around a star. The center of the star and the focal point represent the foci of the orbit.

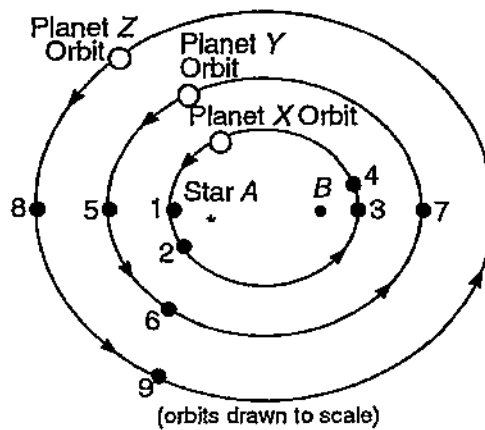


The eccentricity of the planet's orbit is approximately

- A) 0.3                      C) 0.9  
 B) 0.5                      D) 1.6

Questions 6 through 9 refer to the following:

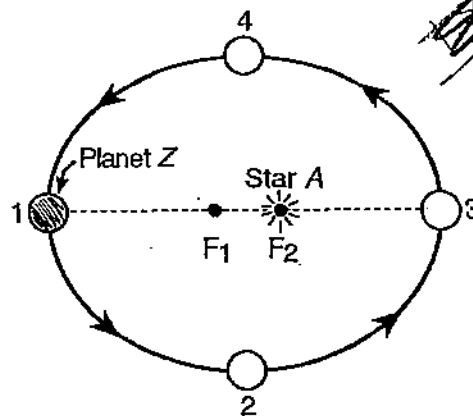
The diagram below represents the orbits of three planets (X, Y, and Z) around star A. Star A is located at one focus and point B is the other focus. Numbers 1 through 9 represent different positions of the three planets. The arrows show the direction of revolution.



- 6) Which statement about the period of revolution of the planets is correct?
- A) Planet X has a longer period of revolution than planet Y.  
 B) The planets have equal periods of revolution.  
 C) Planet Y has a longer period of revolution than planet Z.  
 D) Planet Z has a longer period of revolution than planet X.
- 7) The time required for planet X to travel from point 1 to point 2 is approximately the same as the time required for planet X to travel from point
- A) 3 to point 1  
 B) 2 to point 3  
 C) 3 to point 4  
 D) 2 to point 4
- 8) The orbital paths of these planets around star A can best be described as having
- A) major axes of the same length  
 B) a circular shape, with star A at one focus  
 C) the same period of rotation  
 D) an elliptical shape, with star A at one focus
- 9) Which number indicates the position at which a planet would have the greatest gravitational attraction to star A? [Assume that all three planets have the same mass.]
- A) 6  
 B) 5  
 C) 7  
 D) 3

Questions 10 through 14 refer to the following:

The diagram below represents planet Z in its orbit around star A. Locations 1 through 4 of planet Z are indicated on the orbit. The sizes of the planet and the star are not drawn to scale. The elliptical orbit of planet Z and the distance between the foci ( $F_1$  and  $F_2$ ) are drawn to scale.



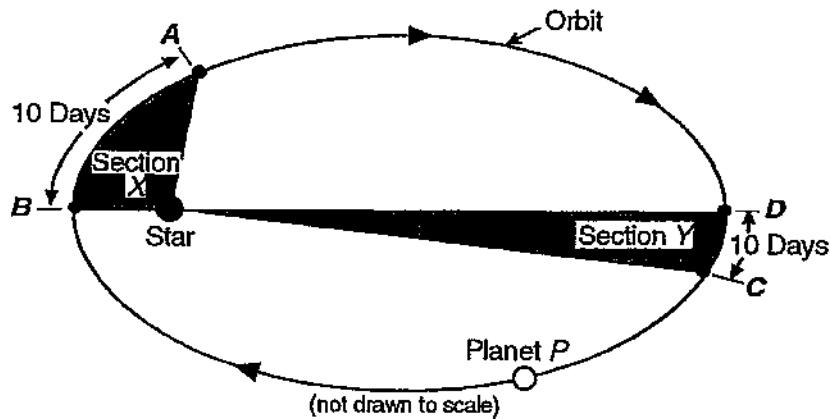
- 10) What is the eccentricity of the elliptical orbit of planet Z?
- A) 0.20  
 B) 1.0  
 C) 0.75  
 D) 0.10
- 11) Star A would have the greatest apparent size to an observer on planet Z when the planet is at location
- A) 1  
 B) 2  
 C) 3  
 D) 4
- 12) The orbiting motion of planet Z around star A is known as
- A) rotation  
 B) declination  
 C) revolution  
 D) inclination
- 13) As planet Z travels around star A in a complete orbit starting from location 1, the orbital velocity of the planet will
- A) remain the same  
 B) increase, then decrease  
 C) continually increase  
 D) decrease, then increase

- 14) At which location would the gravitational force between star A and planet Z be *least*?

A) 1                      C) 3  
 B) 2                      D) 4

Questions 15 and 16 refer to the following:

The diagram below shows the orbit of planet P around a star. A, B, C, and D are points on the orbit. Planet P takes 10 days to travel from point A to point B and 10 days to travel from point C to point D.



- 15) How does the area of section X compare to the area of section Y?

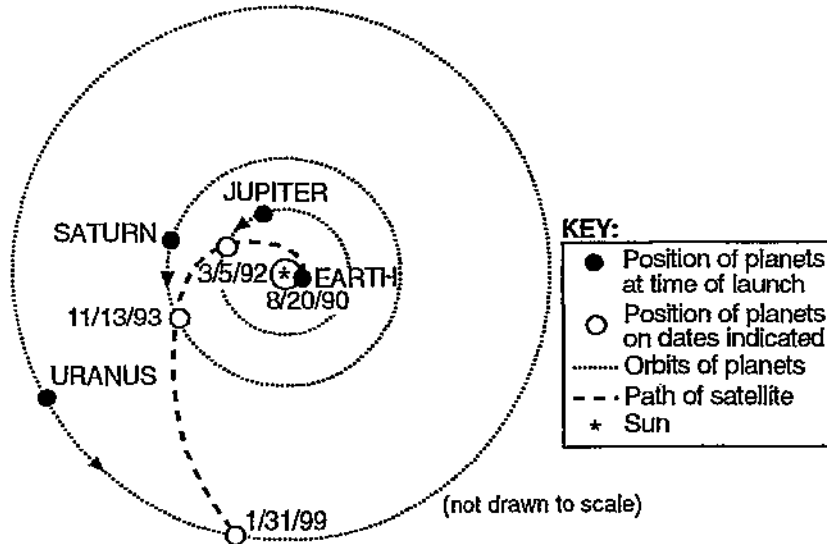
A) It is the same as the area of section Y.  
 B) It is five times the area of section Y.  
 C) It is twice the area of section Y.  
 D) It is one-half the area of section Y.

- 16) At which point will planet P have its greatest orbital velocity?

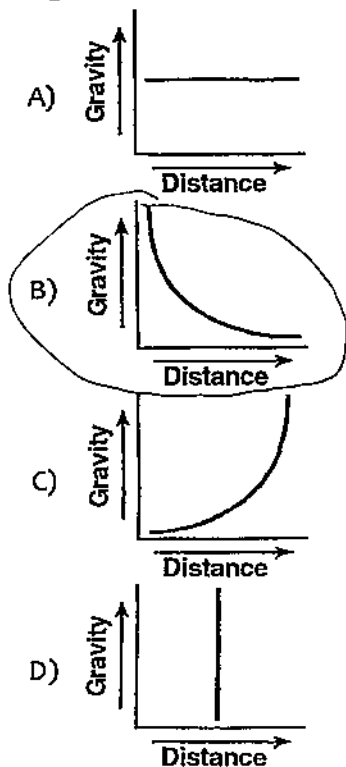
A) A                      C) C  
 B) B                      D) D

Questions 17 through 20 refer to the following:

The diagram below represents a launch of a satellite from Earth on August 20, 1990. The satellite passed close to the planets Jupiter and Saturn and then will orbit the planet Uranus.

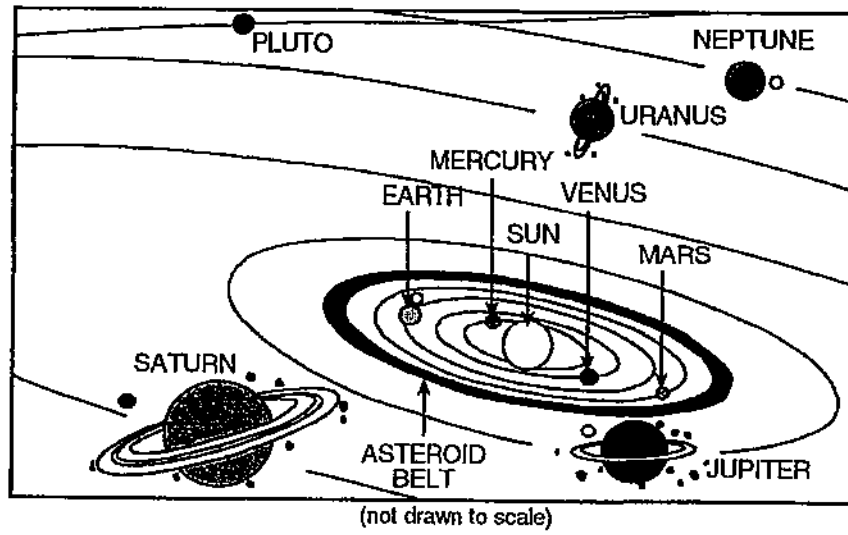


- 17) Which graph best shows the change in gravitational attraction between the Earth and the satellite during its flight?



- 18) What is the total number of complete revolutions around the Sun that the Earth will make during the satellite's flight to Uranus?
- A) 7      C) 8  
B) 2      D) 10
- 19) The actual orbits of Jupiter, Saturn, and Uranus are best described as
- A) elliptical, with the Earth at one focus  
B) circular, with the Earth in the center  
C) circular, with the Sun in the center  
D) elliptical, with the Sun at one focus
- 20) After the satellite crossed Jupiter's orbit, approximately how long did it take to reach Saturn's orbit?
- A) 3 years  
B) 8 months  
C) 1 year 8 months  
D) 8 years 2 months

21) The diagram below represents our solar system.



Which kind of model of the solar system is represented by the diagram?

- A) geocentric model
- B) lunar model

- C) heliocentric model
- D) sidereal model