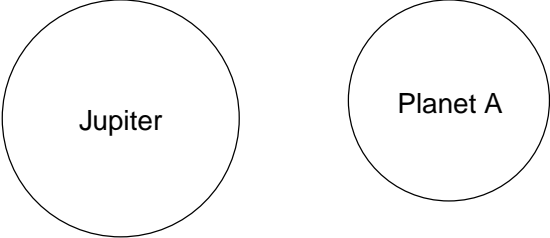


Earth Science  
Astronomy Exam

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

Date: \_\_\_\_\_

- 1 Scientists can plan to photograph a solar eclipse because most astronomical events are
  - (1) cyclic and predictable
  - (2) cyclic and unpredictable
  - (3) random and predictable
  - (4) random and unpredictable
- 2 The Coriolis effect causes winds in New York State to generally curve
  - (1) to the right of the direction of travel
  - (2) to the left of the direction of travel
  - (3) upward away from Earth's surface
  - (4) downward toward Earth's surface
- 3 In New York State, the constellation Pisces can be seen in the night sky between the middle of summer and the middle of winter. The constellation Scorpio can be seen in the night sky between early spring and early fall. The reason these two constellations can be viewed only at these times is a direct result of Earth's
  - (1) spin on its axis
  - (2) movement around the Sun
  - (3) axis having a  $23.5^\circ$  tilt
  - (4) distance from the Sun
- 4 Approximately how many degrees per day does Earth revolve in its orbit around the Sun?
  - (1)  $1^\circ$
  - (2)  $13^\circ$
  - (3)  $15^\circ$
  - (4)  $23.5^\circ$
- 5 Compared with our Sun, the star *Betelgeuse* is
  - (1) smaller, hotter, and less luminous
  - (2) smaller, cooler, and more luminous
  - (3) larger, hotter, and less luminous
  - (4) larger, cooler, and more luminous
- 6 The same side of the Moon always faces Earth because the
  - (1) Moon's period of rotation is longer than its period of revolution around Earth
  - (2) Moon's period of rotation is shorter than its period of revolution around Earth
  - (3) Moon rotates once as it completes one revolution around Earth
  - (4) Moon does not rotate as it completes one revolution around Earth
- 7 Astronomers viewing light from distant galaxies observe a shift of spectral lines toward the red end of the visible spectrum. This shift provides evidence that
  - (1) orbital velocities of stars are decreasing
  - (2) Earth's atmosphere is warming
  - (3) the Sun is cooling
  - (4) the universe is expanding
- 8 Which object is located at one foci of the elliptical orbit of Mars?
  - (1) the Sun
  - (2) *Betelgeuse*
  - (3) Earth
  - (4) Jupiter
- 9 A major belt of asteroids is located between Mars and Jupiter. What is the approximate average distance between the Sun and this major asteroid belt?
  - (1) 110 million kilometers
  - (2) 220 million kilometers
  - (3) 390 million kilometers
  - (4) 850 million kilometers
- 10 Which object is closest to Earth?
  - (1) the Sun
  - (2) Venus
  - (3) the Moon
  - (4) Mars
- 11 The Sun's position in space is best described as the approximate center of
  - (1) a constellation
  - (2) the universe
  - (3) the Milky Way galaxy
  - (4) our solar system
- 12 The diagram below represents two planets in our solar system drawn to scale, Jupiter and planet A.



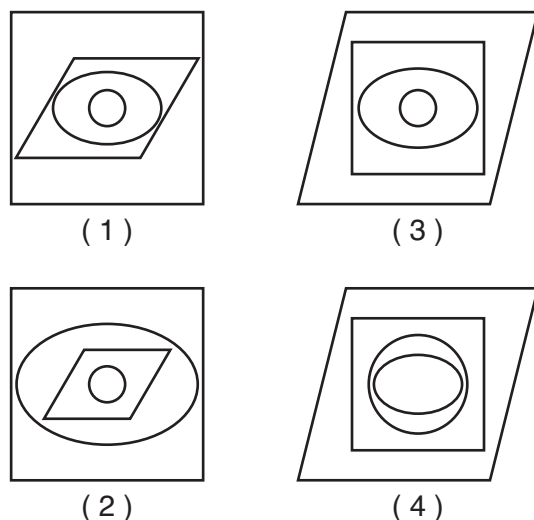
Planet A most likely represents

  - (1) Earth
  - (2) Venus
  - (3) Saturn
  - (4) Uranus

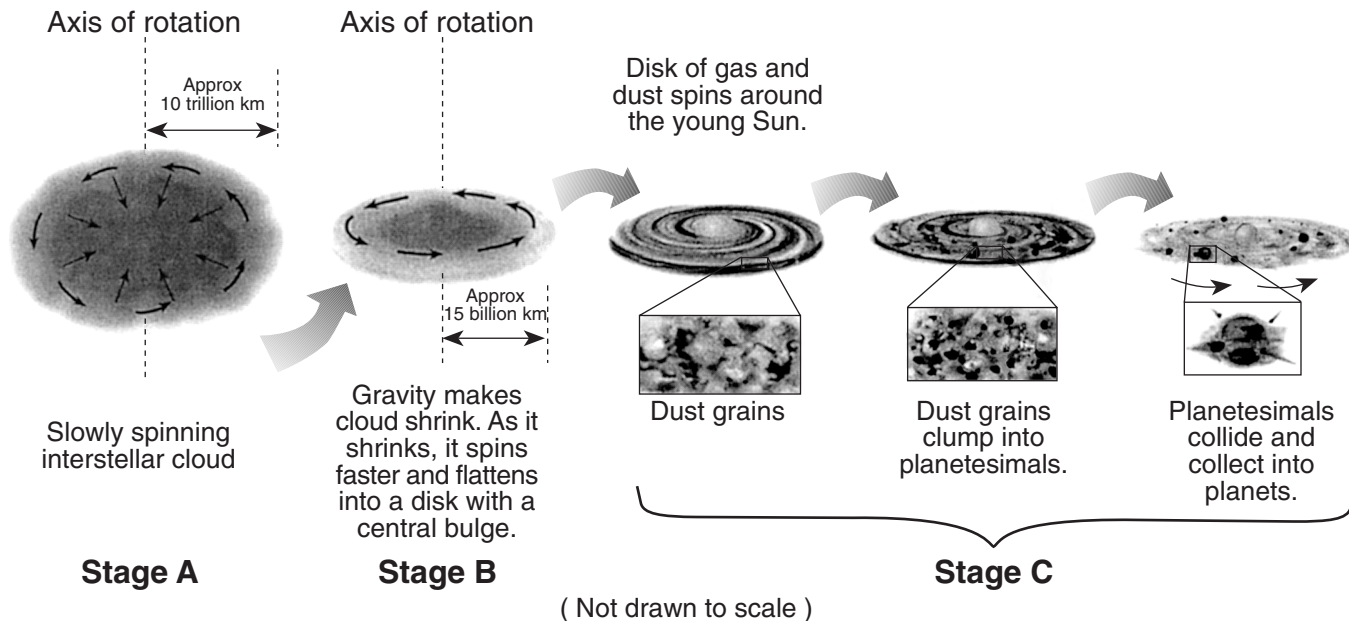
13 The symbols below are used to represent different regions of space.

Universe =  Earth =  Galaxy =  Solar system = 

Which diagram shows the correct relationship between these four regions? [If one symbol is within another symbol, that means it is part of, or included in, that symbol.]



Base your answers to questions 14 and 15 on the diagram below, which shows an inferred sequence in which our solar system formed from a giant interstellar cloud of gas and debris. Stage A shows the collapse of the gas cloud, stage B shows its flattening, and stage C shows the sequence that led to the formation of planets.



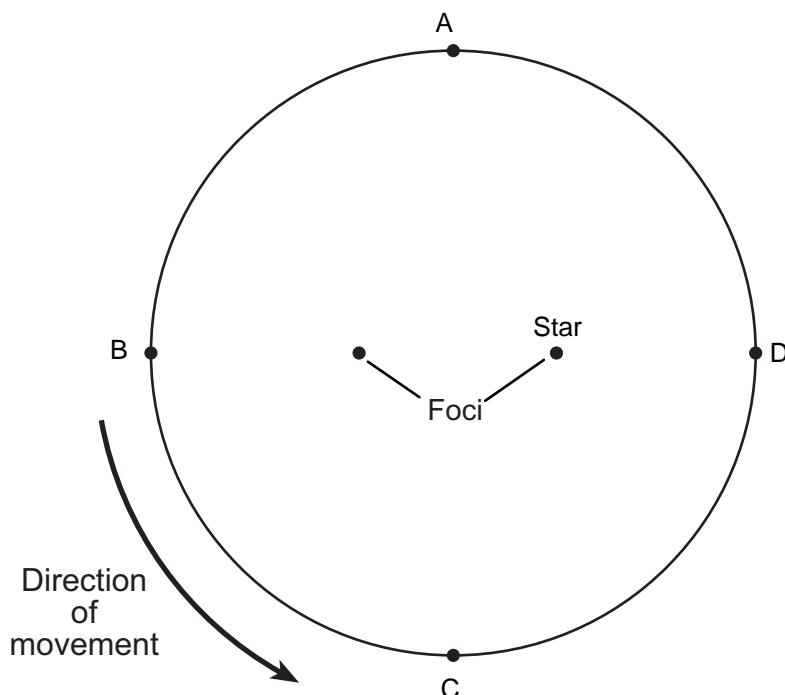
14 From stage B to stage C, the young Sun was created

- (1) when gravity caused the center of the cloud to contract
- (2) when gravity caused heavy dust particles to split apart
- (3) by outgassing from the spinning interstellar cloud
- (4) by outgassing from Earth's interior

15 After the young Sun formed, the disk of gas and dust

- (1) became spherical in shape
- (2) formed a central bulge
- (3) became larger in diameter
- (4) eventually formed into planets

Base your answers to questions 16 through 18 on the diagram below, which 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.



16 The calculated eccentricity of this orbit is approximately

- (1) 0.1
- (2) 0.3
- (3) 3.0
- (4) 2.5

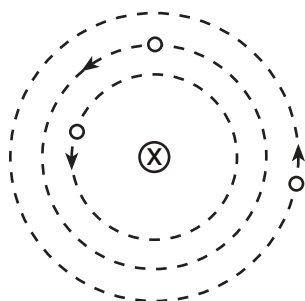
17 The gravitational attraction between the star and the planet will be greatest at position

- (1) *A*
- (2) *B*
- (3) *C*
- (4) *D*

18 As the planet revolves in orbit from position *A* to position *D*, the orbital velocity will

- (1) continually decrease
- (2) continually increase
- (3) decrease, then increase
- (4) increase, then decrease

19 The diagram below represents a simple geocentric model. Which object is represented by the letter *X*?



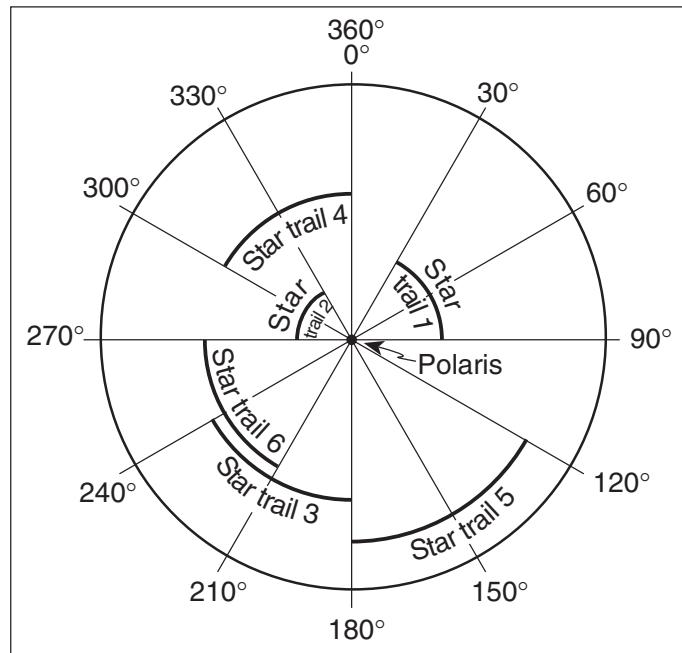
( Not drawn to scale )

- (1) Earth
- (2) Sun
- (3) Moon
- (4) *Polaris*

20 The Milky Way galaxy is best described as

- (1) a type of solar system
- (2) a constellation visible to everyone on Earth
- (3) a region in space between the orbits of Mars and Jupiter
- (4) a spiral-shaped formation composed of billions of stars

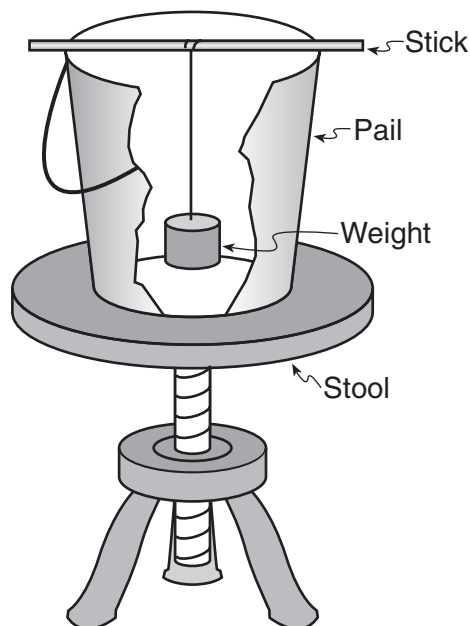
- 21 A camera was placed outside at night and pointed directly at *Polaris* and several other stars. The lens was kept open and a time-exposure photograph was taken. The diagram below represents that photograph of *Polaris* and star trails, with an angular protractor to measure apparent motion.



How many hours was the lens kept open to create the star trails in this photograph?

- |             |             |
|-------------|-------------|
| (1) 1 hour  | (3) 3 hours |
| (2) 6 hours | (4) 4 hours |

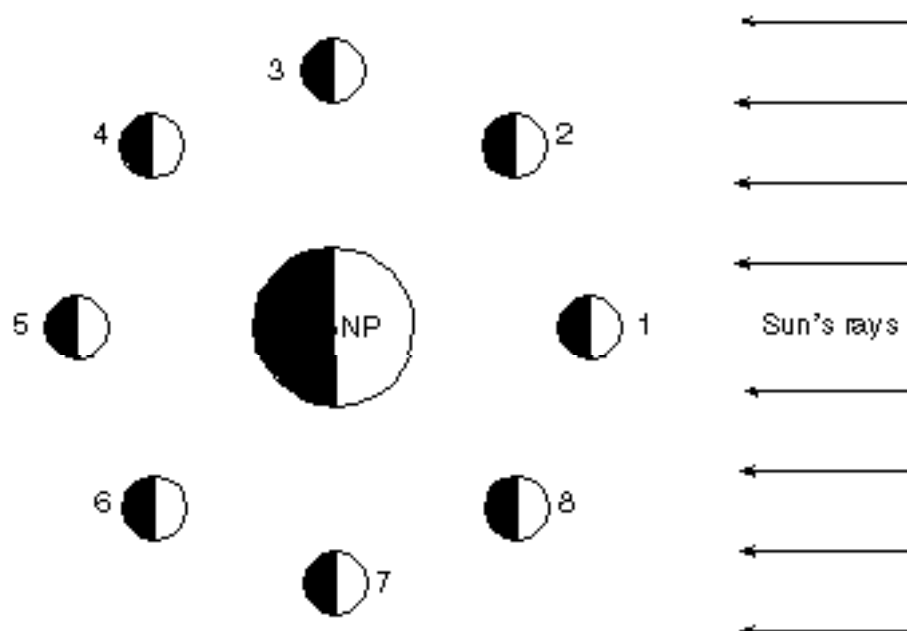
- 
- 22 The diagram below shows the equipment used to demonstrate a Foucault pendulum.



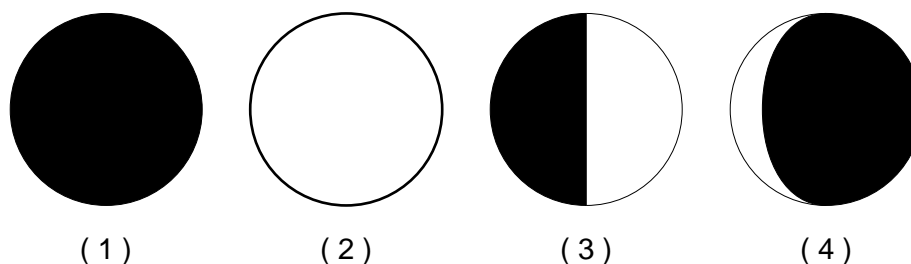
In the demonstration, a student swings the weight hanging in the pail and then spins the stool. The stool represents

- (1) the revolving Earth
- (2) the rotating Earth
- (3) the Coriolis effect
- (4) convection currents

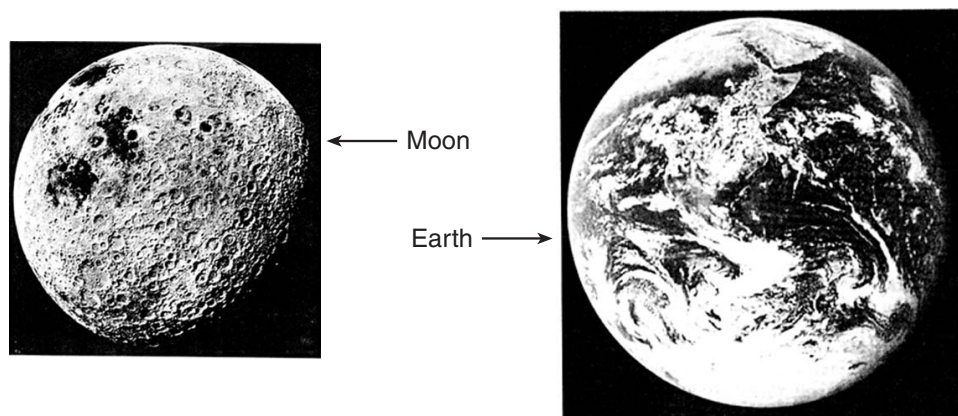
23 The diagram below shows the Moon in different positions as it revolves around Earth, as observed from above the North Pole (NP).



Which image correctly represents the Moon at position 8, as observed from Earth?



24 The photographs below show the Moon and Earth as viewed from space. It is inferred that Earth had many impact craters similar to those shown on the Moon.



(Not drawn to scale)

Describe one process that has destroyed many of the impact craters that once existed on Earth.

Base your answers to questions 25 through 29 on the data table below, which shows the percentage of the lighted side of the Moon visible from Earth for the first fourteen days of July 2003.

| Date    | Percentage of Lighted Side of the Moon Visible From Earth (%) |
|---------|---|
| July 1  | 1   |
| July 2  | 5   |
| July 3  | 10  |
| July 4  | 17  |
| July 5  | 26  |
| July 6  | 37  |
| July 7  | 48  |
| July 8  | 59  |
| July 9  | 70  |
| July 10 | 80  |
| July 11 | 89  |
| July 12 | 95  |
| July 13 | 98  |
| July 14 | 100   |

25 On what July date listed in the table did the Moon appear as shown below?



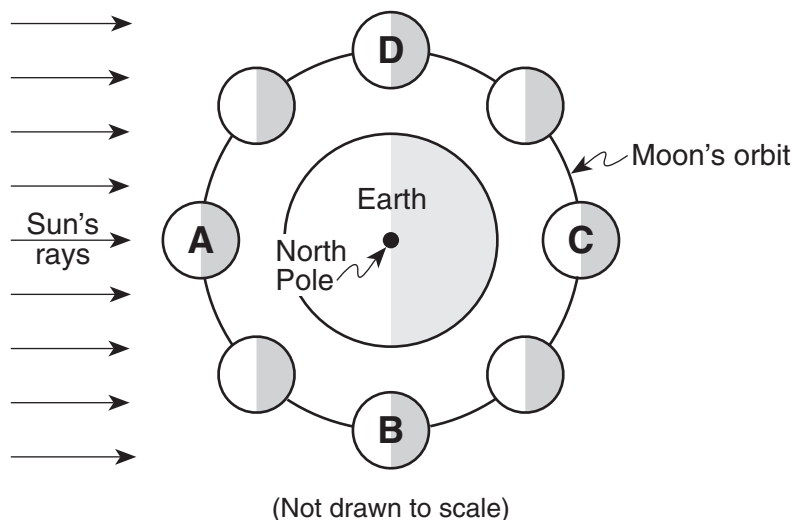
26 What motion of the Moon causes the percentage of the lighted side of the Moon visible from Earth to change from July 1 to July 14?

27 A full Moon phase was observed on July 14. On what day in August was the next full Moon phase observed?

28 The diagram *in your answer booklet* shows the orbit of the Moon around Earth. Place an **X** on the orbit to show where the Moon was in its orbit on July 14, 2003.

29 Why are the phases of the Moon considered to be cyclic?

Base your answers to questions 30 and 31 on the diagram below, which shows the Moon's orbit around Earth. Four positions of the Moon are represented by letters A, B, C, and D. Earth's North Pole is labeled. The shaded areas on Earth and the Moon represent night.



- 30 What motion of the Moon results in the Moon phases as viewed from Earth?
- 31 A total solar eclipse sometimes occurs when the Moon is at position A. Explain why a total solar eclipse does *not* occur every time the Moon is at position A.

Base your answers to questions 32 and 33 on the diagram *in your answer booklet*, which represents an asteroid's elliptical orbit around the Sun. The dashed line is the major axis of the ellipse.

- 32 Place a circle, **O**, on the orbital path where the velocity of the asteroid would be the least.
- 33 The Sun is located at one focal point of the orbit. Place an **X** on the diagram at the location of the second focal point.

Base your answers to questions 34 and 35 on the diagram in your answer booklet. The diagram shows the positions of Halley's Comet and Asteroid 134340 at various times in their orbits. Specific orbital positions are shown for certain years.

- 34 Determine which was traveling faster, Halley's Comet or the asteroid, between the years 1903 and 1908. State *one* reason for your choice.
- 35 Explain why Halley's Comet is considered to be part of our solar system.

- 
- 36 The photograph below shows an impact crater approximately 1 mile wide located in Diablo Canyon, Arizona. Describe the event that produced this crater.

Barringer Crater, Arizona, U.S.A. (photo courtesy of NASA)



- 
- 37 The diagram *in your answer booklet* shows the average distance between the Sun and Earth drawn to a scale of 1 centimeter = 100,000,000 kilometers. Using this same scale, place a small dot representing **Venus** along the line to indicate how far **Venus** would be from the Sun, and label the dot “**Venus**.”



1. 1 2 3 4  
2. 1 2 3 4  
3. 1 2 3 4  
4. 1 2 3 4  
5. 1 2 3 4  
6. 1 2 3 4  
7. 1 2 3 4  
8. 1 2 3 4  
9. 1 2 3 4  
10. 1 2 3 4  
11. 1 2 3 4  
12. 1 2 3 4

13. 1 2 3 4  
14. 1 2 3 4  
15. 1 2 3 4  
16. 1 2 3 4  
17. 1 2 3 4  
18. 1 2 3 4  
19. 1 2 3 4  
20. 1 2 3 4  
21. 1 2 3 4  
22. 1 2 3 4  
23. 1 2 3 4

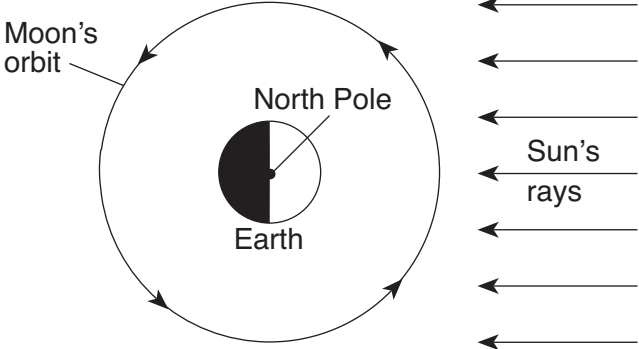
24. \_\_\_\_\_

25. \_\_\_\_\_

26. \_\_\_\_\_

27. \_\_\_\_\_

28.

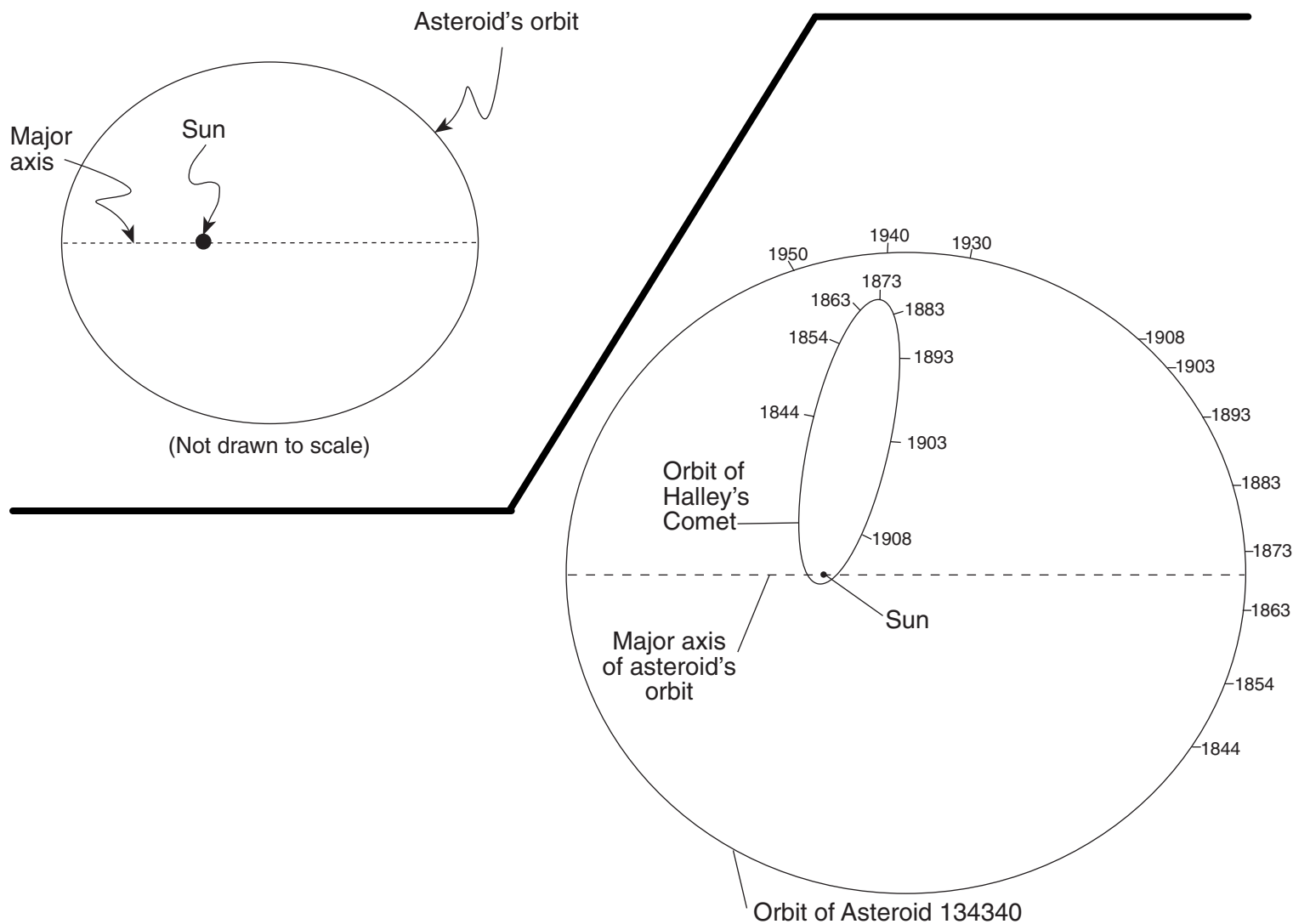


29. \_\_\_\_\_

30. \_\_\_\_\_

31. \_\_\_\_\_

32 & 33



34. \_\_\_\_\_ was traveling faster between 1903 and 1908.  
Reason: \_\_\_\_\_

35. \_\_\_\_\_

36. \_\_\_\_\_

37.   
The diagram shows a horizontal line with two dots. The left dot is labeled 'Sun' and the right dot is labeled 'Earth'. Both labels have arrows pointing to their respective dots.

1 cm = 100,000,000 km