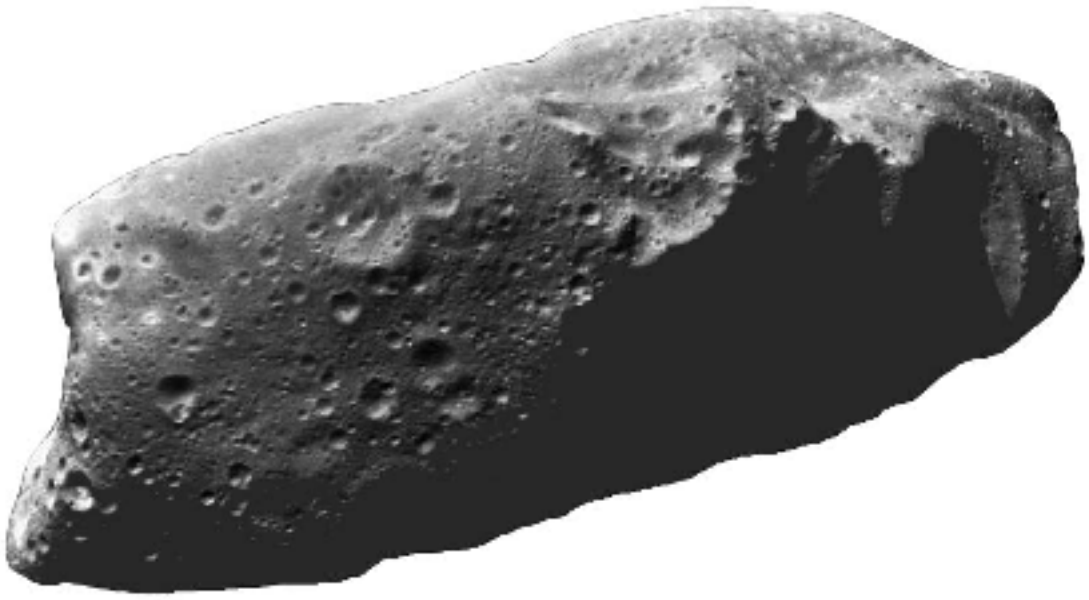
Asteroids Comets And Meteors

1 The solar system object in the photograph below is 56 kilometers long.



The object in the photograph is most likely

(1) an asteroid
(2) Neptune
(3) Earth’s Moon
(4) Mercury

2 A 65.5-million-year-old impact crater in Mexico provides evidence for the cause of the

(1) breakup of Pangaea
(2) evolution of the earliest corals
(3) Alleghenian orogeny
(4) extinction of ammonoids

3 Which event is inferred to have contributed to the significant global climate change that may have caused the mass extinctions of organisms at the end of the Late Cretaceous Epoch?

(1) the Big Bang
(2) an asteroid impact
(3) formation of Pangaea
(4) shifting of Earth’s magnetic poles

4 The asteroid Ceres lies at an average distance of 414 million kilometers from the Sun. The period of revolution of Ceres around the Sun is approximately

(1) 438 days
(2) 687 days
(3) 4.6 years
(4) 12.6 years

5 The chart below describes some components of the solar system.

Object	Description
X	chunk of rock and ice orbiting from the outer solar system to near the Sun
Y	streak of light seen when a space rock enters Earth's atmosphere and starts burning up
Z	rocky/metallic object orbiting the Sun between Mars and Jupiter

Letters X, Y, and Z identify which components of our solar system?

(1) X = asteroid; Y = meteor; Z = comet

(2) X = asteroid; Y = meteor; Z = moon

(3) X = comet; Y = meteor; Z = asteroid

(4) X = comet; Y = moon; Z = meteor

6 The map below shows the location of the Chicxulub crater, which was formed when a massive asteroid impacted Earth 65.5 million years ago.

Scientists infer that this impact contributed to the extinction of

(1) trilobites

(2) gastropods

(3) many land plants

(4) placoderm fish

Base your answers to questions 7 on the diagrams below. The diagrams represent the events that occur when a large meteor, such as the one believed to have caused the extinction of many organisms, impacts Earth's surface. Diagram A shows the meteor just before impact. Diagram B represents the crater forming, along with the vapor and ejecta (the fragmented rock and dust) thrown into the atmosphere.

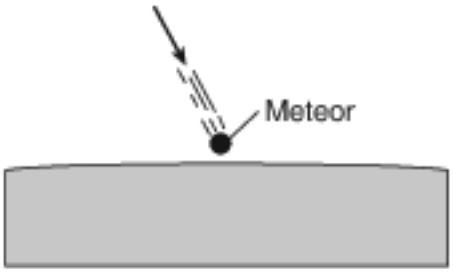


Diagram A: Before Impact

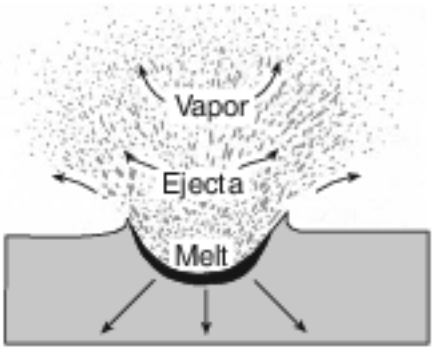


Diagram B: During Impact

7 Which statement best explains how global climate would most likely be affected after this large meteor impact?

(1) Large quantities of ejecta in the atmosphere would block insolation and lower global temperatures.

(2) An increase in vapor and ejecta would allow radiation to escape Earth's atmosphere and lower global temperatures.

(3) Ejecta settling in thick layers would increase the absorption of insolation by Earth's surface and raise global temperatures.

(4) Forest fires produced from the vapor and ejecta would raise global temperatures.

8 The impacts of large asteroids on Earth are inferred to be associated with

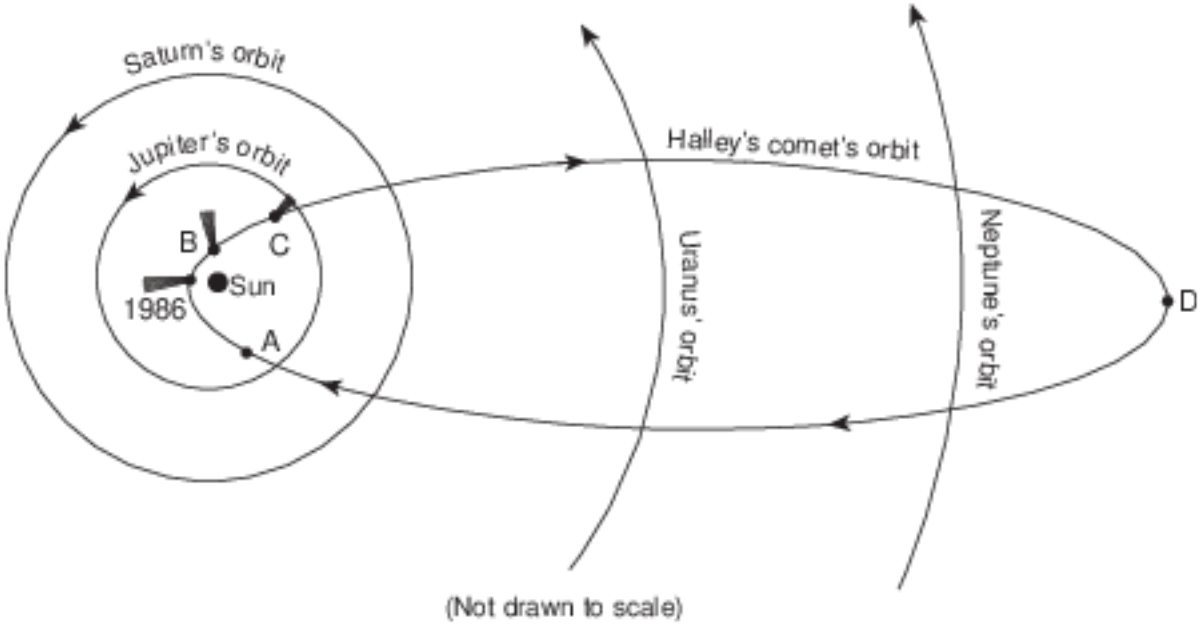
(1) free oxygen entering Earth's atmosphere

(2) seafloor spreading

(3) the creation of subduction zones

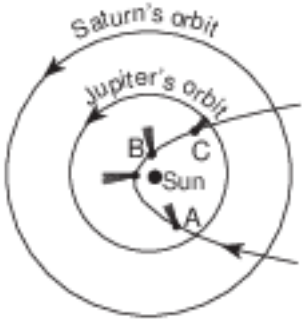
(4) global climatic changes

Base your answers to questions 9 on the diagram below and on your knowledge of Earth science. The diagram represents the orbital paths of the four Jovian planets and Halley's comet around the Sun. Halley's comet has a revolution period of 76 years. In 1986, Halley's comet was at perihelion, its closest point to the Sun. Letters A, B, C, and D represent locations of Halley's comet in its orbit. Location D represents Halley's comet at aphelion, its farthest point from the Sun. The comet's tail is shown at perihelion and at locations B and C.

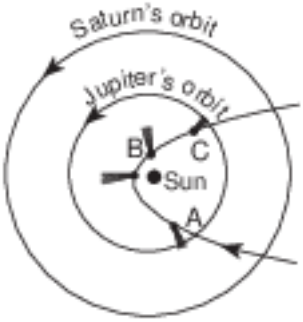


9 Based on the pattern shown above, which diagram best represents the correct position of the comet's tail at location A relative to the Sun?

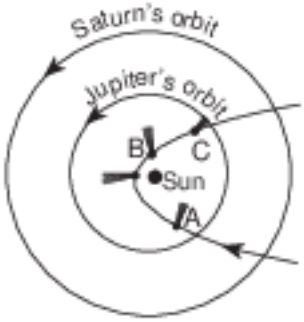
(1)



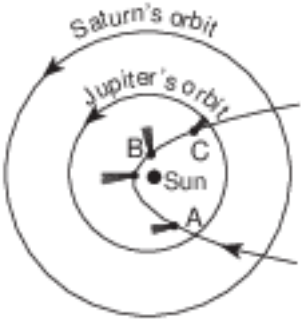
(3)



(2)

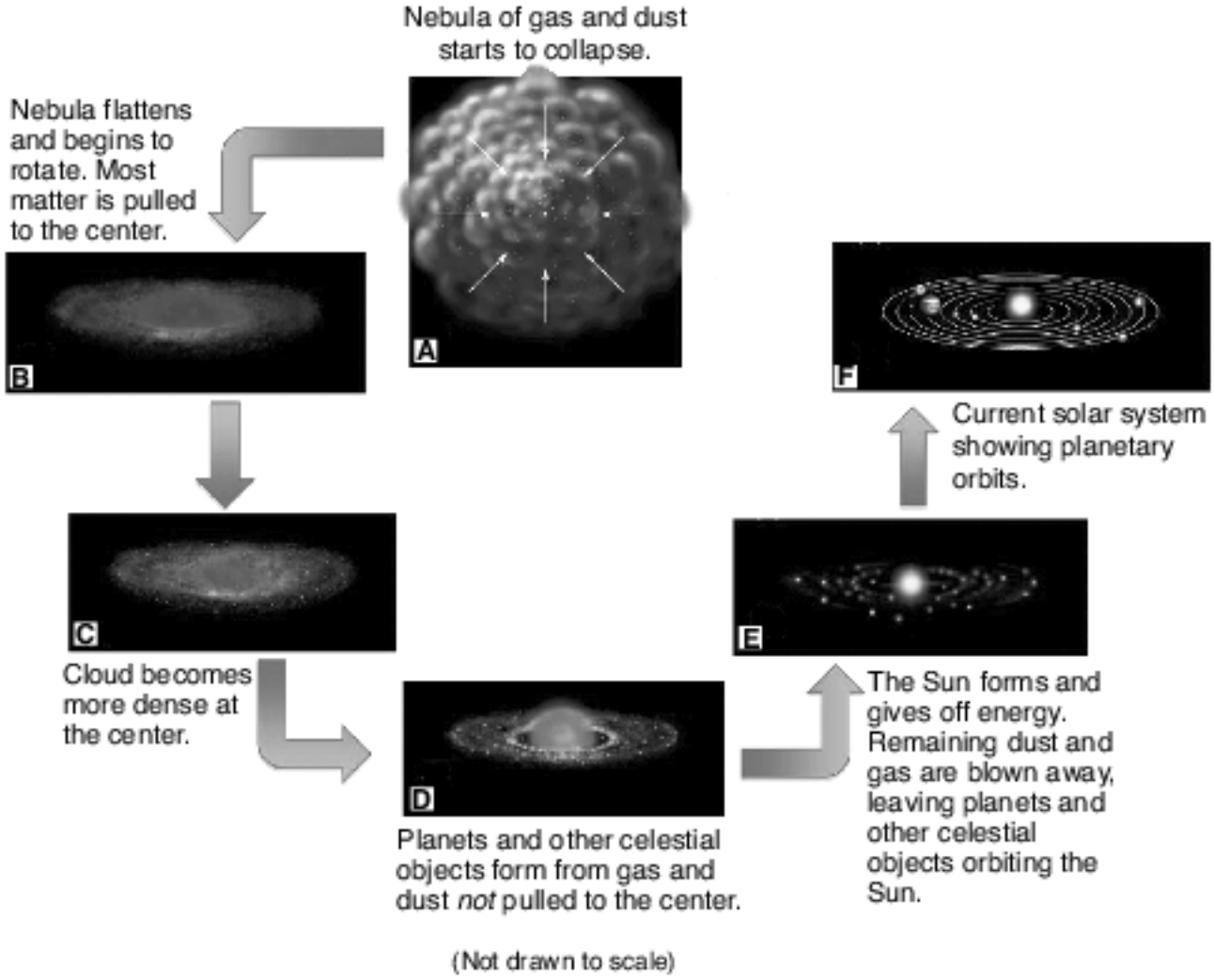


(4)



10 Many scientists infer that one cause of the mass extinction of dinosaurs and ammonoids that occurred approximately 65.5 million years ago was
(1) tectonic plate subduction of most of the continents
(2) an asteroid impact that resulted in climate change
(3) a disease spreading among many groups of organisms
(4) severe damage produced by worldwide earthquakes

Base your answers to questions 11 on the diagram below and on your knowledge of Earth science. The diagram represents the inferred sequence in which our solar system formed from a nebula of gas and dust. Letters A through F represent different stages in its development.

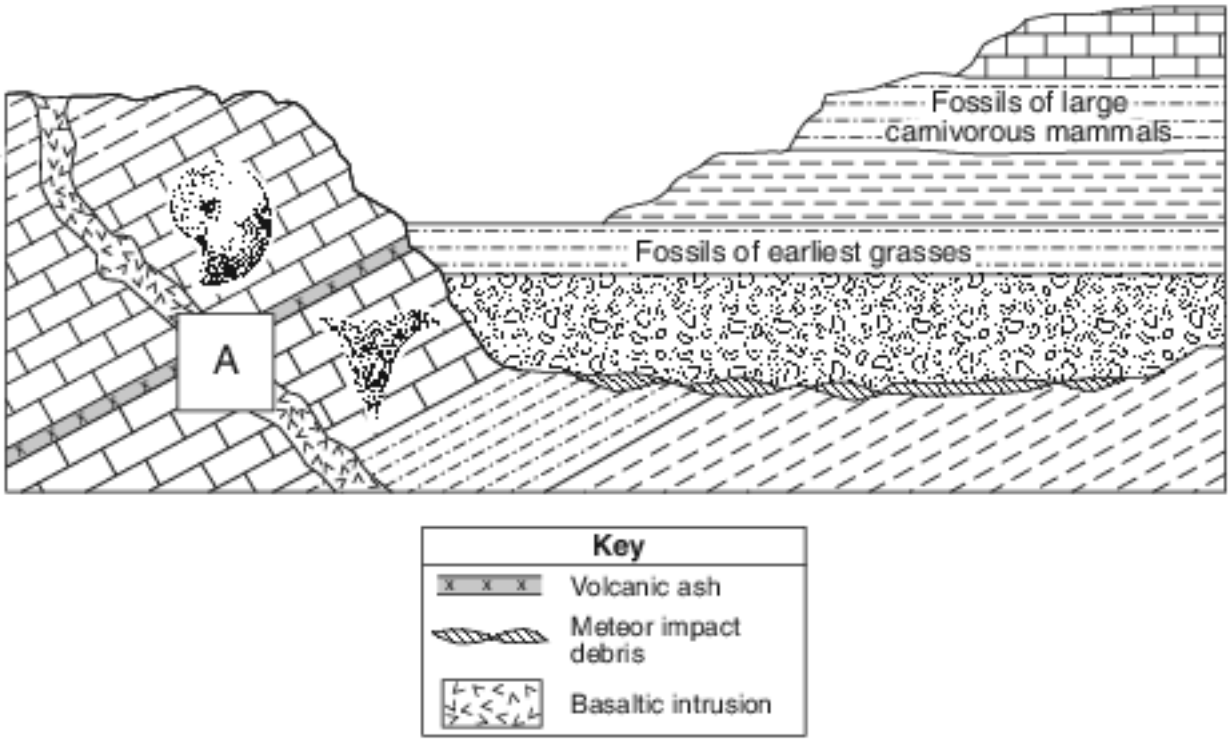


Adapted from www.astro.ufl.edu/~reyes/classes

11 Most asteroids formed in a belt located between 329 million and 478.7 million kilometers from the Sun. Identify the two planets located on either side of the asteroid belt. [1]

_____ and _____

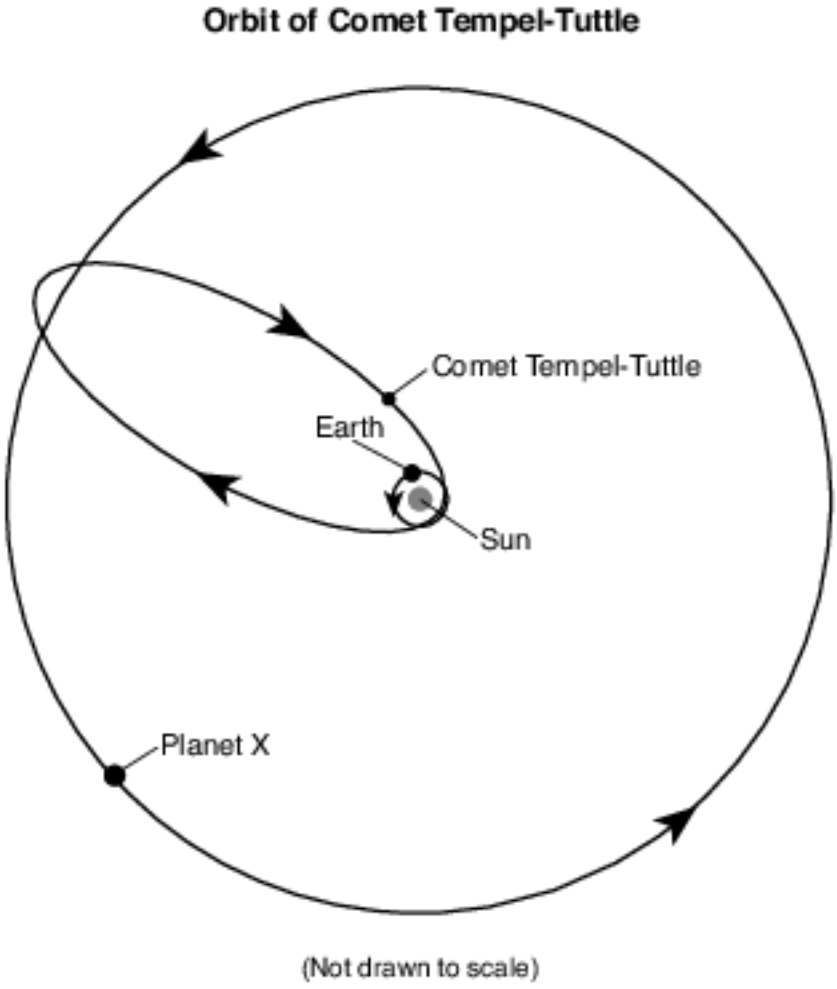
Base your answers to questions 12 on the geologic cross section below, which represents a portion of Earth's crust. Some rock units contain index fossils. Box A indicates a missing portion of the cross section.



12 The meteor impact debris was deposited at the time trilobites became extinct. State the age, in million years, of this debris layer. [1]

million years

Base your answers to questions 13 on the diagram and passage below and on your knowledge of Earth science. The diagram represents the orbits of Earth, Comet Tempel-Tuttle, and planet X, another planet in our solar system. Arrows on each orbit represent the direction of movement.



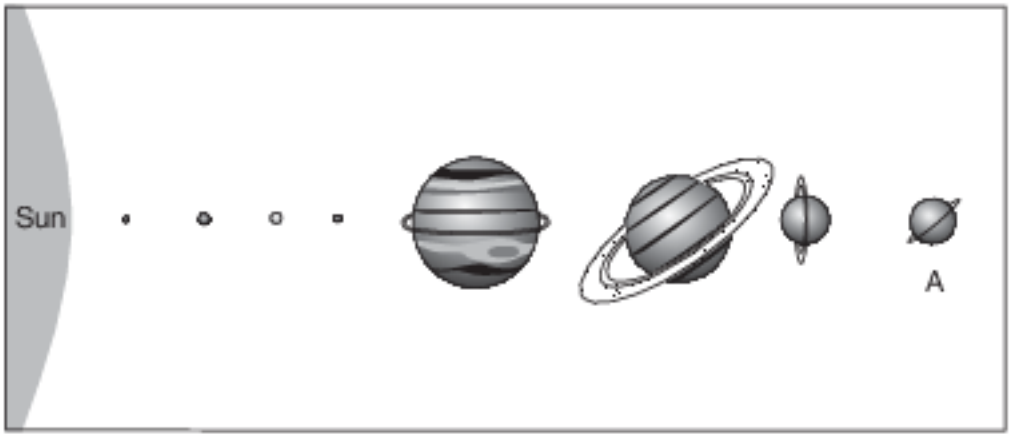
Comet Tempel-Tuttle

Comet Tempel-Tuttle orbits our Sun and is responsible for the Leonid meteor shower event observed from Earth. This meteor shower occurs every year in November and is visible in the night sky as Earth passes through the debris left in space by this comet. The debris from the comet produces meteors that are smaller than a grain of sand, which enter Earth's atmosphere and burn up in the mesosphere temperature zone. Comet Tempel-Tuttle's orbital distance from the Sun ranges from about 145 million kilometers at its closest approach to 2900 million kilometers at its farthest distance. Its two most recent closest approaches to the Sun occurred in 1965 and one revolution later in 1998.

13 Identify the name of the object located at one of the foci of the elliptical orbit of Comet Tempel-Tuttle. [1]

Base your answers to questions 14 on the side-view model of the solar system in image provided and on your knowledge of Earth science. The planets are shown in their relative order of distance from the Sun. Letter A indicates one of the planets.

14 The center of the asteroid belt is approximately 503 million kilometers from the Sun. In image below, draw an X on the model between two planets to indicate the center of the asteroid belt. [1]



(Not drawn to scale)

Base your answers to questions 15 on the graph in image provided and on your knowledge of Earth science. The graph shows planet equatorial diameters and planet mean distances from the Sun. Neptune is not shown.

15 The center of the asteroid belt is approximately 404 million kilometers from the Sun. State the name of the planet that is closest to the center of the asteroid belt. [1]

Answer Keys

1 1

2 4

3 2

4 3

5 3

6 3

7 1

8 4

9 3

10 2

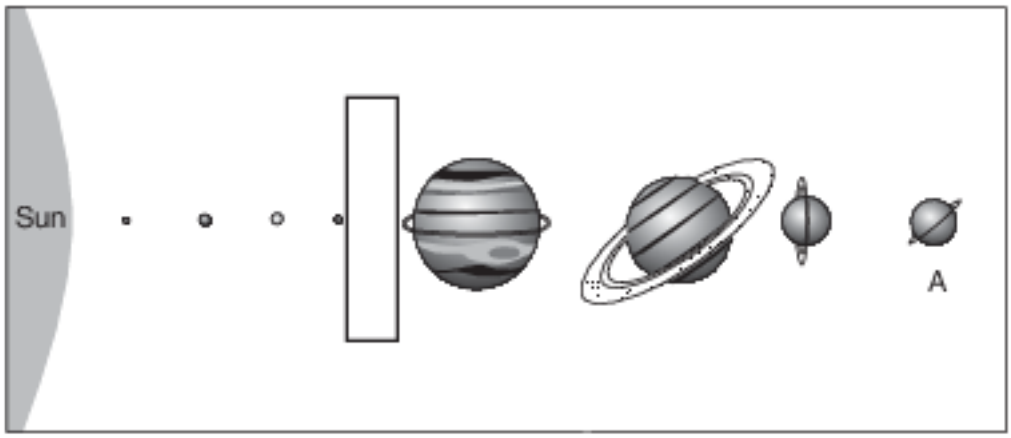
11 Allow 1 credit for Mars and Jupiter.

12 Allow 1 credit for 251 million years.

13 Allow 1 credit for the Sun.

14 Allow 1 credit if the center of the X is drawn in or touches the box shown below.

- Note: Allow credit if a symbol other than an X is used.
-



(Not drawn to scale)

15 Allow 1 credit for Mars.