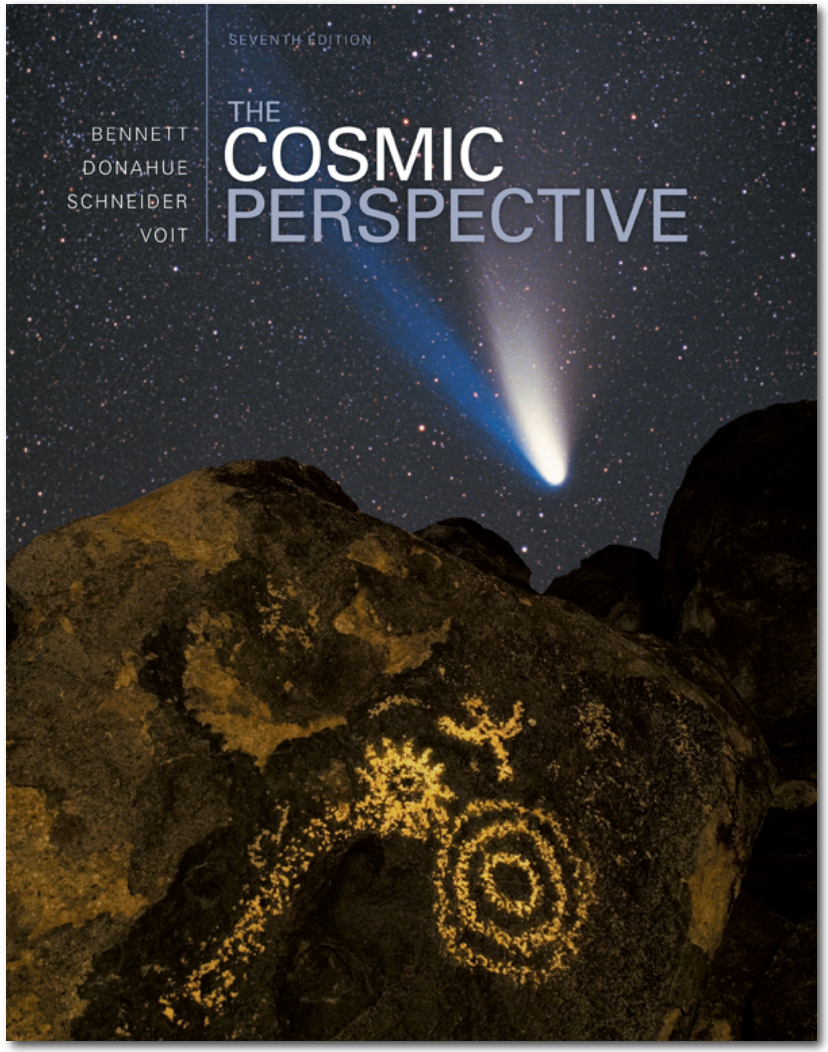
The Cosmic Perspective

Seventh Edition



Formation of the Solar System

Why do we think that the solar system formed from a rotating, collapsing gas cloud that ended up as a disk orbiting the Sun?

a) Most of the planets revolve and rotate in the same direction and in the same plane.
b) Conservation of angular momentum means a collapsing cloud will spin faster and faster.
c) We see clouds of gas and dust in space.
d) We see disks around young stars.
e) all of the above

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Why do we think the inner (terrestrial) planets became more dense than the outer planets?

a) As the solar nebula collapsed, denser materials sank toward the center.
b) The Sun's gravity pulled denser materials toward the center.
c) The inner part of the solar nebula was so hot that only dense metals and rocks were able to accrete there.
d) The rotating disk in which the planets formed flung lighter elements outward by centrifugal force.

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What do we think the composition of the solar nebula was?

a) about half hydrogen and helium, half heavier elements (iron, carbon, silicon, etc.)
b) about 98% hydrogen and helium, and 2% heavier elements
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How much of the solar nebula condensed in the inner regions (where the temperature was greater than 1300 K) and in the outer regions (where the temperatures were less than 150 K) ?

a) 0% in the inner regions and about 2% in the outer regions
b) 0% in the inner regions and 100% in the outer regions
c) about 0.2% in the inner regions and 1.4% in the outer regions
d) about 2% in both inner and outer regions

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The dense, rocky, and metallic planets are found close to the Sun because

a) The Sun's gravity attracted the denser particles (rocks and metals) closer to it.
b) The Sun was unable to hold onto the lighter (gaseous) particles and they moved farther away where they formed the outer planets.
c) Rocks and metals condensed at the relatively high temperatures close to the Sun.
d) They were nudged inward by close encounters with Jupiter early in the solar system's history.

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c) electrical forces
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Why could the jovian planets grow to be much larger than the terrestrial planets?

a) They were farther from the Sun, where gravity was weaker.
b) They formed beyond the *frost line* where ices could condense, so they included hydrogen compounds.
c) They were far enough from the Sun to escape the *heavy bombardment* that battered the early solar system.

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What appears to have happened to increase the mass of jovian planets?

a) They captured more gas from interstellar space.
b) They captured gas from the solar wind.
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b) similar to winds on Earth, but faster and stronger
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During the *heavy bombardment* early in the solar system's history,

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Could a solar system like ours have formed with the first generation of stars after the Big Bang?

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c) the half-life of Uranium-238 (4.5 billion years)
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