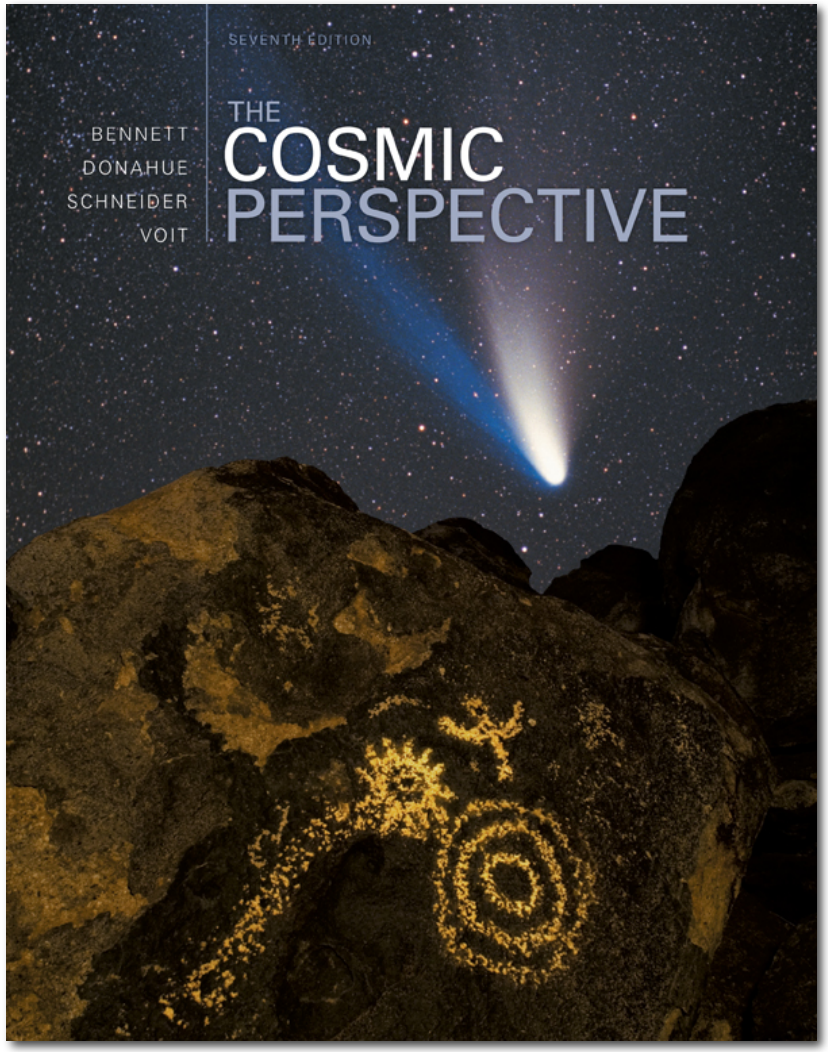
Chapter 17 Review Clickers

The Cosmic Perspective

Seventh Edition



Star Stuff

A star's life is a struggle between _____ wanting to crush it, and _____ wanting to expand it.

a) nuclear forces, hot gases
b) gravity, nuclear fusion
c) gravity, convection
d) gravity, radiation
e) gas pressure, radiation

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Because low mass stars have convective outer layers,

a) they have surface activity similar to the Sun's.
b) they can have starspots like the Sun's sunspots.
c) they can have flares and emit X-rays.
d) all of the above
e) A and B

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b) after a few billion years
c) it depends on its mass
d) when the hydrogen fuel in its core is used up
e) C and D

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What happens to nuclear fusion when the hydrogen in a star's core runs low?

a) it stops
b) it shifts from the core to a shell around the core
c) other elements start to fuse
d) the star goes out of balance and becomes a red giant
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In a red giant star, three helium atoms (^{4}He) can fuse together to

a) make more energy for the star.
b) prolong the star's life.
c) create the element carbon (^{12}C).
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After the Sun becomes a red giant star and makes carbon in its core, why will it not make heavier elements?

a) It will have run out of fuel.
b) It will be near the end of its life.
c) It will not be hot enough for further reactions to occur.
d) The heavier elements will all go into a planetary nebula.
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b) planetary nebula.
c) stellar nebula.
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How does the life of a high mass star differ from the Sun's life?

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b) It lives a shorter time on the main sequence.
c) It makes elements heavier than carbon.
d) It dies in a tremendous supernova explosion.
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Can elements heavier than iron produce energy through fusion?

a) Yes, though the amount of energy produced is less than in fusion of lighter elements.
b) No. Elements heavier than iron use energy in order to fuse.
c) We don't know, as the conditions necessary to fuse iron have not been observed.

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a) white dwarf
b) neutron star
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d) B or C

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Why are supernovas important to *galactic ecology*?

a) They recycle material from stars that have died.
b) They create new elements and blow them out into space so that new generations of stars can be made from them.
c) They destroy elements, letting each new generation of stars begin anew.

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The binary star Algol has a 3.7 solar mass main sequence star and a 0.8 solar mass red giant. How could that be?

a) In this system, the lower mass star must have evolved faster than the higher mass one.
b) The red giant might be made of some different elements, so it evolved faster.
c) The lower mass star *used to be* a more massive main sequence star, but when it became a giant some of its mass was transferred to the other star.

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Suppose the universe contained only low-mass stars. Would elements heavier than carbon exist?

a) Yes, all stars create heavier elements than carbon when they become a supernova.
b) Yes, but there would be far fewer heavier elements because high-mass stars form elements like iron far more prolifically than low-mass stars.
c) No, the core temperatures of low-mass stars are too low to fuse other nuclei to carbon, so it would be the heaviest element.
d) No, heavy elements created at the cores of low-mass stars would be locked away for billions of years.
e) No, fission reactions would break down all elements heavier than carbon.

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What would stars be like if hydrogen, rather than iron, had the lowest mass per nuclear particle?

a) Stars would rapidly burn all their hydrogen and have very short lifetimes.
b) Nuclear fusion would be impossible so stars would slowly cool and dim after their initial formation.
c) Nuclear fission would be impossible and elements heavier than iron would not exist.
d) Stars would continue burning heavier and heavier elements and the universe would have far more lead and uranium.
e) Stars would be much less dense, and therefore larger, but otherwise the same.

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True or False? When helium fusion begins in the core of a low-mass star, the extra energy generated causes the star's luminosity to rise.

a) True, stars that undergo helium fusion are more luminous than main-sequence stars.
b) True, this is called a helium flash.
c) False, when helium fusion begins, the star's core expands, lowering the luminosity generated by hydrogen shell burning.
d) False, main-sequence low-mass stars do not have sufficiently high core temperatures to allow for helium fusion.

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True or False? If you could look inside the Sun today, you'd find that its core contains a much higher proportion of helium and a lower proportion of hydrogen than it did when the Sun was first born.

a) True, the Sun is about halfway through its hydrogen-burning life, so it has turned about half its core hydrogen into helium.
b) False, the proportion of helium only increases near the end of the Sun's life.
c) False, the proportion of helium in the Sun will always be the same as when it first formed.
d) False, the lighter helium will rise to the surface and the proportion of hydrogen in the core will remain the same.

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