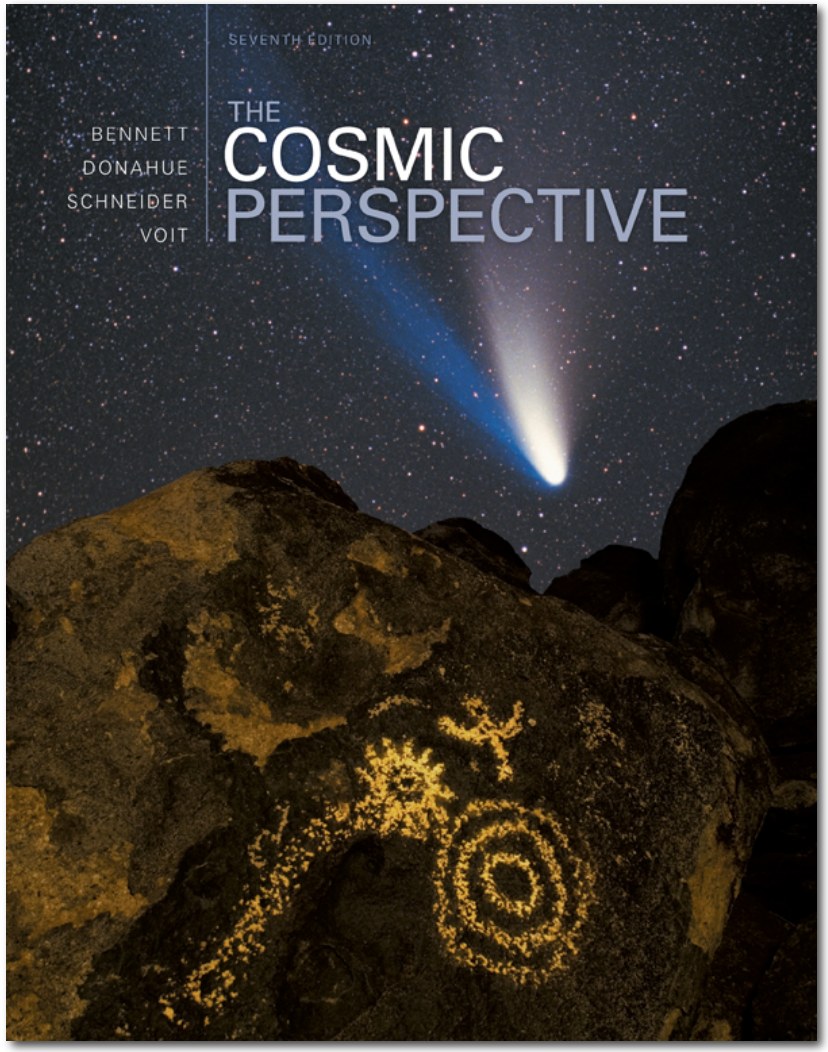
Chapter 4 Reading Quiz Clickers

The Cosmic Perspective

Seventh Edition



Making Sense of the Universe: Understanding Motion, Energy, and Gravity

4.1 Describing Motion: Examples from Daily Life

- How do we describe motion?
- How is mass different from weight?

Which of the following is *not* changing for someone driving a car in a circle at 30 miles per hour?

a) position
b) velocity
c) acceleration
d) momentum
e) none of the above (all are changing)

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What does a force acting on an object do to that object's motion?

a) A force keeps an object moving at a constant velocity.
b) A force changes an object's momentum.
c) A force changes an object's acceleration.
d) A force changes an object's mass.
e) B and C

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Space Station astronauts are weightless because

a) no force is acting on them.
b) their acceleration is zero.
c) their acceleration is equal to the acceleration due to gravity.
d) they are in space.
e) A and B

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If you take off in a rocket accelerating upward

a) your mass increases and your weight stays the same.
b) your weight increases and your mass stays the same.
c) both your weight and mass increase.
d) both your weight and mass stay the same.
e) both your weight and mass decrease.

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4.2 Newton's Laws of Motion

- How did Newton change our view of the universe?
- What are Newton's three laws of motion?

Which of the following was Newton's insight about gravity?

a) It is responsible for the motion of the Moon around Earth.
b) It produces a change in an object's acceleration.
c) It produces a change in an object's direction of motion as well as its speed.
d) It is caused by a warping of space–time.

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Newton's second law of motion states that

a) the acceleration of an object is equal to its mass times the force acting on it.
b) the acceleration of an object is equal to its mass divided by the force acting on it.
c) the acceleration of an object is equal to the force acting on it divided by its mass.
d) the acceleration of an object is equal to its mass times its velocity.
e) the acceleration of an object is equal to its velocity divided by its mass.

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All of Newton's laws of motion express the concept that

a) a force (and only a force) always changes the momentum of an object.
b) the momentum of an object is always constant.
c) the motion of an object reverses direction when a force acts on it.
d) the acceleration of an object depends on its momentum.
e) all of the above

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Which of the following describes how a rocket takes off?

a) The rocket exerts a force on the ground, and then the atmosphere, causing it to accelerate upward.
b) The backward momentum of the rocket exhaust is canceled by the forward momentum of the rocket.
c) The escaping rocket exhaust changes the mass of the rocket, giving it upward momentum.
d) The burning rocket fuel heats the air beneath the rocket, causing it to move upward.

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4.3 Conservation Laws in Astronomy

- Why do objects move at constant velocity if no force acts on them?
- What keeps a planet rotating and orbiting the Sun?
- Where do objects get their energy?

When two objects collide

a) their combined momentum remains unchanged.
b) they exert equal and opposite forces on each other.
c) their combined angular momentum remains unchanged.
d) their combined energy remains unchanged.
e) all of the above

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What is required to change an object's angular momentum?

a) a force.
b) a force acting opposite to the direction of motion.
c) a twisting force.
d) It is not possible to change an object's angular momentum.
e) There is no such thing as "angular" momentum.

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The energy of Earth's rotation is an example of

a) twisting energy.
b) potential energy.
c) thermal energy.
d) radiative energy.
e) kinetic energy.

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When a ball is dropped, some of the ball's energy changes from

a) kinetic energy to gravitational potential energy.
b) gravitational potential energy to kinetic energy.
c) radiative energy to kinetic energy.
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Which of the following processes violates a conservation law?

a) Mass is converted directly into energy.
b) An object orbiting the Sun and affected only by the Sun's gravity spirals into the Sun.
c) One ball hits a second ball and stops moving while the second ball starts moving in the same direction.
d) An object speeds up as it approaches the Sun and turns around it, and then slows down as it moves further away, never to return.
e) An object orbits Earth on a perfectly circular orbit with no rockets firing.

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4.4 The Universal Law of Gravitation

- What determines the strength of gravity?
- How does Newton's law of gravity extend Kepler's laws?

How does the force of gravity between two objects depend on the distance between the objects?

a) It does not depend on the distance.
b) It increases in proportion to the distance.
c) It increases in proportion to 1/distance.
d) It increases in proportion to the distance squared.
e) It increases in proportion to 1/distance squared.

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What happens to the energy of an object while it follows an unbound orbit around the Sun?

a) The total remains constant while gravitational potential energy is converted to kinetic energy as it approaches the Sun.
b) The total increases when the object approaches the Sun and decreases when it recedes from the Sun.
c) The total, kinetic, and potential energy remain constant.
d) The total remains constant while kinetic energy is converted to gravitational potential energy as it approaches the Sun.

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The masses of orbiting objects can be determined from

a) Newton's second law.
b) Newton's version of Kepler's third law.
c) Newton's third law.
d) Newton's first law.
e) Newton's version of Kepler's first law.

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Objects on bound orbits

a) follow elliptical orbits.
b) orbit the center of mass of the system.
c) stay in orbit around the object they are orbiting.
d) all of the above

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4.5 Orbits, Tides, and the Acceleration of Gravity

- How do gravity and energy together allow us to understand orbits?
- How does gravity cause tides?
- Why do all objects fall at the same rate?

The Moon always keeps the same face toward Earth because

a) it happened to form that way.
b) the gravity of Earth pulls more strongly on the near side, locking it into place facing Earth.
c) friction due to tides slowed the rotation of the Moon until it reached the point where it always keeps the same face toward Earth.
d) the tidal force from Earth caused the Moon's rotation to speed up until it reached the point where it always keeps the same face toward Earth.

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Tidal forces from the Moon and Sun add up to make larger tides on Earth when the Moon is

a) new.
b) full.
c) first quarter.
d) third quarter.
e) A and B

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The acceleration due to gravity of an object on the surface of Earth depends on

a) the radius of Earth.
b) the mass of Earth.
c) the mass of the object.
d) all of the above
e) A and B

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