AP Physics 1 Multiple Choice Questions - Chapter 6

1 A 0.10 kg ball is thrown up vertically. What is the magnitude of the momentum of the ball at its maximum height, if its initial velocity was 15 m/s?

6.1

a 0 kg m/s
b 1.5 kg m/s
c 3 kg m/s
d 15 kg m/s

2 A soccer player runs up behind a 0.450 kg soccer ball traveling at 3.20 m/s and kicks it in the same direction as it is moving, increasing its speed to 12.8 m/s. What is the magnitude of the impulse delivered by the soccer player to the ball?

6.1

a 2.45 kg m/s
b 4.32 kg m/s
c 5.61 kg m/s
d 7.08 kg m/s
e 9.79 kg m/s

3 A 57.0 g tennis ball is traveling straight at a player at 21.0 m/s. The player volleys the ball straight back at 25.0 m/s. If the ball remains in contact with the racket for 0.060 sec, what average force acts on the ball?

6.1

a 22.6 N
b 32.5 N
c 43.7 N
d 72.1 N
e 102 N

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1 The data in the table below were recorded during an experiment in which two carts on a frictionless one-dimensional track collide head-on. What are the values of the magnitude of the change in momentum Δp_2 of cart 2 and the magnitude of its average acceleration a_2 during the collision?

6.2

	Cart 1	Cart 2
Mass	5 kg	1 kg
Average F	15 N	15 N
ΔP	0.3 kg m/s	Δp_2
a_{avg}	3 m/s^2	a_2

	Δp_2	a_2
a	0.3 kg m/s	3 m/s^2
b	0.3 kg m/s	15 m/s^2
c	1.5 kg m/s	3 m/s^2
d	1.5 kg m/s	15 m/s^2

2 A small china bowl having kinetic energy *E* is sliding along a frictionless countertop when a server, with perfect timing, places a rice ball into the bowl as it passes him. If the bowl with the rice ball have the same mass, what is the kinetic energy of the system thereafter?

6.2

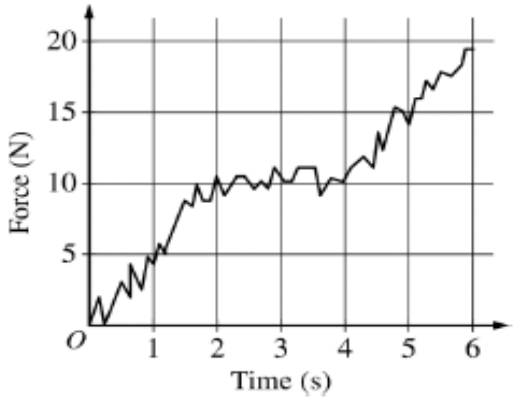
a *2E*
b *E*
c *E/2*
d *E/4*
e *E/8*

3 A 5.0 kg cart moving to the right with a speed of 6.0 m/s collides with a concrete wall and rebounds with a speed of 2.0 m/s. Is the change of the momentum of the cart

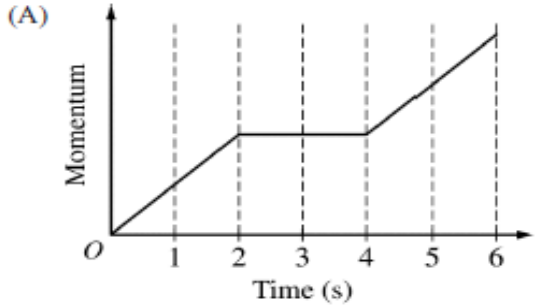
6.2

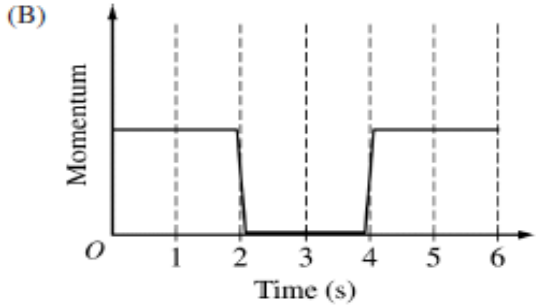
a 0 kg m/s
b 40 kg m/s
c -40 kg m/s
d -30 kg m/s
e -10 kg m/s

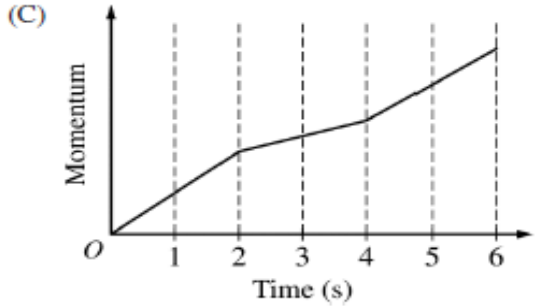
6.3

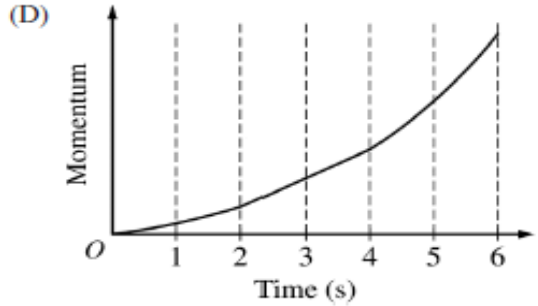


1 Using a force probe, a student generates the graph above the force exerted on a small wagon as a function of time. The wagon starts from rest and rolls with negligible friction in the axles. Which of the following graphs best represents the wagon's momentum as a function of time?

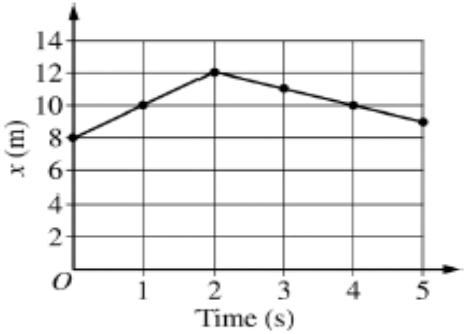








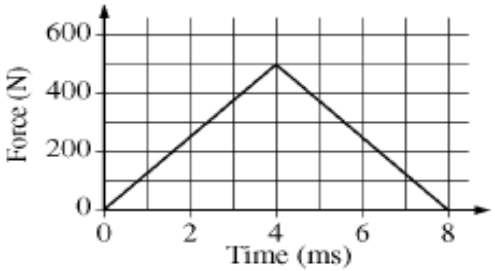
6.3



2 The graph above shows the position *x* as a function of time t for the center of mass of a system of particles of total mass 6.0 kg. For a very short time interval around 2.0 seconds, an external force is exerted on an object in the system. What is the resulting change in momentum of the system?

a 52 kg m/s
b 6 kg m/s
c -6 kg m/s
d -18 kg m/s

6.3



3 A 0.050 kg tennis ball is moving to the left at 10 m/s when it is hit by a tennis racket that is moving to the right. The magnitude of the force exerted on the ball by the racket as a function of time is shown above. What is the speed of the ball after the collision with the racket?

a 30 m/s
b 50 m/s
c 70 m/s
d 90 m/s

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1 A 2 kg object traveling at 5 m/s on a frictionless horizontal surface collides head-on with and sticks to a 3 kg object initially at rest. Which of the following correctly identifies the change in total kinetic energy and the resulting speed of the objects after the collision?

6.4

	Kinetic Energy	Speed
a	Increases	2 m/s
b	Increases	3.2 m/s
c	Decreases	2 m/s
d	Decreases	3.2 m/s

2 A 1.0 kg lump of clay is sliding to the right on a frictionless surface with speed 2 m/s. It collides head-on and sticks to a 0.5 kg metal sphere that is sliding to the left with speed 4 m/s. What is the kinetic energy of the combined objects after the collision?

6.4

a 6 J
b 4 J
c 2 J
d 0 J

3 A 0.004 kg bullet is fired into a 0.200 kg block of wood at rest on a horizontal surface. After impact, the block with the embedded bullet slides 8.00 m before coming to rest. If the coefficient of friction is 0.400, what is the speed of the bullet before impact?

6.4

a 96 m/s
b 112 m/s
c 286 m/s
d 404 m/s
e 812 m/s

4 A car of mass m traveling at speed v crashes into the rear of a truck of mass 2m that is at rest and in neutral at an intersection. If the collision is perfectly inelastic, what is the speed of the combined car and truck after the collision?

6.4

a v
b v/2
c v/3
d 2v
e None of the above

AP Physics 1 Multiple Choice Questions - Chapter 6

1 In a one-dimensional perfectly elastic collision, an object of mass *m* is traveling with speed v_o in the +x-direction when it strikes an object with mass *3m* that is at rest. What are the object's velocities following the collision?

6.5

	Object of Mass m	Object of Mass 3m
a	Zero	v_o /3, +x-dir
b	v_o /4, +x-dir	v_o /2, +x-dir
c	v_o /2, +x-dir	v_o /2, +x-dir
d	v_o /2, -x-dir	v_o /2, +x-dir

2 A 0.10 kg object moving initially with a velocity of 0.20 m/s eastward makes an elastic head-on collision with a 0.15 kg object initially at rest. What is the final velocity of the 0.10 kg object after the collision?

6.5

a 0.16 m/s eastward
b 0.16 m/s westward
c 0.040 m/s eastward
d 0.040 m/s westward
e None of the above

3 In a game of billiards, a red billiard ball is traveling in the positive x-direction with speed v and the cue ball is traveling in the negative x-direction with speed 3v when the two balls collide head-on. Which statement is true concerning their velocities subsequent to the collision? Neglect any effects of spin.

6.5

a red ball: -v, cue ball: 3v
b red ball: v, cue ball: 2v
c red ball: -3v, cue ball: v
d red ball: v, cue ball: 3v
e The velocities can't be determined without knowing the mass of the ball

AP Physics 1 Multiple Choice Questions - Chapter 6

1 A billiard ball moving at 5.00 m/s strikes a stationary ball of the same mass. After the collision, the first ball moves at 4.33 m/s at an angle of 30° with respect to the original line of motion. Is the collision elastic or inelastic?

6.6

a Elastic
b Inelastic
c Not enough information to determine

2 A billiard ball moving at 5.00 m/s strikes a stationary ball of the same mass. After the collision, the first ball moves at 4.33 m/s at an angle of 30° with respect to the original line of motion. Find the magnitude of the velocity of the second ball after the collision.

6.6

a 2.50 m/s
b 3.33 m/s
c 0.75 m/s
d 4.50 m/s

3 A billiard ball moving at 5.00 m/s strikes a stationary ball of the same mass. After the collision, the first ball moves at 4.33 m/s at an angle of 30° with respect to the original line of motion. Find the direction of the velocity of the second ball after the collision.

6.6

a 60° below horizontal
b 60° above horizontal
c 45° above horizontal
d 45° below horizontal