

Review Jeopardy

	Impulse- Momentum	Cons of Momentum	Cons of Energy	Work- Energy
0.25	1	5	9	13
0.5	2	6	10	14
0.75	3	7	11	15
1.00	4	8	12	16

Question #1

Consider two less-than-desirable options. In the first you are driving 30 mph and crash head-on into an identical car also going 30 mph in the opposite direction. In the second option you are driving 30 mph and crash head-on into a stationary brick wall. In neither case does your car bounce off the thing that it hits and the collision time is the same in both cases. Which of these two situations would result in the greatest impact force?

- a) hitting the other car
- b) hitting the brick wall
- c) We cannot answer this question without more information.
- d) None of these are true.
- e) The force would be the same in both cases.

Question #2

During a collision with the wall, the velocity of a 0.200-kg ball changes from 20.0 m/s toward the wall to 12.0 m/s away from the wall. If the time the ball was in contact with the wall was 60.0 ms, what was the magnitude of the average force applied to the ball?

- a) 107 N
- b) 40.0 N
- c) 16.7 N
- d) 26.7 N
- e) 13.3 N

Question #3

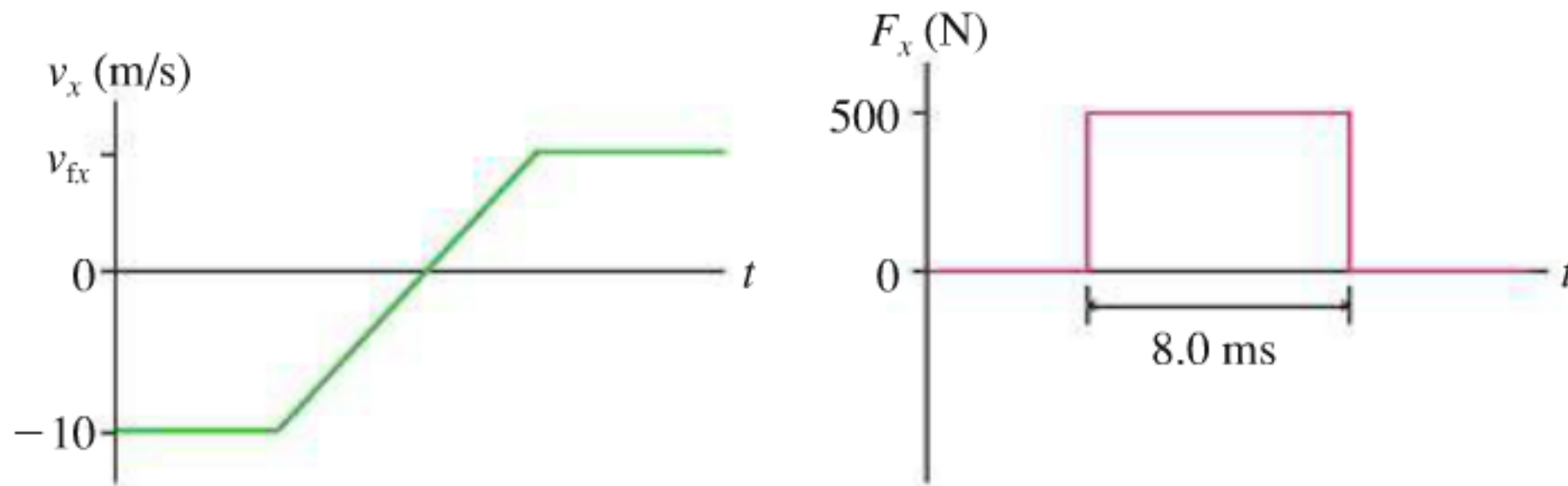
A stationary 1.67-kg object is struck by a stick. The object experiences a horizontal force given by $F = 1500(\text{N/ms}) t - 20(\text{N/ms}^2) t^2$, where t is time in milliseconds. From the instant the stick first makes contact with the object. What is the speed of the object just after loses contact with the stick at $t = 2.74 \text{ ms}$?

- a) 22 m/s
- b) 3.7 m/s
- c) 3.3 m/s
- d) 25 m/s

Question #4

A 250 g ball collides with a wall. The figure shows the ball's velocity and the force exerted on the ball by the wall, what is v_{fx} , the ball's final velocity?

- a) 3.1 m/s
- b) 7.5 m/s
- c) 2.2 m/s
- d) 6.0 m/s



Question #5

As a tile falls from the roof of a building to the ground its momentum is conserved.

- a) False
- b) True

Question #6

A 480-kg car moving at 14.4 m/s hits from behind a 570-kg car moving at 13.3 m/s in the same direction. If the new speed of the heavier car is 14.0 m/s, what is the speed of the lighter car after the collision?

- a) 10.5 m/s
- b) 13.6 m/s
- c) 5.24 m/s
- d) 18.8 m/s
- e) 19.9 m/s

Question #7

A 1000-kg car approaches an intersection traveling north at 20.0 m/s. A 1200-kg car approaches the same intersection traveling east at 22.0 m/s. The two cars collide at the intersection and lock together. What is the velocity of the cars immediately after the collision?

- a) 29.7 m/s in a direction 47.7° east of north.
- b) 21.1 m/s in a direction 47.7° west of south.
- c) 15.1 m/s in a direction 52.8° east of north.
- d) 21.1 m/s in a direction 47.7° east of north.
- e) 21.1 m/s in a direction 52.8° east of north.

Question #8

Two automobiles traveling at right angles to each other collide and stick together. Car A has a mass of 1200 kg and had a speed of 25 m/s before the collision. Car B has a mass of 1600 kg. The skid marks show that, immediately after the collision, the wreckage was moving in a direction making an angle of 40° with the original direction of car A. What was the speed of car B before the collision?

- a) 18 m/s
- b) 16 m/s
- c) 11 m/s
- d) 21 m/s
- e) 14 m/s

Question #9

In a perfectly elastic collision between two perfectly rigid objects

- a) the momentum of each object individually is conserved.
- b) the kinetic energy of each object individually is conserved.
- c) both the momentum and the kinetic energy of the system are conserved.
- d) the momentum of the system is conserved but the kinetic energy of the system is not conserved.
- e) the kinetic energy of the system is conserved, but the momentum of the system is not conserved.

Question #10

In the figure, two identical ideal massless springs have unstretched lengths of 0.25 m and spring constants of 700 N/m. The springs are attached to a small cube and stretched to a length L of 0.30 m as in Figure A. An external force P pulls the cube a distance $D = 0.020$ m to the right and holds it there (figure B.) The external force P , that holds the cube in place in Figure B, is closest to

- a) 25 N
- b) 14 N
- c) 21 N
- d) 18 N
- e) 28 N

Figure A

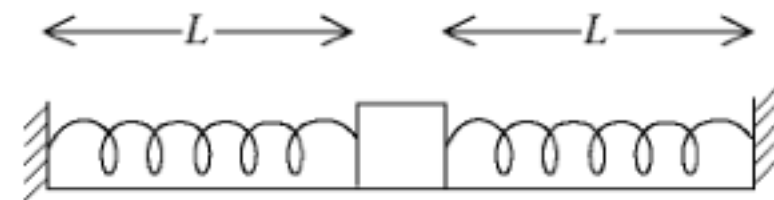
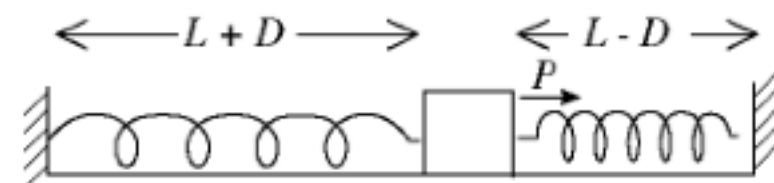


Figure B



Question #11

A 5.00-kg ball is hanging from a long but very light flexible wire when it is struck by a 1.50 kg stone traveling horizontal to the right at 12.0 m/s. The stone rebounds to the left with a speed of 8.50 m/s, and the ball swings to a max height “h” above its original level. The value of “h” is closest to

- a) 0.0563 m
- b) 1.10 m
- c) 2.20 m
- d) 1.93 m
- e) 3.69 m

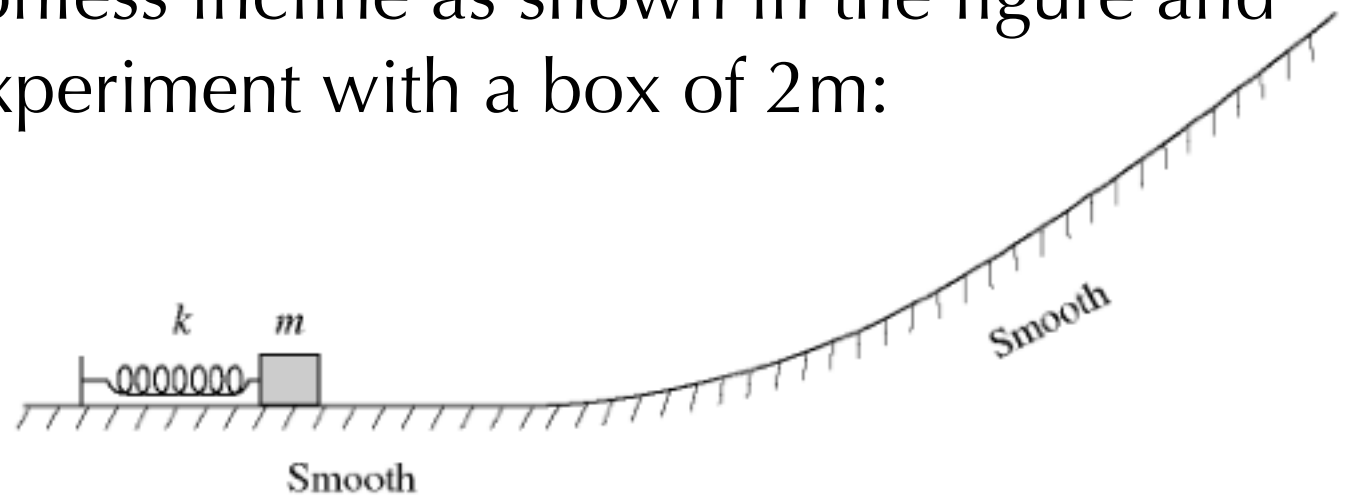
Question #12

On a frictionless table, two blocks (A of mass 2.00 kg and B of mass 3.00 kg) are pressed together against an ideal massless spring that stores 75.0 J of elastic potential energy. The blocks are not attached to the spring and are free to move free of it once they are released from rest. The maximum speed achieved by each block is closest to:

- a) 4.47 m/s (A), 6.71 m/s (B)
- b) 5.48 m/s for both
- c) 6.12 m/s (A), 5.00 m/s (B)
- d) 5.00 m/s (A), 6.12 m/s (B)
- e) 6.71 m/s (A), 4.47 m/s (B)

Question #13

A box of mass m is pressed against (but not attached to) an ideal spring of force constant k and negligible mass, compressing it a distance x . After it is released, the box slides up the frictionless incline as shown in the figure and eventually stops. If we repeat this experiment with a box of $2m$:



- a) just as it moves free of the spring, the lighter box will be moving twice as fast as the heavier box.
- b) the lighter box will go twice as high as the heavier box.
- c) both boxes will have the same speed just as they move free of the spring.
- d) both boxes will reach the same height on the incline.
- e) just as it moves free of the spring, the heavier box will have twice as much kinetic energy as the lighter box.

Question #14

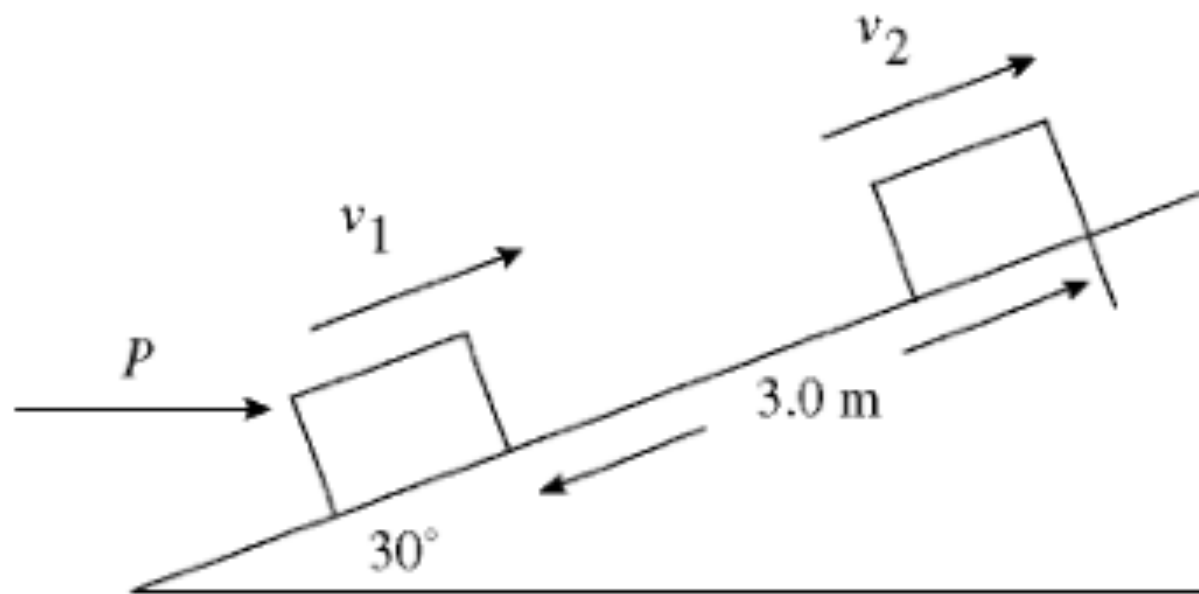
A crane lifts a 425 kg steel beam vertically a distance of 117 m. How much work does the crane do on the beam if the beam accelerates upward at 1.8 m/s^2 ?

- a) $4.9 \times 10^5 \text{ J}$
- b) $3.4 \times 10^5 \text{ J}$
- c) $4.0 \times 10^5 \text{ J}$
- d) $5.8 \times 10^5 \text{ J}$

Question #15

In the figure, a 900-kg crate is on a rough surface inclined at 30° . A constant external force $P = 7200\text{ N}$ is applied horizontally to the crate. While this force pushes the crate a distance of 3.0 m up the incline, its velocity changes from 1.2 m/s to 2.3 m/s . What is the increase in thermal energy of the system during this process?

- a) -3700 J
- b) -7200 J
- c) $+7200\text{ J}$
- d) $+3700\text{ J}$
- e) zero



Question #16

In the figure, two boxes, each of mass 24 kg , are initially at rest and connected as shown. The coefficient of kinetic friction between the surface and the box is 0.31 . Find the speed of the boxes after they have moved 1.6 m .

- a) 2.6 m/s
- b) 1.2 m/s
- c) 1.9 m/s
- d) 0.3 m/s
- e) 3.5 m/s

