HW6 - due 6 pm Day 13 (Wed. Aug. 13) (6008301)

Question 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

1. Question Details OSColPhys1 8.1.001. [2153186]

(a) Calculate the momentum of a 2150 kg elephant charging a hunter at a speed of 7.50 m/s.
[ ] 16100 kg·m/s

(b) Compare the elephant's momentum with that of a 0.0400 kg bullet fired at a speed of 600 m/s.
[ ] 672 (momentum of elephant / momentum of bullet)

(c) What is the momentum of the 90.0 kg hunter running at 7.50 m/s after missing the elephant?
[ ] 675 kg·m/s

2. Question Details OSColPhys1 8.1.004. [2153356]

(a) What is the momentum of a 1.40×10^4 kg garbage truck moving at 29.0 m/s?
[ ] 4.06e+05 kg·m/s

(b) At what speed would an 8.00 kg trash can have the same momentum?
[ ] 50800 m/s

3. Question Details OSColPhys1 8.P.005.WA. [2611425]

An object is traveling such that it has a momentum of magnitude 24.7 kg · m/s and a kinetic energy of 271 J. Determine the following.

(a) speed of the object
[ ] 21.9 m/s

(b) mass of the object
[ ] 1.13 kg

Supporting Materials

Physical Constants

4. Question Details OSColPhys1 8.2.016.XP. [2153654]

When serving a tennis ball, the player hits it when its velocity is zero (at the highest point of a vertical toss). The racket exerts a force of 530 N on the ball for 5.00 ms, giving it a final velocity of 44.0 m/s. Using these data, find the mass of the ball.
[ ] 60.2 g

5. Question Details OSColPhys1 8.P.011.WA. [2611607]

A professional boxer hits his opponent with a 1200-N horizontal blow that lasts 0.190 s. The opponent's total body mass is 109 kg and the blow strikes him near his center of mass and while he is motionless in midair. Determine the following.

(a) impulse the boxer imparts to his opponent by this blow
[ ] 228 kg · m/s

(b) the opponent's final velocity after the blow
[ ] 2.09 m/s

(c) Calculate the recoil velocity of the opponent's 5.0-kg head if hit in this manner, assuming the head does not initially transfer significant momentum to the boxer's body.
[ ] 45.6 m/s

Supporting Materials

Physical Constants

6. Question Details OSColPhys1 8.P.008.WA. [2611508]

A baseball with a mass of 150 g is thrown horizontally with a speed of 41.4 m/s (93 mi/h) at a bat. The ball is in contact with the bat for 1.15 ms and then travels straight back at a speed of 45.1 m/s (101 mi/h). Determine the average force exerted on the ball by the bat. Neglect the weight of the ball (it is much smaller than the force of the bat) and choose the direction of the incoming ball to be positive. (Indicate the direction with the sign of your answer.)
[ ] -11300 N

Supporting Materials

Physical Constants

7. Question Details OSColPhys1 8.P.014.WA. [2611592]

Two ice skaters stand facing each other at rest on a frozen pond. They push off against one another and the 48-kg skater acquires a speed of 0.73 m/s. If the other skater acquires a speed of 0.82 m/s, what is her mass?
[ ] 42.7 kg

Supporting Materials

Physical Constants

8. Question Details OSColPhys1 8.P.015.WA. [2611742]

During a football game, a receiver has just caught a pass and is standing still. Before he can move, a tackler, running at a velocity of +4.0 m/s, grabs and holds onto him so that they move off together with a velocity of +2.5 m/s. If the mass of the tackler is 130 kg, determine the mass of the receiver. Assume momentum is conserved.
[ ] 78 kg

Supporting Materials

Physical Constants

9. Question Details OSColPhys1 8.P.016.WA. [2611531]

When a golfer tees off, the head of her golf club which has a mass of 260 g is traveling 43 m/s just before it strikes a 46-g golf ball at rest on a tee. Immediately after the collision, the club head continues to travel in the same direction but at a reduced speed of 36 m/s. Neglect the mass of the club handle and determine the speed of the golf ball just after impact.

[ ] 39.6 m/s

Supporting Materials

Physical Constants

10. Question Details OSColPhys1 8.P.018.WA. [2611681]

A knife thrower throws a knife toward a 300-g target that is sliding in her direction at a speed of 2.20 m/s on a horizontal frictionless surface. She throws a 22.5-g knife at the target with a speed of 41.0 m/s. The target is stopped by the impact and the knife passes through the target. Determine the speed of the knife after passing through the target.

[ ] 11.7 m/s

Supporting Materials

Physical Constants

11. Question Details OSColPhys1 8.P.025.WA. [2611812]

A truck with a mass of 1390 kg and moving with a speed of 15.0 m/s rear-ends a 711-kg car stopped at an intersection. The collision is approximately elastic since the car is in neutral, the brakes are off, the metal bumpers line up well and do not get damaged. Find the speed of both vehicles after the collision.

v_{car} = [ ] 19.8 m/s

v_{truck} = [ ] 4.85 m/s

Supporting Materials

Physical Constants

12. Question Details OSColPhys1 8.P.026.WA. [2611462]

An object with a mass of 5.00 g is moving to the right at 14.0 cm/s when it is overtaken by an object with a mass of 29.0 g moving in the same direction with a speed of 21.0 cm/s. If the collision is elastic, determine the speed of each object after the collision.

29.0-g object [ ] 18.9 cm/s

5.00-g object [ ] 25.9 cm/s

Supporting Materials

Physical Constants

13. Question Details OSColPhys1 8.P.045.WA. [2611622]

A hockey player with a mass of 45.0 kg is traveling due east with a speed of 2.75 m/s. A second hockey player with a mass of 68.5 kg is moving due south with a speed of 7.20 m/s. They collide and hold on to each other after the collision, managing to move off at an angle θ south of east, with a speed of v_f. Assume friction may be ignored and determine the following.

(a) the angle θ

[ ] 75.9 ° south of east

(b) the speed v_f

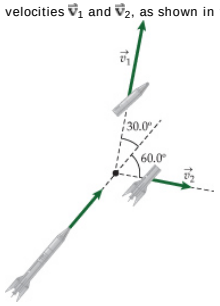
[ ] 4.48 m/s

Supporting Materials

Physical Constants

14. Question Details OSColPhys1 8.P.023.WA. [2611466]

A fireworks rocket moving at a speed of 23.8 m/s suddenly breaks into two pieces of equal mass. If the masses fly off with velocities $\vec{v}_1$ and $\vec{v}_2$, as shown in the drawing, determine the speed of each mass.



(a) speed associated with $\vec{v}_1$

[ ] 41.2 m/s

(b) speed associated with $\vec{v}_2$

[ ] 23.8 m/s

Supporting Materials

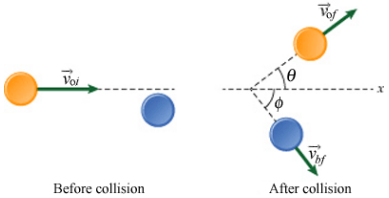
Physical Constants

15. Question Details OSColPhys1 8.P.033.WA. [2611418]

Two ice pucks (one orange and one blue) of equal mass are involved in a perfectly elastic glancing collision as shown in the figure below. The orange puck is initially moving to the right at v_{oi} = 4.85 m/s, strikes the initially stationary blue puck, and moves off in a direction that makes an angle of θ = 37.0° with the horizontal axis while the blue puck makes an angle of ϕ = 53.0° with this axis as in figure (b). Note that for an elastic collision of two equal masses, the separation angle $\theta + \phi$ = 90.0°. Determine the speed of each puck after the collision.

v_{0f} = [ ] 3.87 m/s

v_{bf} = [ ] 2.92 m/s



Supporting Materials

Physical Constants

16. Question Details OSColPhys1 8.P.050.WA. [2611706]

A 99.0-g wooden block is initially at rest on a rough horizontal surface when a 11.2-g bullet is fired horizontally into (but does not go through) it. After the impact, the block–bullet combination slides 6.5 m before coming to rest. If the coefficient of kinetic friction between block and surface is 0.750, determine the speed of the bullet immediately before impact.

[ ] 96.2 m/s

Supporting Materials

Physical Constants

17. Question Details OSColPhys1 8.P.040.WA. [2611594]

A 0.430-kg block of wood rests on a horizontal frictionless surface and is attached to a spring (also horizontal) with a 25.5-N/m force constant that is at its equilibrium length. A 0.0600-kg wad of Play-Doh is thrown horizontally at the block with a speed of 2.80 m/s and sticks to it. Determine the amount by which the Play-Doh–block system compresses the spring?

[ ] 4.75 cm

Supporting Materials

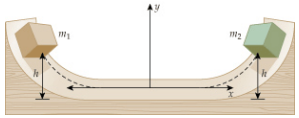
Physical Constants

18. Question Details OSColPhys1 8.P.024.Tutorial.WA. [2611929]

As shown in the figure below, two blocks (m_1 and m_2) are each released from rest at a height of h = 3.63 m on a frictionless track and when they meet on the horizontal section of the track they undergo an elastic collision. If m_1 = 2.50 kg and m_2 = 4.65 kg, determine the maximum heights to which they rise after the collision. Use the coordinate system shown in the figure.

y_{1f} = [ ] 9.31 m

y_{2f} = [ ] 0.577 m.



Supporting Materials

Physical Constants

Assignment Details

Name (AID): **HW6 - due 6 pm Day 13 (Wed. Aug. 13) (6008301)**
Submissions Allowed: **5**
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Code:
Locked: **No**
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