

Reminders 10-15-07:

- Next Homework Due 10/21!!!
- Momentum Worksheet due Wed 10/17.
- Quiz Wed. 10/17, Energy & Momentum.
- EXAM 2 10/22
- Chapter 4, 5, & 6 Practice Assignment.
- You need a 50% average in lab to pass this course.

Objectives:


-Discuss Work Worksheet-

Work done by forces producing circular motion is zero not because displacement is zero (because it isn't in general), but because force is always perpendicular to displacement!!!!

Work done by gravity on incline plane is

ALWAYS $|mg||x|\cos \theta$.

- Momentum & Impulse
- Conservation of Momentum



Physics 2A Old Exams

- Dominic Calabrese -

- Home
- Syllabus
- Labs
- P2X Syllabus
- Old Exams
- Web Assgn

Exams

- [Exam 1](#)
- [Exam 2](#)
- [Exam 3](#)
- [Exam 4](#)
- [Exam 4 Another Sample](#)
- [Final Exam](#)

Note: The above sample exams were used in class periods that were 50 minutes in length.

- [Exam 1 Crib Sheet](#)
- [Exam 2 Crib Sheet](#)
- [Exam 3 Crib Sheet](#)
- [Exam 4 Crib Sheet](#)
- [Final Exam Crib Sheet](#)

Worksheets (to be assigned)

[Worksheet file](#)

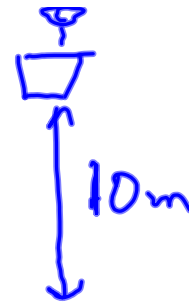
Conceptual Questions (to be assigned)

- [Kinematics](#)
- [Force](#)
- [Energy & Momentum](#)
- [Circular Motion](#)
- [Fluids](#)
- [Torque](#)
- [Heat](#)
- [Thermodynamics](#)

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| Resources | Phys Dept | Sierra

- A mischievous child drops a 1 kg flower pot on the head of a person 10 m below. What is the momentum of the pot upon impact?



$$\vec{p} = m\vec{v} \quad \vec{v}_i = 0 \quad \vec{p}_i = 0$$

$$\vec{v}_f = ?$$

$$v_f^2 = v_i^2 + 2a\Delta y$$

$$v_f = \sqrt{2a\Delta y}$$

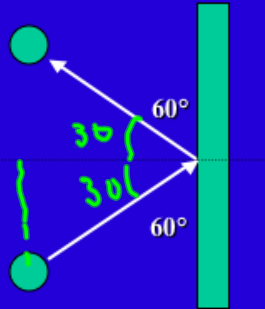
$$= \sqrt{2(-9.80)(10)}$$

$$v_f = -14 \text{ m/s}$$

$$\vec{p}_f = (1 \text{ kg})(-14 \text{ m/s}) = -14 \text{ kg m/s}$$

$$\Delta \vec{p} = -14 \text{ kg m/s} = -14 \text{ N s}$$

A 3 kg steel ball strikes a wall with a speed of 10 m/s at an angle of 60° with the surface. It bounces off with the same speed and angle. If the ball is in contact with the wall for 0.2 s, what is the change in momentum of the ball? What is the impulse delivered by the wall? What is the average force exerted on the ball by the wall?



Want
 $m \Delta \vec{v}$
 because
 Impulse
 is change
 in momentum

$$\vec{p}_{ix} = m v_{ix} = m v_i \cos 30 = 3(10) \cos 30 = 26$$

$$p_{iy} = m v_{iy} = m v_i \sin 30 = 3(10) \sin 30 = 15$$

$$p_{xf} = -26 \text{ kg m/s}$$

$$p_{yf} = 15 \text{ kg m/s}$$

$$\Delta \vec{p} = -26 \text{ kg m/s} - 26 \text{ kg m/s} = -52 \text{ kg m/s}$$

$$\Delta \vec{p} = \sqrt{\Delta p_x^2 + \Delta p_y^2}$$

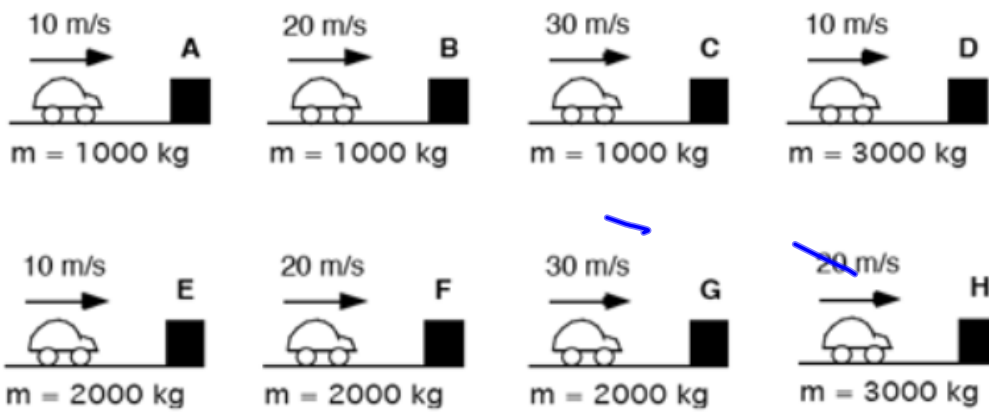
$$\underline{F} \Delta t = m \Delta \vec{v} = \Delta p ; F = \frac{\Delta p}{\Delta t}$$

$$F = \frac{-52 \text{ kg}}{0.2} = -260 \text{ N} = \text{force of wall on ball}$$

Force of ball on wall is +260 N

Shown below are eight cars that are moving along horizontal roads at specified speeds. Also given are the masses of the cars. All of the cars are the same size and shape, but they are carrying loads with different masses. All of these cars are going to be stopped by plowing into identical barriers. All of the cars are going to be stopped by the same constant force by the barrier.

Rank these situations from greatest to least on the basis of the stopping time that will be needed to stop the cars with the same force. That is, put first the car that requires the longest time and put last the car that requires the shortest time to stop the car with the same force.



G H, F, D C, E B, A

Longest 1 ___ 2 ___ 3 ___ 4 ___ 5 ___ 6 ___ 7 ___ 8 ___ Shortest

Or, all cars require the same time. _____

Please carefully explain your reasoning.

$$F \Delta t = m \Delta v = \text{Impulse}$$

- A 2.0 kg gun fires a 5.0 g bullet. The bullet has a velocity of 6.0×10^2 m/s. Find the recoil velocity of the gun. Note that the momentum of the bullet is equal to the momentum of the gun. Why does the bullet cause more damage than the gun?



$$\sum \vec{p}_i = \sum \vec{p}_f$$

$$0 = m_g v_g + m_b v_b$$

$$v_{gun} = \frac{-m_b v_b}{m_g} = \frac{-(0.005)(600) \frac{m}{s}}{2.0 \text{ kg}} = \underline{1.5 \frac{m}{s}}$$

$$KE_{bullet} = \frac{1}{2} (0.005) (600)^2 = 900 \text{ J}$$

$$KE_{gun} = \frac{1}{2} (2) (1.5)^2 = 2.25 \text{ J}$$

$$W = \Delta KE = \int \vec{F} \cdot d\vec{r}$$