

Physics 112

In Class Assignment

Monday Nov 27th

1. Momentum = Momentum
 a) Before After

$$A + B = A + B$$

$$0.04(325) + 5.27(0) = 0.04(134) + 5.27v$$

$$13 + 0 = 5.36 + 5.27v$$

$$1.5 \text{ m/s} = v$$

same direction as the
bullet.

b) Before -- After

$$A + B = A + B$$

$$B = 5.31 \text{ V}$$

$$2.4 \text{ m/s} = \text{V}$$

same direction that
the bullet was originally
moving.

$$\begin{array}{l}
 \text{c) Before} \quad \quad \quad \text{-- After} \\
 A + B \quad \quad \quad = A + B \\
 13 \quad \quad \quad = 0.04(-31) + 5.27v
 \end{array}$$

$$13 = -1.24 + 5.27v$$

$$2.7 \text{ m/s} = v$$

Same direction that the
bullet was originally moving

$$\begin{aligned} 2. \quad W &= Fd \\ &= (98.5 \cos 40)(15.0) \\ &= 1130 \text{ N}\cdot\text{m} \\ &\quad \text{or} \\ &\quad 1130 \text{ J} \end{aligned}$$

$$3. \quad P = \frac{W}{t} = \frac{1130 \text{ J}}{4.5 \text{ sec}} = 250 \text{ W}$$

$$\begin{aligned} 4 \quad (a) \quad W &= Fd \\ &= \text{weight} \times d \\ &= (15 \times 9.81) (1.2) \\ &= 176 \text{ N}\cdot\text{m} \\ &\quad \text{or} \\ &\quad 176 \text{ J} \end{aligned}$$

$$\begin{aligned} (b) \quad PE &= mgh \\ &= 15 \times 9.81 \times 1.2 \\ &= 176 \text{ J} \end{aligned}$$

Note:

$$W = \Delta PE = 176 \text{ J}$$

$$5. \quad W = \Delta KE$$

$$KE_1 = 0 \text{ J (not moving)}$$

$$KE_2 = \frac{1}{2} m v^2$$

$$= \frac{1}{2} (2.50) (2.25)^2$$

$$= 6.33 \text{ J}$$

$$W = \Delta KE = KE_2 - KE_1$$

$$W = 6.33 - 0$$

$$= 6.33 \text{ J}$$

$$W = Fd$$

$$6.33 = F(11)$$

$$\underline{0.575 \text{ N} = F}$$

$$\begin{aligned} \text{b. } W &= Fd \\ &= 75.0 \text{ N} \times 15.0 \text{ m} \\ &= 1125 \text{ N}\cdot\text{m} = 1125 \text{ J} \end{aligned}$$

$$KE_1 = 0 \text{ (not moving)}$$

$$\begin{aligned} KE_2 &= \frac{1}{2} m v^2 \\ &= \frac{1}{2} (67) v^2 \end{aligned}$$

$$W = \Delta KE$$

$$1125 = \frac{1}{2} (67) v^2 - 0$$

$$\boxed{5.80 \text{ m/s} = v}$$

7. Momentum Before - Momentum After

$$\text{Truck} + \text{Car} = \text{Truck} + \text{Car}$$
$$15\,000(12) + 12\,000(v) = 27\,000(10)$$

$$180\,000 + 12\,000v = 270\,000$$

$$12\,000v = 90\,000$$

$$v = +7.5 \text{ m/s}$$

7.5 m/s East

8.

A

$$PE = mgh$$

$$= 0$$

$$KE = \frac{1}{2}(7.5)(22)^2$$

$$= 1815 \text{ J}$$

$$TE = 1815 \text{ J}$$

B

$$TE = 1815 \text{ J}$$

$$PE = mgh$$

$$PE = 7.5(9.8)(7.4 \sin 25)$$

$$= 230 \text{ J}$$

$$KE = TE - PE$$

$$KE = 1815 - 230$$

$$= 1585 \text{ J}$$

$$KE = \frac{1}{2}mv^2$$

$$1585 = \frac{1}{2}(7.5)v^2$$

$$20 \text{ m/s} = v$$

up the incline