

Conservation of Momentum and Collisions Worksheet

Name _____ Date _____ Period _____

Momentum = mass X velocity

Total Momentum Before Collision = Total Momentum After Collision

momentum object 1	+	momentum object 2	=	Momentum object 1	+	momentum object 2
$m_1 v_1$	+	$m_2 v_2$	=	$m_1 v_1$	+	$m_2 v_2$

1. You are given the following data about a golf club hitting a *stationary* golf ball:

mass of club head	=	0.350 kg
mass of golf ball	=	0.046 kg
speed of club head before collision	=	38 m/s
speed of club head after collision	=	29 m/s

Calculate the following: **SHOW WORK!!**

$$p = mv$$

A. momentum of club head before collision

$$(0.35 \text{ kg})(38 \text{ m/s})$$

Answer = 13.3 kg·m/s

B. momentum of club head after collision

$$(0.35 \text{ kg})(29 \text{ m/s})$$

Answer = 10.15 Kg·m/s

Club transferred p to ball!

C. momentum of golf ball before collision

$$(0.046 \text{ kg})(0 \text{ m/s})$$

Answer = 0

D. momentum of golf ball after collision $P_{\text{before}} = P_{\text{after}}$

$$13.3 \text{ kg·m/s} = 10.15 \text{ kg·m/s} + p_2$$

$$-10.15 \quad \quad -10.15$$

Answer = 3.15 kg·m/s

E. Velocity of the golf ball after it is hit by the golf club

$$p = mv$$

$$\frac{3.15 \text{ kg·m/s}}{0.046 \text{ kg}} = \frac{(0.046 \text{ kg})v}{0.046 \text{ kg}}$$

Answer = 68.5 m/s

2. You are given the following data about a bowling ball hitting a stationary bowling pin: SHOW WORK!!

mass of bowling ball	=	7.0 kg
mass of bowling pin	=	1.5 kg
speed of bowling ball before collision	=	11 m/s
speed of bowling ball after collision	=	6 m/s

Calculate the following: SHOW WORK!! $p = mv$

A. momentum of bowling ball before collision

$$(7.0 \text{ kg})(11 \text{ m/s})$$

Answer = 77 Kg·m/s

B. momentum of bowling ball after collision

$$(7 \text{ kg})(6 \text{ m/s})$$

Answer = 42 Kg·m/s

C. momentum of bowling pin before collision

$$(1.5 \text{ kg})(0 \text{ m/s})$$

Answer = 0 Kg·m/s

D. momentum of bowling pin after collision

$$77 \text{ Kg·m/s} = 42 \text{ Kg·m/s} + p_2$$

Answer = 35 Kg·m/s

E. speed of the bowling pin after it is hit by the bowling ball

$$p = mv$$
$$\frac{35 \text{ Kg·m/s}}{1.5 \text{ kg}} = \frac{1.5 \text{ kg}(v)}{1.5 \text{ kg}}$$

Answer = 23.3 m/s