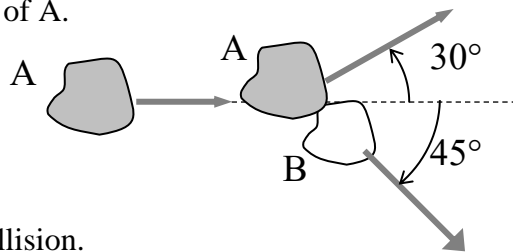


Worksheet 13: Collisions

1. Find the final velocities of the particles in the following 1-D elastic collisions.

m_1	v_{1i}	m_2	v_{2i}	v_{1f}	v_{2f}
m	v	m	$-v$		
m	v	∞	0		
∞	v	m	0		
m	v	m	0		
m	v_1	m	v_2		
$2m$	v	m	0		
m	v	$2m$	0		
m	v	$10m$	$-v$		

2. Two asteroids of equal mass collide with a glancing blow. Asteroid A, which was initially traveling at 40.0 m/s, is deflected 30.0° from its original direction, while asteroid B, which was initially at rest, travels at 45.0° to the direction of A.



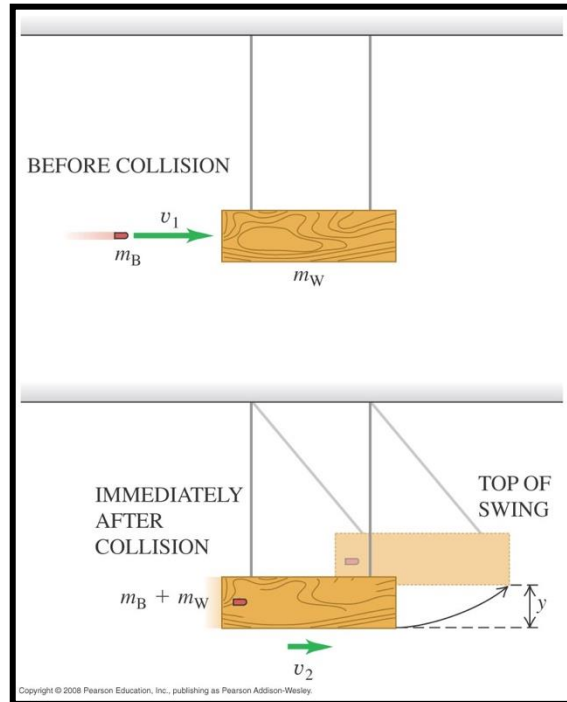
- a. Find the speed of each asteroid after the collision.

x	y
p_{Ai}	
p_{Bi}	
p_{Af}	
p_{Bf}	
$\sum p_i$	
$\sum p_f$	

- b. What kind of collision is this?
- c. What fraction of the original kinetic energy of asteroid A is lost during the collision?

3. A 12.0-g rifle bullet is fired with a speed of 380 m/s into a wood block pendulum with mass 6.00 kg, suspended from two cords 70.0 cm long. The bullet embeds in the block, and the block swings upward after impact.

- a. What kind of collision is this?
- b. Find the kinetic energy of the bullet and pendulum immediately after the bullet becomes embedded in the pendulum.



- c. Find the vertical height through which the pendulum rises.

- d. What fraction of the initial kinetic energy of the system is lost in the collision?