

Momentum Vector Problems

Note: In each of these problems, angles given are relative to the velocity of the ball initially moving. After the collision, the balls travel on either side of the initial velocity.

1. A 0.15 kg pool ball traveling at 4 m/s collides with an identical pool ball initially at rest. The first ball goes off at an angle of 30° and the second goes off at an angle of 60° . How fast is each ball traveling after the collision?
2. A 0.15 kg pool ball traveling at 5 m/s collides with an identical pool ball initially at rest. After the collision, the first ball is traveling at 3 m/s and the second is traveling at 4 m/s. What angles could they be traveling at?
3. A 0.25 kg pool ball collides with an identical pool ball initially at rest. After the collision, the first ball goes off at 3 m/s and an angle of 35° . The second ball goes off at an angle of 65° . How fast was the first ball going before the collision and how fast is the second ball going after the collision?

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4. A 0.15 kg pool ball traveling at 4 m/s collides with an 0.25 kg pool ball initially at rest. After the collision, the 0.15 kg ball goes off at an angle of 60° and the 0.25 kg ball goes at an angle of 30° . How fast is each ball traveling after the collision?

5. A 0.30 kg pool ball traveling at 5 m/s collides with an 0.15 kg pool ball initially at rest. After the collision, the first ball is traveling at 3 m/s and the second is traveling at 4 m/s. What angles are they traveling at after the collision?

Answers:

- 1) 2.00 m/s & 3.46 m/s 2) 37° & 53° 3) $v_1=3.3$ m/s & $v_2=1.9$ m/s
4) $v_1=2.00$ m/s & $v_2=2.08$ m/s 5) 0° & 0° !