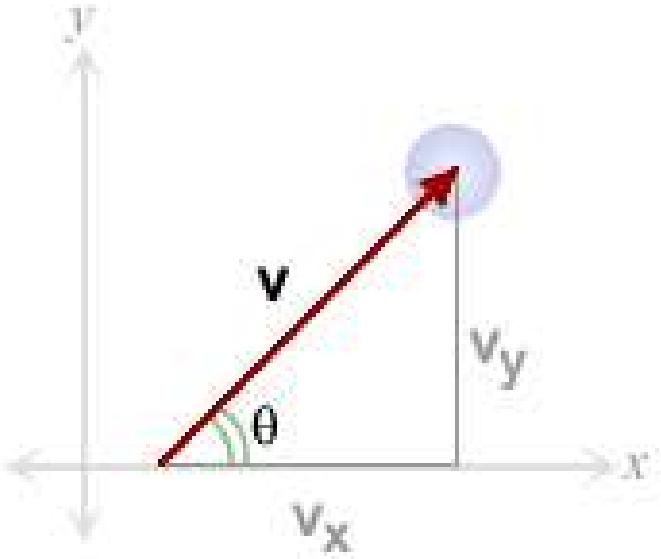
2D Momentum

Warm Up

A red billiard ball (mass of 0.17 kg) is moving at 1.4 m/s towards a blue billiard ball that is at rest (also with a mass of 0.17kg). The red billiard ball moves with a velocity of 0.5 m/s after the collision.

1) Draw the situation.
2) What type of collisions is this?
3) What is the velocity of the second billiard ball after the collision?

How can I find the components of x and y?



Momentum in x and Y

#1: 2D Momentum- No Angle

A 1000 kg car traveling South at 20.0 m/s collides with a 1200 kg car traveling East at 20.0 m/s. The two vehicles entangle after the collision and head off as one. What is the velocity of the combined wreckage immediately after the collision?

#2: 2D Momentum- No Angle

A 1500 kg car traveling West at 9 m/s collides with a 1400 kg truck traveling North at 7 m/s. The two vehicles entangle after the collision and head off as one. What is the velocity of the wreckage immediately after the collision?

#3: 2D Momentum- No "Angles"

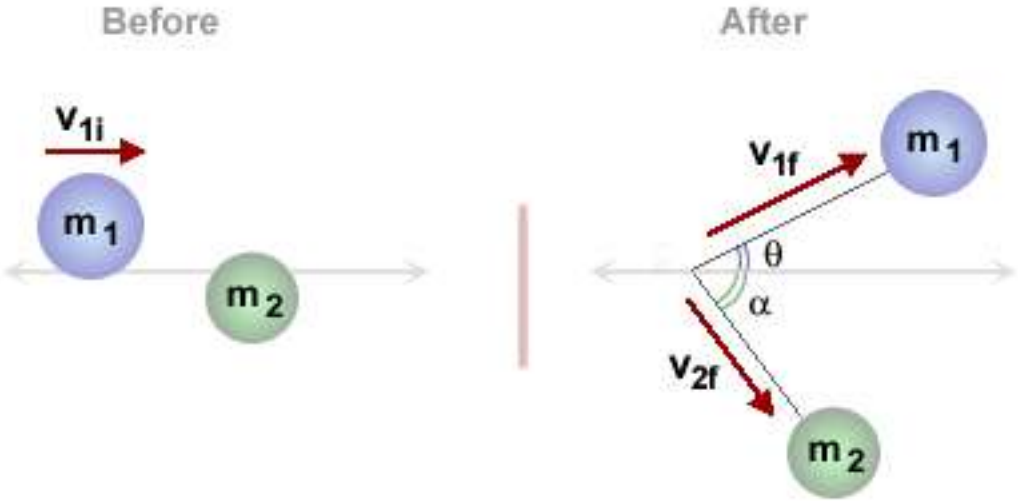
Tina runs towards Julia with a speed of 3 m/s moving South. Julia runs towards Julia with a speed vector 1.4 m/s moving West. They collide and move together. What is their final velocity?

What happens when we change the angle of the pool ball?

http://games.aarp.org/games/pool/

https://phet.colorado.edu/sims/collision-lab/collision-lab_en.html

Ball A (m=0.17kg) collides elastically with Ball B (m= 0.17) that is at rest. Initially, Ball A was travelling to the right at 4.5 m/s. After the collision, Ball A moving with a speed of 3.65 m/s and at an angle of 27° to its original direction. What is the final speed and direction of motion for Ball B?

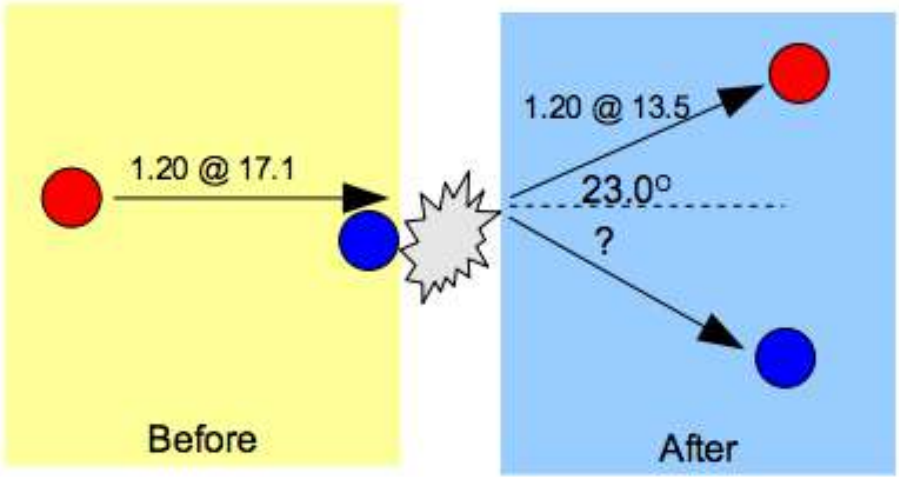


Set it Up!

1) Separate x and ys

Example 3: A 1.20 kg red ball moving to the right at 17.1m/s strikes a stationary 2.31 kg blue ball. If the final velocity of the red ball is 13.5m/s at 23.0° above the horizontal, **determine** the final velocity of the blue ball.

A sketch is always a good idea, even if you're not asked for one...



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