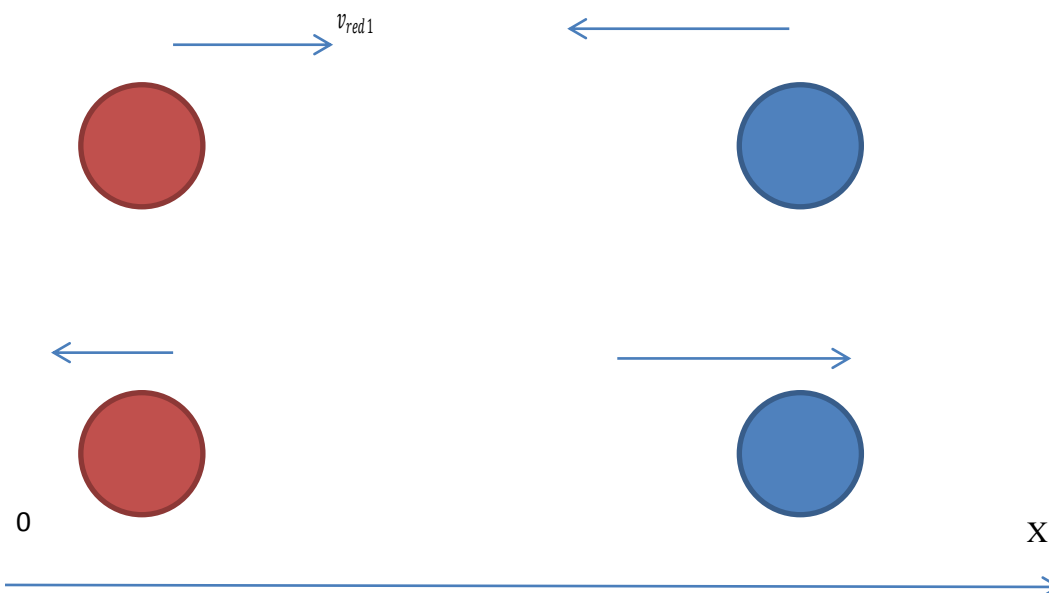


A 12 kg red ball travels with a velocity of 7 m/s towards a 8 kg blue ball that is traveling a speed of 10 m/s in the opposite direction. What is the velocity of the blue ball after collision if the velocity of the red ball after collision is 5 m/s? (The balls have changed direction.)

Solution:



Set OX as positive direction.

We are given:

$$m_{red} = 12 \text{ kg}$$

$$m_{blue} = 8 \text{ kg}$$

$$v_{red1} = 7 \frac{m}{s}$$

$$v_{blue1} = -10 \frac{m}{s}$$

$$v_{red2} = -5 \frac{m}{s}$$

According to the linear momentum conservation principle:

$$m_{red} * v_{red1} + m_{blue} * v_{blue1} = m_{red} * v_{red2} + m_{blue} * v_{blue2}$$

Thus:

$$v_{blue2} = \frac{m_{red} * v_{red1} + m_{blue} * v_{blue1} - m_{red} * v_{red2}}{m_{blue}}$$

Calculating:

$$v_{blue2} = \frac{12 * 7 + 8 * (-10) - 12 * (-5)}{8} = \mathbf{8 \frac{m}{s}}$$

Answer: 8 m/s