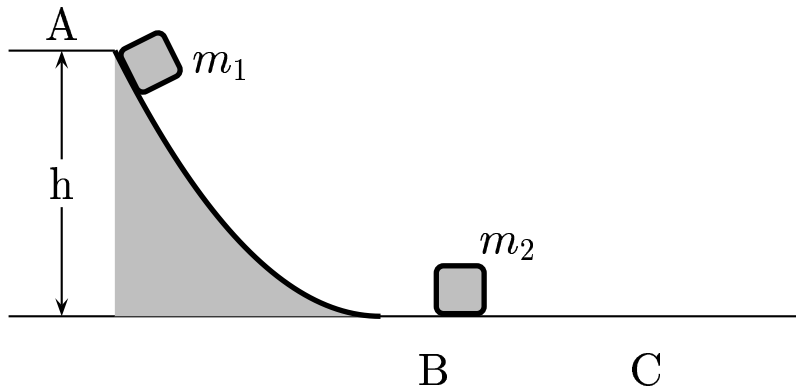


Consider the setup shown where block  $m_1$  moves down a smooth curved surface collides with the block  $m_2$ .



After a head-on elastic collision, what is the speed of  $m_2$ , if  $m_1 = m_2 = m$ ?

- A)  $v = \sqrt{gh}$ .
- B)  $v = \sqrt{2gh}$ .
- C)  $v = 2\sqrt{gh}$ .

Immediately before the collision, conservation of energy implies that

$$\frac{1}{2} m v_1^2 = m g h .$$

After the elastic head-on collision, the velocity of block-2 is given by

$$v_2' = 2 v_{cm} - v_2 .$$

For the present case,  $m_1 = m_2$  and initially the block-2 is at rest,  $v_{cm} =$

$$\frac{m v_1 + m v_2}{2 m} = \frac{v_1}{2} .$$

$$\text{Thus } v_2' = 2 \frac{v_1}{2} - 0 = v_1 = \sqrt{2 g h} .$$

**Answer B.**

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