Answer on Question #43276 – Physics – Other

Question.

A 30kg girl and a 25kg boy are standing on frictionless roller skates. The girl pushes the boy away who moves at 1.0m/s, the girl's speed is

A. 1.8 m/s
B. 1.2 m/s
C. 0.83 m/s
D. 0.55 m/s
E. 0.45 m/s

Given:

$m_1 = 30\ kg$ is the mass of the girl

$m_2 = 25\ kg$ is the mass of the boy

$v_2 = 1\ \frac{m}{s}$ is the speed of the boy

Find:

$v_1 = ?$ is the speed of the girl

Solution.

Use the law of conservation of momentum:

In a closed system (one that does not exchange any matter with the outside and is not acted on by outside forces) the total momentum is constant.

$$p_1 = p_2$$

By definition: $p = mv \rightarrow p_1 = m_1 v_1;\ p_2 = m_2 v_2$

So, in our case,

$$m_1 v_1 = m_2 v_2$$

Therefore,

$$v_1 = \frac{m_2}{m_1} v_2$$

Calculate:

$$v_1 = \frac{25}{30} \cdot 1 = 0.83\ \frac{m}{s}$$

Answer.

C. 0.83 m/s

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