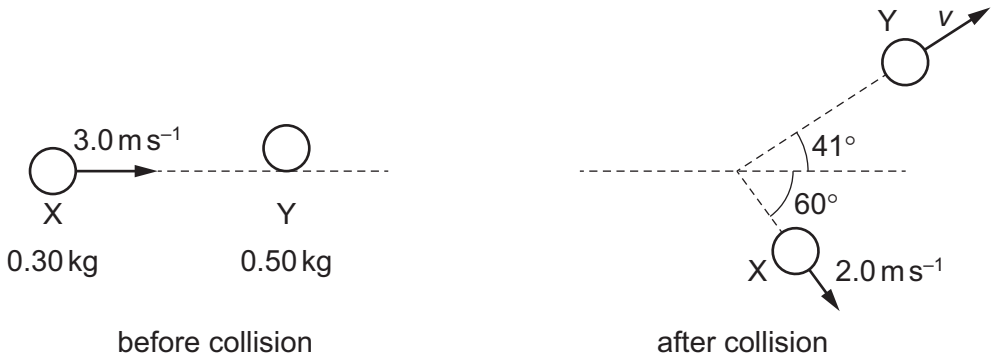
10 An object X of mass 0.30 kg is travelling in a straight line at a constant velocity of $3.0\,m\,s^{-1}$ on a horizontal frictionless surface. Object X collides with a stationary object Y of mass 0.50 kg.

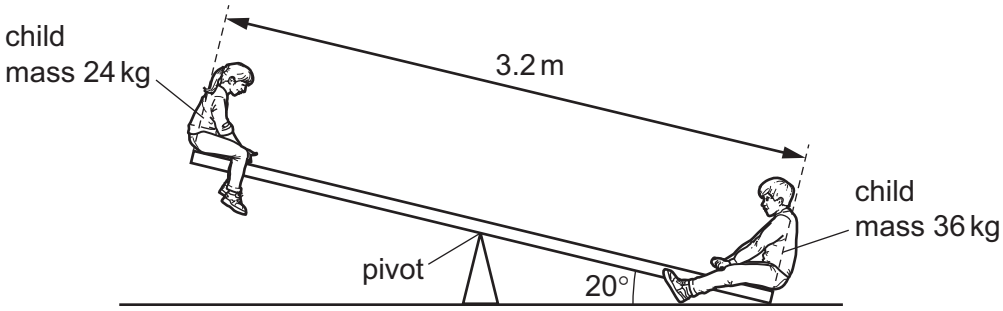
After the collision, X moves with a velocity of $2.0\,m\,s^{-1}$ at an angle of 60° to its direction before the collision. Object Y moves with a velocity *v* at an angle of 41° to the direction of X before the collision, as shown.



What is the value of *v*?

A $0.80\,m\,s^{-1}$ **B** $1.2\,m\,s^{-1}$ **C** $1.6\,m\,s^{-1}$ **D** $1.8\,m\,s^{-1}$

11 A uniform rigid beam of length 3.2 m is pivoted at its centre. Two children sit at the opposite ends of the beam, as shown.



One child has a mass of 24 kg. The other child has a mass of 36 kg. The heavier child causes one end of the beam to permanently rest on the ground, so that the beam makes an angle of 20° to the horizontal ground.

What is the moment of the weight of the 24 kg child about the pivot?

A 72 N m **B** 130 N m **C** 350 N m **D** 380 N m