

**3** Curling is a sport played on ice.

A player slides stone A across the ice towards a scoring zone.

The ice reduces friction so that there is negligible friction when the stone is sliding.



© Corepics VOF/Shutterstock

(a) Stone A leaves the player's hand with a velocity of  $2.90 \text{ m/s}$ .

The mass of stone A is  $17 \text{ kg}$ .

(i) State the formula linking momentum, mass and velocity.

(1)

(ii) Show that the momentum of stone A is approximately  $50 \text{ kg m/s}$ .

(2)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



- (b) Stone A slides towards the scoring zone.

In the scoring zone, stone A collides with a stationary stone, B.



© Michael715/Shutterstock

- (i) After the collision, both stones move in the same direction as the initial direction of stone A.

The velocity of stone A after the collision is  $0.40 \text{ m/s}$ .

Calculate the velocity of stone B after the collision.

[mass of stone B =  $19 \text{ kg}$ ]

(4)

velocity of stone B = .....  $\text{m/s}$

- (ii) When the stones collided, they were in contact for a time of  $25 \text{ ms}$ .

Calculate the magnitude of the force stone A exerted on stone B in this collision.

(3)

force = .....  $\text{N}$

**(Total for Question 3 = 10 marks)**

