16 Speed skating on ice is an Olympic sport. Collisions between skaters sometimes occur.

(a) State the principle of conservation of momentum.

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(b) Two speed skaters are skating as shown.

(Source: © sportpoint/Shutterstock)

Initially, skater B is directly behind skater A. Skater B is moving faster and collides with skater A.

During the collision, skater B locks his arms around skater A so that they move forward together with a speed of 6.2 m s^{-1}.

Deduce whether momentum is conserved in this collision.

initial speed of skater A = 5.5 m s^{-1}
mass of skater A = 65 kg
initial speed of skater B = 7.5 m s^{-1}
mass of skater B = 60 kg

(3)

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(c) The kinetic energy of the two skaters after the collision is much less than their combined kinetic energy before the collision, so the collision is inelastic.

Explain the decrease in kinetic energy in this collision.

(2)

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(Total for Question 16 = 7 marks)