Momentum – 2022 November IGCSE 0625

1. Nov/2022/Paper_22/No.7

A trolley of mass 4.0 kg travelling with a velocity of 4.0 m/s collides with a trolley of mass 2.0 kg travelling with a velocity of 2.0 m/s in the same direction. After the collision, the velocity of the 4.0 kg trolley is reduced to 3.0 m/s.

What is the velocity *v* of the 2.0 kg trolley after the collision?

A 0.25 m/s **B** 4.0 m/s **C** 5.0 m/s **D** 16 m/s

2. Nov/2022/Paper_23/No.7

A force *F* acts on a body of mass *m* for a time *t*. During this time, the velocity of the body increases from *u* to *v*.

Which equation relates *F*, *m*, *t*, *u* and *v*?

A $Fm = t(v - u)$

B $Fm = t(v + u)$

C $Ft = m(v - u)$

D $Ft = m(v + u)$

3. Nov/2022/Paper_41/No.1(b)

(b) The mass of block A is 2.0 kg.

When the thread tightens, it pulls on block A which moves to the right at a speed of 0.60 m/s.

(i) Calculate the impulse exerted on block A as it accelerates from rest to 0.60 m/s.

impulse = ... [3]

(ii) Both of the blocks now move at a constant speed of 0.60 m/s until block B hits the ground and the thread becomes loose.

Explain the energy change that takes place in block A after block B stops moving.

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..... [3]

4. Nov/2022/Paper_42/No.2

Fig. 2.1 shows a tennis ball approaching a tennis racket.

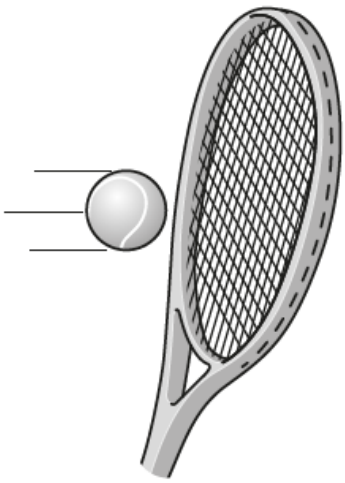

Fig. 2.1

The tennis ball hits the racket at a speed of 52 m/s. The average force on the ball during the time that it is in contact with the racket is 350 N. The speed of the ball after it leaves the racket is 26 m/s in the opposite direction to the initial speed of the ball. The mass of the ball is 58 g.

(a) (i) Calculate the change in momentum of the ball while it is in contact with the racket.

change in momentum = ... [3]

(ii) State an equation which defines impulse in terms of force and time.

..... [1]

(iii) Calculate the time that the racket is in contact with the ball.

time = ... [2]

(b) Calculate the difference between the values of the kinetic energy of the ball before and after the impact with the racket.

difference in kinetic energy = ... [3]

[Total: 9]