Work, energy and power – AS Further Mathematics Mechanics

1. June/2022/Paper_7366/02/No.1

A box is being pushed in a straight line along horizontal ground by a force.

The force is applied in the direction of motion and has magnitude 10 newtons.

The box moves 5 metres in 2 seconds.

Calculate the work done by the force.

Circle your answer.

[1 mark]

20 J 25 J 50 J 100 J

2. June/2022/Paper_7366/02/No.3

In this question use $g = 9.8\,\text{m s}^{-2}$

A ball of mass of 0.75 kg is thrown vertically upwards with an initial speed of $12\,\text{m s}^{-1}$

The ball is thrown from ground level.

(a) Calculate the initial kinetic energy of the ball.

[1 mark]

(b) The maximum height of the ball above the ground is h metres.

Jeff and Gurjas use an energy method to find h

Jeff concludes that $h = 7.3$

Gurjas concludes that $h < 7.3$

Explain the reasoning that they have used, showing any calculations that you make.

[3 marks]

3. June/2022/Paper_7366/02/No.5

A car, of mass 1000 kg, is travelling on a straight horizontal road.

When the car travels at a speed of $v\,\text{m s}^{-1}$, it experiences a resistance force of magnitude $25v$ newtons.

The car has a maximum speed of $72\,\text{km h}^{-1}$ on the straight road.

Find the maximum power output of the car.

Fully justify your answer.

[5 marks]