

(3)

(b) Find the value of m .

(3)

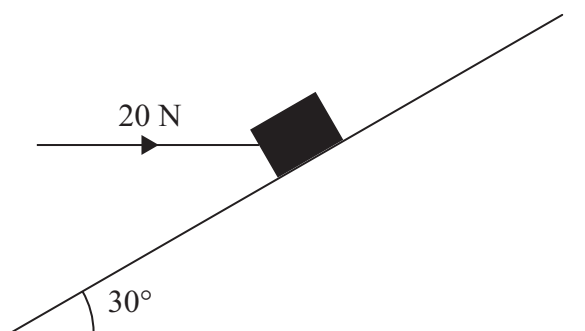


Figure 2

Find

- (a) the magnitude of the normal reaction of the plane on the box, (4)
- (b) the coefficient of friction between the box and the plane. (5)





4. A car is moving on a straight horizontal road. At time $t = 0$, the car is moving with speed 20 m s^{-1} and is at the point A . The car maintains the speed of 20 m s^{-1} for 25 s. The car then moves with constant deceleration 0.4 m s^{-2} , reducing its speed from 20 m s^{-1} to 8 m s^{-1} . The car then moves with constant speed 8 m s^{-1} for 60 s. The car then moves with constant acceleration until it is moving with speed 20 m s^{-1} at the point B .

(a) Sketch a speed-time graph to represent the motion of the car from A to B .

(3)

(b) Find the time for which the car is decelerating.

(2)

Given that the distance from A to B is 1960 m,

(c) find the time taken for the car to move from A to B .

(8)





(3)

(5)

(4)



(a) Find the direction in which S is moving, giving your answer as a bearing. (3)

(b) Write down $\mathbf{s}$ in terms of t . (2)

(c) Find the distance of S from B when $t = 3$ (4)

(d) Find the distance of S from B when S is due north of B . (4)



7.



Figure 3

Two particles P and Q , of mass 0.3 kg and 0.5 kg respectively, are joined by a light horizontal rod. The system of the particles and the rod is at rest on a horizontal plane.

At time $t = 0$, a constant force $\mathbf{F}$ of magnitude 4 N is applied to Q in the direction PQ , as shown in Figure 3. The system moves under the action of this force until $t = 6$ s. During the motion, the resistance to the motion of P has constant magnitude 1 N and the resistance to the motion of Q has constant magnitude 2 N.

Find

- (a) the acceleration of the particles as the system moves under the action of $\mathbf{F}$, (3)

- (b) the speed of the particles at $t = 6$ s,

- (c) the tension in the rod as the system moves under the action of $\mathbf{F}$. (3)

At $t = 6$ s, $\mathbf{F}$ is removed and the system decelerates to rest. The resistances to motion are unchanged. Find

- (d) the distance moved by P as the system decelerates,

- (e) the thrust in the rod as the system decelerates. (3)



Question 7 continued

(Total 15 marks)

Q7

TOTAL FOR PAPER: 75 MARKS

END

