

Q1

(Total 5 marks)



(4)

(b) Find the new rate of working of the lorry's engine.

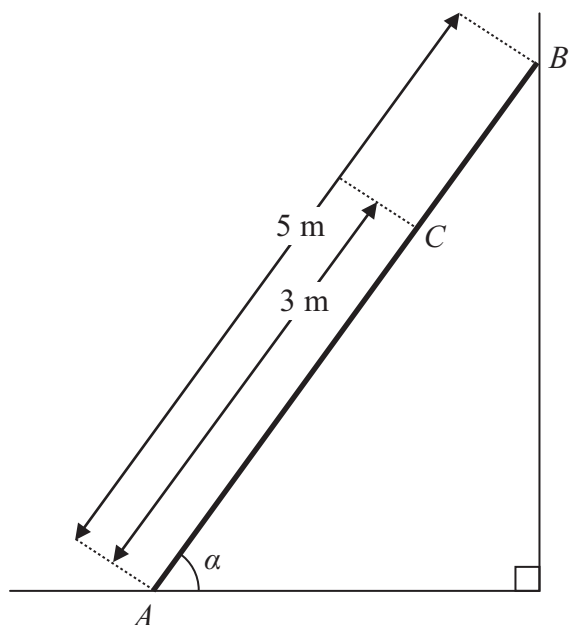
(5)



Q2

(Total 9 marks)





A ladder, of length 5 m and mass 18 kg, has one end A resting on rough horizontal ground and its other end B resting against a smooth vertical wall. The ladder lies in a vertical plane perpendicular to the wall and makes an angle α with the horizontal ground, where $\tan \alpha = \frac{4}{3}$, as shown in Figure 1. The coefficient of friction between the ladder and the ground is μ . A woman of mass 60 kg stands on the ladder at the point C , where $AC = 3$ m. The ladder is on the point of slipping. The ladder is modelled as a uniform rod and the woman as a particle.

Find the value of μ .

(9)





- (b) Find an expression for the position vector of P at time t seconds. (4)

(c) Find

- (i) the value of c ,
- (ii) the value of d .

(5)



Question 4 continued



(Total 10 marks)

Q4





Q5

6.

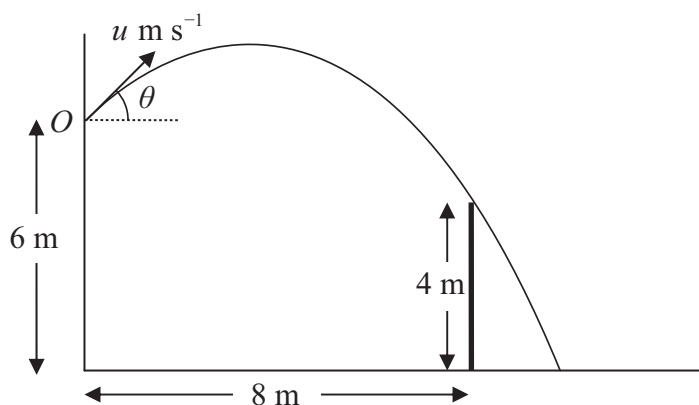


Figure 2

A ball is thrown from a point O , which is 6 m above horizontal ground. The ball is projected with speed $u \text{ m s}^{-1}$ at an angle θ above the horizontal. There is a thin vertical post which is 4 m high and 8 m horizontally away from the vertical through O , as shown in Figure 2. The ball passes just above the top of the post 2 s after projection. The ball is modelled as a particle.

- (a) Show that $\tan \theta = 2.2$ (5)

- (b) Find the value of u . (2)

The ball hits the ground T seconds after projection.

- (c) Find the value of T . (3)

Immediately before the ball hits the ground the direction of motion of the ball makes an angle α with the horizontal.

- (d) Find α .





Q6





Question 7 continued

(Total 16 marks)

TOTAL FOR PAPER: 75 MARKS

END

Q7

