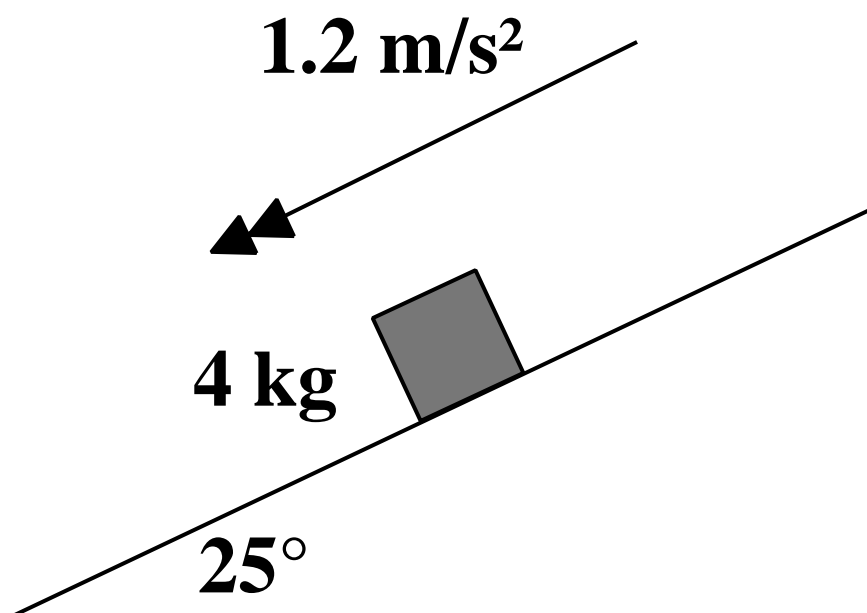


GRADE GRABBER APPLIED

Numbers 1 to 3
(With answers)



Grade Grabber 1

Applied Mathematics Revision

Question 1

A particle's position relative to a fixed origin, O , is given by;

$$\mathbf{r} = (2t^3 + 12t)\mathbf{i} + (8t^3 + 3t^2)\mathbf{j}$$

At time T seconds the particle is moving in the direction of the vector $(\mathbf{i} + 3\mathbf{j})$

- (i) Differentiate to find an expression for the particle's velocity
in the form $\mathbf{v} = p\mathbf{i} + q\mathbf{j}$

[2 marks]

- (ii) By using the fact that $q = 3p$ form an equation and then solve it
to calculate the value of T

[5 marks]

- (iii) What was the speed of the particle at time T ?

[3 marks]

Question 2

Morning Rise™ breakfast cereal is supplied in packets whose masses are normally distributed with mean 500 g and standard deviation 2.5 g

- (i) Calculate the probability that a packet of Morning Rise™ chosen at random has a mass that is greater than 502 g
Give your answer to 3 decimal places.

[2 marks]

The supplier claims that each packet of Morning Rise™ has a mass of at least 497 g
A retailer decides to test this claim by weighing 200 packets at random

- (ii) Estimate, to the nearest whole number, the number of packets the retailer is likely to find to have a mass less than 497 g

[2 marks]

The supplier reviews quality control and decides to reject 10% of the packets in any batch; the 5% with the largest mass and the 5% with the smallest mass.

- (iii) Calculate, to 2 decimal places, the limits within which the mass of a packet of Morning Rise™ must lie if it is to be accepted by the supplier

[3 marks]

Question 3

A javelin is thrown from horizontal ground with an initial speed of 65 m/s at an angle of 36° above the horizontal.

By modelling the javelin as a particle work out

(i) The time of flight

[3 marks]

(ii) The maximum height of the javelin

[3 marks]

(iii) The range of the throw

[3 marks]

(iv) The speed of the arrow after 1.5 seconds

[5 marks]

Question 4

A stone is skimmed across a lake such that its first bounce occurs 14.4 m from the launch point and its second bounce is 24.0 m from the launch point.

If the bounces continue in the fashion of a geometric progression, calculate the possible total length of the throw.

[3 marks]