

Variable acceleration As level Edexcel Mechanics Maths Past Papers Questions

01.

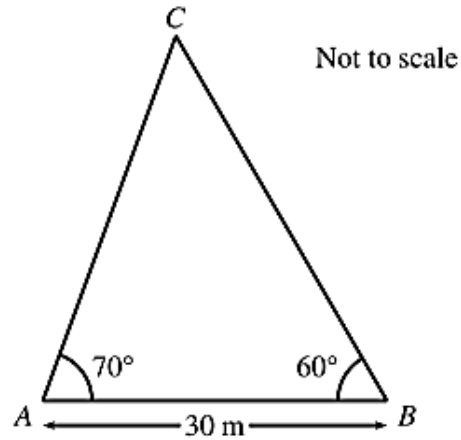


Figure 1

A triangular lawn is modelled by the triangle ABC , shown in Figure 1. The length AB is to be 30 m long.

Given that angle $BAC = 70^\circ$ and angle $ABC = 60^\circ$,

(a) calculate the area of the lawn to 3 significant figures.

(4)

(b) Why is your answer unlikely to be accurate to the nearest square metre?

(1)

02.

A particle, P , moves along the x -axis. At time t seconds, $t \geq 0$, the displacement, x metres, of P from the origin O , is given by $x = \frac{1}{2}t^2(t^2 - 2t + 1)$

(a) Find the times when P is instantaneously at rest. (5)

(b) Find the total distance travelled by P in the time interval $0 \leq t \leq 2$ (3)

(c) Show that P will never move along the negative x -axis. (2)

- 03.** A particle, P , moves along a straight line such that at time t seconds, $t \geq 0$, the velocity of P , $v \text{ m s}^{-1}$, is modelled as

$$v = 12 + 4t - t^2$$

Find

- (a) the magnitude of the acceleration of P when P is at instantaneous rest, (5)
- (b) the distance travelled by P in the interval $0 \leq t \leq 3$ (3)

04.

- . A particle P moves along a straight line such that at time t seconds, $t \geq 0$, after leaving the point O on the line, the velocity, $v \text{ m s}^{-1}$, of P is modelled as

$$v = (7 - 2t)(t + 2)$$

- (a) Find the value of t at the instant when P stops accelerating. (4)

- (b) Find the distance of P from O at the instant when P changes its direction of motion. (5)

In this question, solutions relying on calculator technology are not acceptable.

05.

A particle P moves along a straight line.

At time t seconds, the velocity $v \text{ m s}^{-1}$ of P is modelled as

$$v = 10t - t^2 - k \quad t \geq 0$$

where k is a constant.

(a) Find the acceleration of P at time t seconds.

(2)

The particle P is instantaneously at rest when $t = 6$

(b) Find the other value of t when P is instantaneously at rest.

(4)

(c) Find the total distance travelled by P in the interval $0 \leq t \leq 6$

(4)

06.

A fixed point O lies on a straight line.

A particle P moves along the straight line.

At time t seconds, $t \geq 0$, the distance, s metres, of P from O is given by

$$s = \frac{1}{3}t^3 - \frac{5}{2}t^2 + 6t$$

(a) Find the acceleration of P at each of the times when P is at instantaneous rest.

(6)

(b) Find the total distance travelled by P in the interval $0 \leq t \leq 4$

(3)

07.

In this question you must show all stages of your working.

Solutions relying entirely on calculator technology are not acceptable.

A fixed point O lies on a straight line.

A particle P moves along the straight line such that at time t seconds, $t \geq 0$, after passing through O , the velocity of P , $v \text{ m s}^{-1}$, is modelled as

$$v = 15 - t^2 - 2t$$

- (a) Verify that P comes to instantaneous rest when $t = 3$ (1)
- (b) Find the magnitude of the acceleration of P when $t = 3$ (3)
- (c) Find the total distance travelled by P in the interval $0 \leq t \leq 4$ (4)