
Year 12 Mathematics

Test 3

Time Allowed: 1 hour

Total Marks: 50

06 February 2021

Calculator Allowed

Full Name of Student:

1.

(i) Find the gradient of the line l_1 which has equation $4x - 3y + 5 = 0$. [1]

(ii) Find an equation of the line l_2 , which passes through the point $(1, 2)$ and which is perpendicular to the line l_1 , giving your answer in the form $ax + by + c = 0$. [4]

The line l_1 crosses the x -axis at P and the line l_2 crosses the y -axis at Q .

(iii) Find the coordinates of the mid-point of PQ . [3]

(iv) Calculate the length of PQ , giving your answer in the form $\frac{\sqrt{a}}{b}$, where a and b are integers. [3]

[Total for Question 1 = 11 marks]

2.

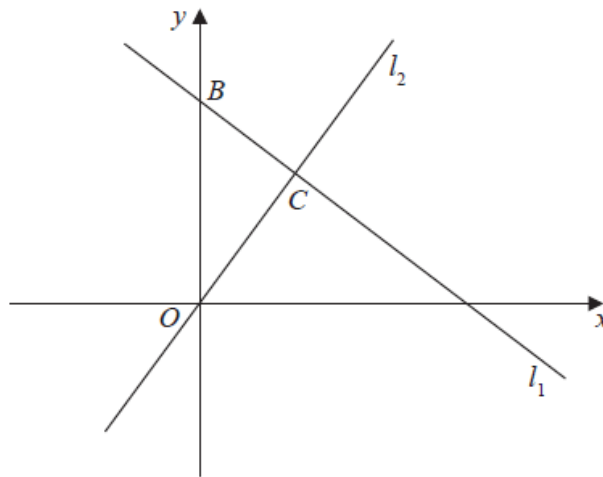


Figure 2

The line l_1 , shown in Figure 2 has equation $2x + 3y = 26$

The line l_2 passes through the origin O and is perpendicular to l_1

(a) Find an equation for the line l_2 [4]

The line l_2 intersects the line l_1 at the point C .

Line l_1 crosses the y -axis at the point B as shown in Figure 2.

(b) Find the area of triangle OBC .
Give your answer in the form $\frac{a}{b}$, where a and b are integers to be determined. [6]

[Total for Question 2 = 10 marks]

3.

A train is slowing down with constant deceleration. It passes a signal at A , and after successive intervals of 40 seconds it passes points B and C , where $AB = 1800$ m and $BC = 1400$ m.

(a) How fast is the train moving when it passes A ?

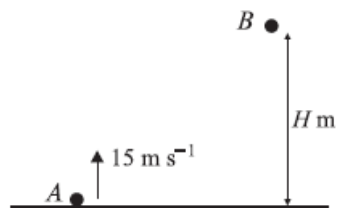
(6)

(b) How far from A does it come to a stop?

(3)

[Total for Question 3 = 9 marks]

4.



A particle A is projected vertically upwards from horizontal ground with speed 15 m s^{-1} . At the same instant a particle B is released from rest at a height H m above the ground (see diagram).

(i) Find the height of A after 0.8 s.

[2]

(ii) Find the value of H , given that A and B are at the same height after 0.8 s.

[2]

(iii) Show that the time interval between the instant that B reaches the ground and the instant that A returns to the ground is approximately 1.5 s.

[5]

[Total for Question 4 = 9 marks]

(Question 5 is on the next page.)

5.

A car moves along a horizontal straight road, passing two points A and B . At A the speed of the car is 15 m s^{-1} . When the driver passes A , he sees a warning sign W ahead of him, 120 m away. He immediately applies the brakes and the car decelerates with uniform deceleration, reaching W with speed 5 m s^{-1} . At W , the driver sees that the road is clear. He then immediately accelerates the car with uniform acceleration for 16 s to reach a speed of $V \text{ m s}^{-1}$ ($V > 15$). He then maintains the car at a constant speed of $V \text{ m s}^{-1}$. Moving at this constant speed, the car passes B after a further 22 s .

(a) Sketch, in the space below, a speed-time graph to illustrate the motion of the car as it moves from A to B . (3)

(b) Find the time taken for the car to move from A to B . (3)

The distance from A to B is 1 km .

(c) Find the value of V . (5)

[Total for Question 5 = 11 marks]

- End of Test -