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Question 1 continued

Lined area for writing the answer to Question 1.

Q1

(Total 8 marks)

3



Turn over

2. (a) Find the first 3 terms, in ascending powers of x , of the binomial expansion of

$$(1 + px)^9,$$

where p is a constant.

(2)

These first 3 terms are 1, $36x$ and qx^2 , where q is a constant.

(b) Find the value of p and the value of q .

(4)



Question 2 continued

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Lined area for writing the answer to Question 2.

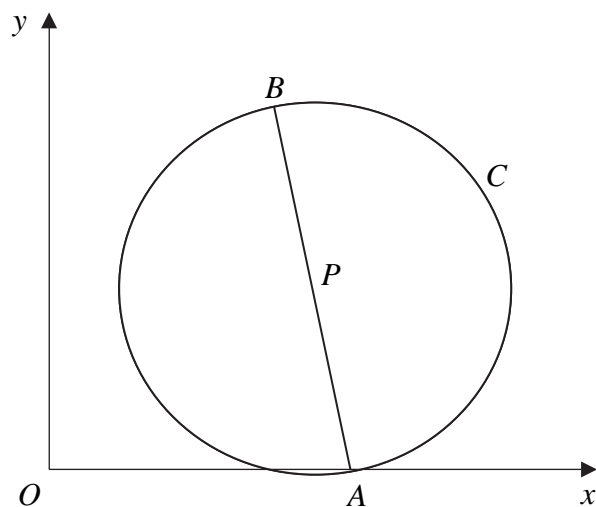
(Total 6 marks)

Q2



3.

Figure 1



In Figure 1, $A(4, 0)$ and $B(3, 5)$ are the end points of a diameter of the circle C .

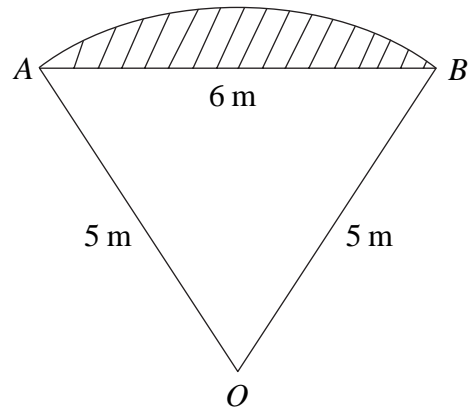
Find

- (a) the exact length of AB , (2)
- (b) the coordinates of the midpoint P of AB , (2)
- (c) an equation for the circle C . (3)



5.

Figure 2



In Figure 2 OAB is a sector of a circle radius 5 m. The chord AB is 6 m long.

- (a) Show that $\cos \widehat{AOB} = \frac{7}{25}$. (2)
- (b) Hence find the angle \widehat{AOB} in radians, giving your answer to 3 decimal places. (1)
- (c) Calculate the area of the sector OAB . (2)
- (d) Hence calculate the shaded area. (3)



6. The speed, v m s⁻¹, of a train at time t seconds is given by

$$v = \sqrt{(1.2^t - 1)}, \quad 0 \leq t \leq 30.$$

The following table shows the speed of the train at 5 second intervals.

t	0	5	10	15	20	25	30
v	0	1.22	2.28		6.11		

(a) Complete the table, giving the values of v to 2 decimal places.

(3)

The distance, s metres, travelled by the train in 30 seconds is given by

$$s = \int_0^{30} \sqrt{(1.2^t - 1)} dt.$$

(b) Use the trapezium rule, with all the values from your table, to estimate the value of s .

(3)



Question 6 continued

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Lined writing area for question 6 continued, consisting of 30 horizontal lines.

(Total 6 marks)

Q6

Small rectangular box for marking question 6.



N 2 3 5 5 2 A 0 1 3 2 0

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Question 7 continued

Lined area for writing answers to Question 7 continued.

(Total 10 marks)

Q7

15



Turn over

Question 8 continued

(b) Find all the values of θ , to 1 decimal place, in the interval $0^\circ \leq \theta < 360^\circ$ for which

$$\tan^2 \theta = 4.$$

(5)

(Total 9 marks)

Q8



9.

Figure 3

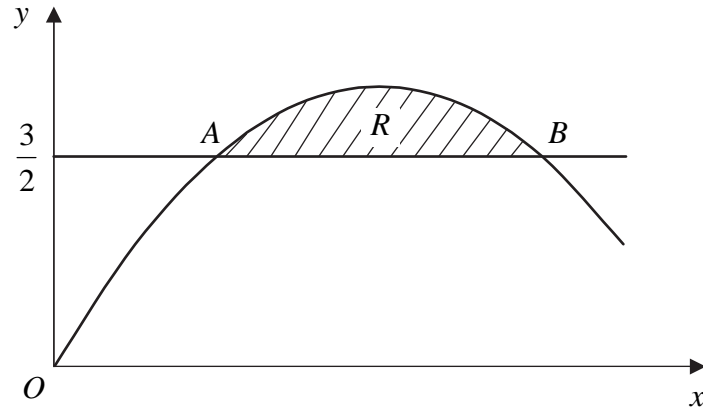


Figure 3 shows the shaded region R which is bounded by the curve $y = -2x^2 + 4x$ and the line $y = \frac{3}{2}$. The points A and B are the points of intersection of the line and the curve.

Find

- (a) the x -coordinates of the points A and B , (4)
- (b) the exact area of R . (6)



