



Leave blank

1.  $f(x) = 2x^3 + x^2 - 5x + c$ , where  $c$  is a constant.

Given that  $f(1) = 0$ ,

(a) find the value of  $c$ , (2)

(b) factorise  $f(x)$  completely, (4)

(c) find the remainder when  $f(x)$  is divided by  $(2x - 3)$ . (2)

Handwritten solution area with horizontal lines.



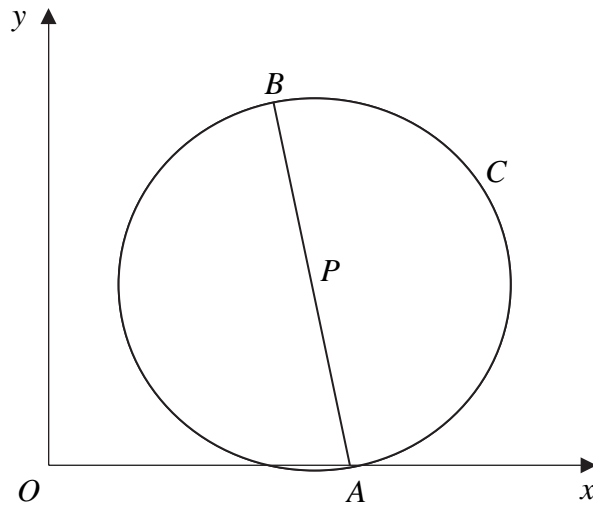






3.

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)

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---





- 4. The first term of a geometric series is 120. The sum to infinity of the series is 480.
  - (a) Show that the common ratio,  $r$ , is  $\frac{3}{4}$ . (3)
  - (b) Find, to 2 decimal places, the difference between the 5th and 6th term. (2)
  - (c) Calculate the sum of the first 7 terms. (2)
  
- The sum of the first  $n$  terms of the series is greater than 300.
  - (d) Calculate the smallest possible value of  $n$ . (4)

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---





Leave  
blank

**Question 4 continued**

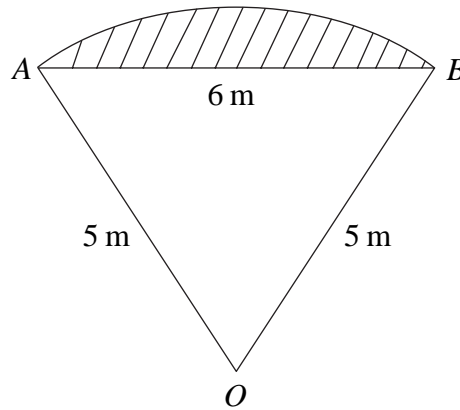
**Q4**

**(Total 11 marks)**



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,  $v \text{ m s}^{-1}$ , 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)**

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---



Leave  
blank

**Question 6 continued**

Lined area for student response.

**(Total 6 marks)**

**Q6**



Leave  
blank

7. The curve  $C$  has equation

$$y = 2x^3 - 5x^2 - 4x + 2.$$

(a) Find  $\frac{dy}{dx}$ .

(2)

(b) Using the result from part (a), find the coordinates of the turning points of  $C$ .

(4)

(c) Find  $\frac{d^2y}{dx^2}$ .

(2)

(d) Hence, or otherwise, determine the nature of the turning points of  $C$ .

(2)

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---



Leave  
blank

Question 7 continued

Lined area for writing the answer to Question 7.

Q7

(Total 10 marks)

--	--









9.

Figure 3

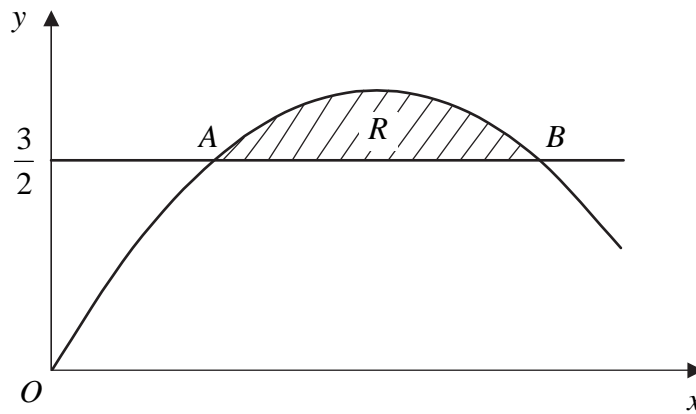


Figure 3 shows the shaded region  $R$  which is bounded by the curve  $y = -2x^2 + 4x$  and the line  $y = \frac{3}{2}$ . The points  $A$  and  $B$  are the points of intersection of the line and the curve.

Find

(a) the  $x$ -coordinates of the points  $A$  and  $B$ , (4)

(b) the exact area of  $R$ . (6)

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---





