

**Solomon Press**  
**Core Mathematics C2**  
**Paper D**  
**(Question Paper)**

**All exam papers are issued free to students for education purpose only.  
Mr.S.V.Swarnaraja (Marking Examiner, Team Leader & Author)  
www.swanash.com, Mobile: +94777304755 , email: swa@swanash.com**

GCE Examinations  
Advanced Subsidiary

## Core Mathematics C2

Paper D

Time: 1 hour 30 minutes

### *Instructions and Information*

---

Candidates may use any calculator EXCEPT those with the facility for symbolic algebra, differentiation and/or integration.

Full marks may be obtained for answers to ALL questions.

Mathematical formulae and statistical tables are available.

This paper has nine questions.

### *Advice to Candidates*

---

You must show sufficient working to make your methods clear to an examiner.  
Answers without working may gain no credit.



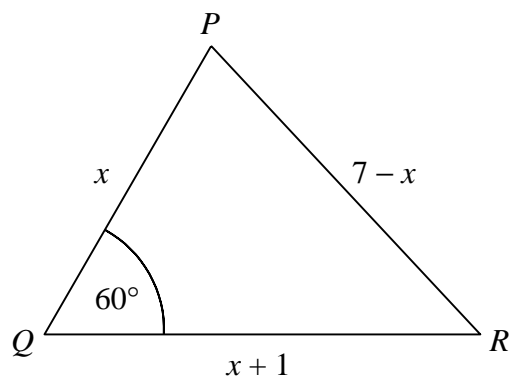
*Written by Shaun Armstrong*

© Solomon Press

*These sheets may be copied for use solely by the purchaser's institute.*

1. Expand  $(3 - 2x)^4$  in ascending powers of  $x$  and simplify each coefficient. (4)
- 

2.



**Figure 1**

Figure 1 shows triangle  $PQR$  in which  $PQ = x$ ,  $PR = 7 - x$ ,  $QR = x + 1$  and  $\angle PQR = 60^\circ$ .

Using the cosine rule, find the value of  $x$ . (4)

---

3. Find the coordinates of the stationary point of the curve with equation

$$y = x + \frac{4}{x^2}. \quad (6)$$

---

4. Find all values of  $x$  in the interval  $0 \leq x < 360^\circ$  for which

$$2 \sin^2 x - 2 \cos x - \cos^2 x = 1. \quad (8)$$

---

5. (a) Sketch the curve  $y = 5^{x-1}$ , showing the coordinates of any points of intersection with the coordinate axes. (2)

(b) Find, to 3 significant figures, the  $x$ -coordinates of the points where the curve  $y = 5^{x-1}$  intersects

(i) the straight line  $y = 10$ ,

(ii) the curve  $y = 2^x$ . (6)

---

6.  $f(x) = 2x^3 + 3x^2 - 6x + 1.$

(a) Find the remainder when  $f(x)$  is divided by  $(2x - 1).$  (2)

(b) (i) Find the remainder when  $f(x)$  is divided by  $(x + 2).$

(ii) Hence, or otherwise, solve the equation

$$2x^3 + 3x^2 - 6x - 8 = 0,$$

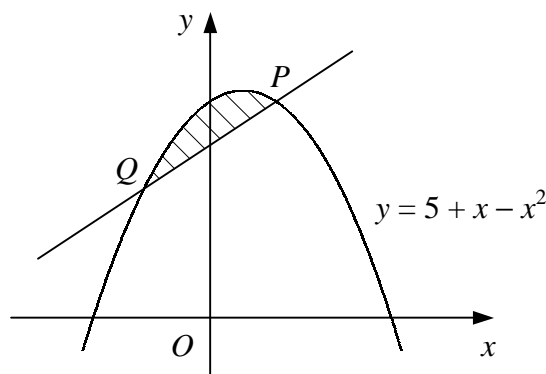
giving your answers to 2 decimal places where appropriate. (7)

7. (a) Prove that the sum of the first  $n$  terms of a geometric series with first term  $a$  and common ratio  $r$  is given by

$$\frac{a(1-r^n)}{1-r}.$$
 (4)

(b) Evaluate  $\sum_{r=1}^{12} (5 \times 2^r).$  (5)

8.



**Figure 2**

Figure 2 shows the curve with equation  $y = 5 + x - x^2$  and the normal to the curve at the point  $P(1, 5).$

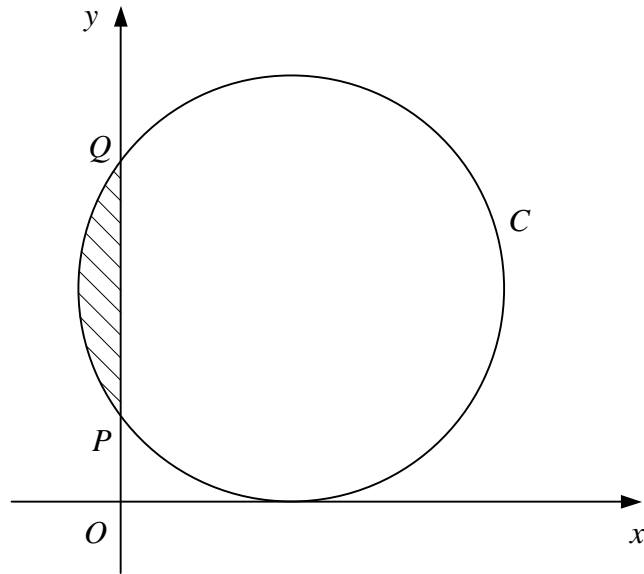
(a) Find an equation for the normal to the curve at  $P$  in the form  $y = mx + c.$  (5)

(b) Find the coordinates of the point  $Q,$  where the normal to the curve at  $P$  intersects the curve again. (2)

(c) Show that the area of the shaded region bounded by the curve and the straight line  $PQ$  is  $\frac{4}{3}.$  (6)

**Turn over**

9.



**Figure 3**

Figure 3 shows the circle  $C$  with equation

$$x^2 + y^2 - 8x - 10y + 16 = 0.$$

- (a) Find the coordinates of the centre and the radius of  $C$ . **(3)**

$C$  crosses the  $y$ -axis at the points  $P$  and  $Q$ .

- (b) Find the coordinates of  $P$  and  $Q$ . **(3)**

The chord  $PQ$  subtends an angle of  $\theta$  at the centre of  $C$ .

- (c) Using the cosine rule, show that  $\cos \theta = \frac{7}{25}$ . **(4)**

- (d) Find the area of the shaded minor segment bounded by  $C$  and the chord  $PQ$ . **(4)**

---

**END**