

Solomon Practice Paper

Core Mathematics 2D

Time allowed: 90 minutes

Centre: www.CasperYC.club

Name:

Teacher:

Question	Points	Score
1	4	
2	4	
3	6	
4	8	
5	8	
6	9	
7	9	
8	13	
9	14	
Total:	75	

How I can achieve better:

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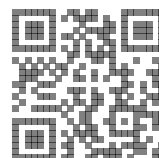


Last updated: May 5, 2023



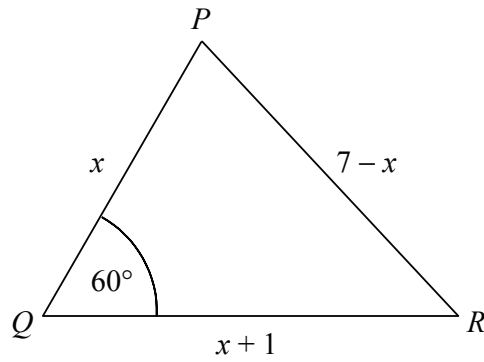
1. Expand $(3 - 2x)^4$ in ascending powers of x and simplify each coefficient.

[4]

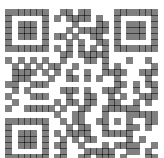


2. Figure shows triangle PQR in which $PQ = x$, $PR = 7 - x$, $QR = x + 1$ and $\angle PQR = 60^\circ$.

[4]



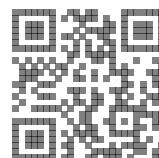
Using the cosine rule, find the value of x .



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

[6]

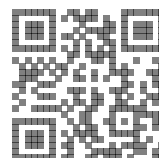
$$y = x + \frac{4}{x^2}.$$



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

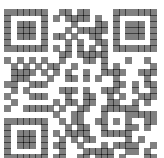
[8]

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



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 [6]
- the straight line $y = 10$,
 - the curve $y = 2^x$.

Total: 8

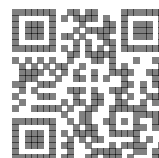


6.

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

- (a) Find the remainder when $f(x)$ is divided by $(2x - 1)$. [2]
- (b) i. Find the remainder when $f(x)$ is divided by $(x + 2)$. [7]
- ii. Hence, or otherwise, solve the equation $2x^3 + 3x^2 - 6x - 8 = 0$, giving your answers to 2 decimal places where appropriate.

Total: 9

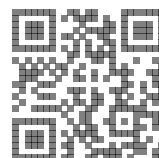


7. (a) Prove that the sum of the first n terms of a geometric series with first term a and common ratio r is given by

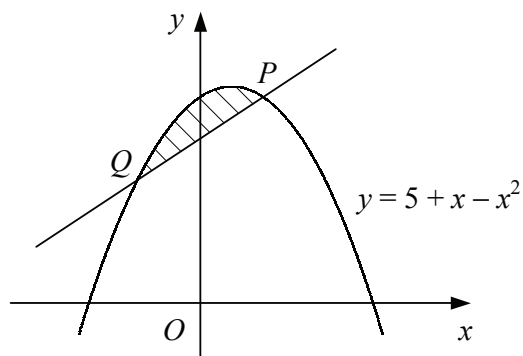
$$\frac{a(1 - r^n)}{1 - r}.$$

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

Total: 9

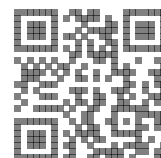


8. Figure shows the curve with equation $y = 5 + x - x^2$ and the normal to the curve at the point $P(1, 5)$.



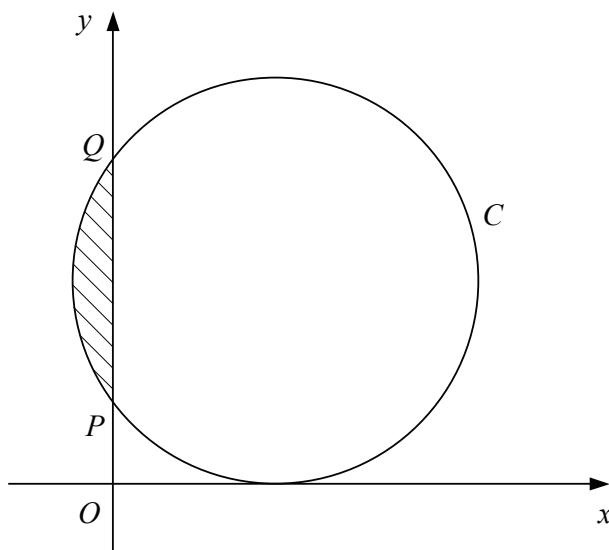
- (a) Find an equation for the normal to the curve at P in the form $y = mx + c$. [5]
- (b) Find the coordinates of the point Q , where the normal to the curve at P intersects the curve again. [2]
- (c) Show that the area of the shaded region bounded by the curve and the straight line PQ is $\frac{4}{3}$. [6]

Total: 13



9. Figure 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 θ 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]

Total: 14

