Solomon Practice Paper

Core Mathematics 2B

Time allowed: 90 **minutes**

Centre: www.CasperYC.club

Name:

Teacher:

Question	Points	Score
1	4	
2	6	
3	6	
4	7	
5	9	
6	10	
7	10	
8	10	
9	13	
Total:	75	

How I can achieve better:

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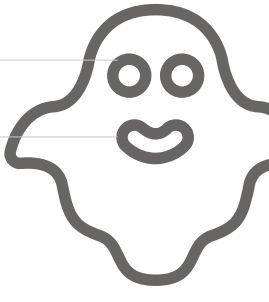
Last updated: July 14, 2025

1. Solve the equation [4]

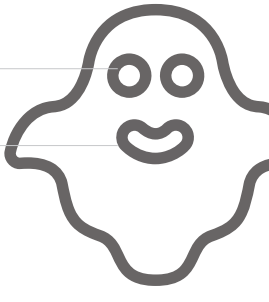
$$\log_5(4x+3) - \log_5(x-1) = 2.$$



2. Given that [6]

$$\int_1^3 x^2 - 2x + k \, \mathrm{d}x = 8\frac{2}{3},$$

find the value of the constant k.



3. For the binomial expansion in ascending powers of x of $\left(1+\frac{1}{4}x\right)^n$, where n is an integer and $n \geq 2$,

   (a) find and simplify the first three terms, [3]

   (b) find the value of n for which the coefficient of x is equal to the coefficient of x^2. [3]

Total: 6

4. Solve, for $0 \leq x < 360°$, the equation [7]

$$3\cos^2(x°) + \sin^2(x°) + 5\sin(x°) = 0.$$

5. The circle C has centre $(-1, 6)$ and radius $2\sqrt{5}$.

   (a) Find an equation for C. [2]

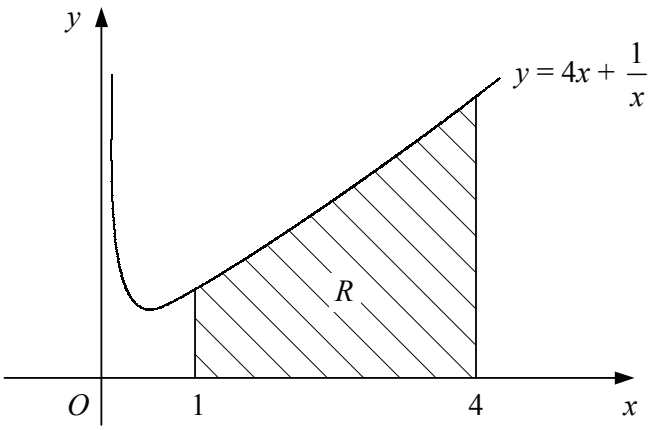
   The line $y = 3x - 1$ intersects C at the points A and B.

   (b) Find the x-coordinates of A and B. [4]

   (c) Show that $AB = 2\sqrt{10}$. [3]

Total: 9

6. Figure shows the curve with equation $y = 4x + \frac{1}{x}$, $x > 0$.



(a) Find the coordinates of the minimum point of the curve. [5]

The shaded region R is bounded by the curve, the x-axis and the lines $x = 1$ and $x = 4$.

(b) Use the trapezium rule with three intervals of equal width to estimate the area of R. [5]

Total: 10

7. A student completes a mathematics course and begins to work through past exam papers.

   He completes the first paper in 2 hours and the second in 1 hour 54 minutes.

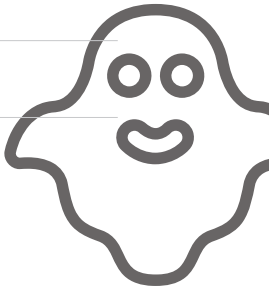
   Assuming that the times he takes to complete successive papers form a geometric sequence,

   (a) find, to the nearest minute, how long he will take to complete the fifth paper, [3]

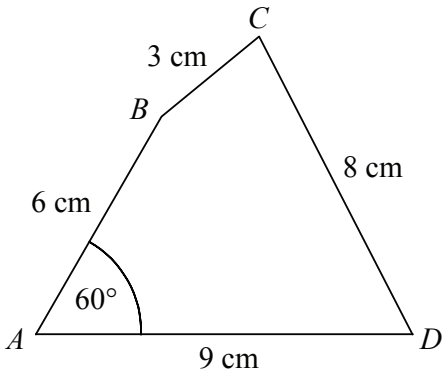
   (b) show that the total time he takes to complete the first eight papers is approximately 13 hours 28 minutes, [3]

   (c) find the least number of papers he must work through if he is to complete a paper in less than one hour. [4]

Total: 10



8. Figure shows the quadrilateral $ABCD$ in which $AB = 6$ cm, $BC = 3$ cm, $CD = 8$ cm, $AD = 9$ cm and $\angle BAD = 60°$.



(a) Using the cosine rule, show that $BD = 3\sqrt{7}$cm. [4]

(b) Find the size of $\angle BCD$ in degrees. [3]

(c) Find the area of quadrilateral $ABCD$. [3]

Total: 10

9.

$$\mathrm{f}(x) = x^3 - 9x^2 + 24x - 16.$$

(a) Evaluate $\mathrm{f}(1)$ and hence state a linear factor of $\mathrm{f}(x)$. [2]

(b) Show that $\mathrm{f}(x)$ can be expressed in the form [4]

$$\mathrm{f}(x) = (x + p)(x + q)^2,$$

where p and q are integers to be found.

(c) Sketch the curve $y = \mathrm{f}(x)$. [2]

(d) Using integration, find the area of the region enclosed by the curve $y = \mathrm{f}(x)$ and the x-axis. [5]

Total: 13