Solomon Practice Paper

Core Mathematics 2I

Time allowed: 90 **minutes**

Centre: **www.CasperYC.club**

Name:

Teacher:

Question	Points	Score
1	4	
2	5	
3	6	
4	7	
5	9	
6	10	
7	10	
8	10	
9	14	
Total:	75	

How I can achieve better:

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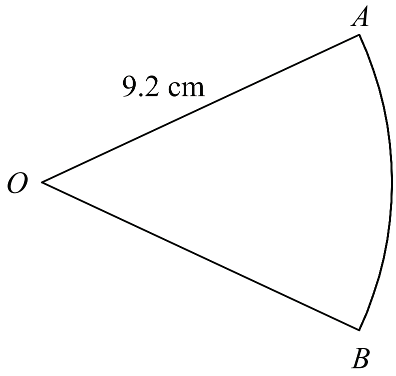
BY NC ND

Last updated: May 5, 2023

1. Figure shows the sector OAB of a circle of radius 9.2 cm and centre O.



Given that the area of the sector is 37.4 cm^2, find to 3 significant figures

(a) the size of $\angle AOB$ in radians, [2]

(b) the perimeter of the sector. [2]

Total: 4

2. The first three terms of a geometric series are $(p-1)$, 2 and $(2p+5)$ respectively, where p is a constant. [5]

Find the two possible values of p.

3. Find the area of the finite region enclosed by the curve $y = 5x - x^2$ and the x-axis. [6]

4. Solve the equation [7]

$$\sin^2(\theta) = 4\cos(\theta),$$

for values of θ in the interval $0 \leq \theta \leq 360°$.

5. Given that

$$f(x) = x^3 + 7x^2 + px - 6,$$

and that $x = -3$ is a solution to the equation $f(x) = 0$,

(a) find the value of the constant p, [2]

(b) show that when $f(x)$ is divided by $(x-2)$ there is a remainder of 50, [2]

(c) find the other solutions to the equation $f(x) = 0$, giving your answers to 2 decimal places. [5]

Total: 9

6. The circle C has the equation

$$x^2 + y^2 - 12x + 8y + 16 = 0.$$

(a) Find the coordinates of the centre of C. [2]

(b) Find the radius of C. [2]

(c) Sketch C. [2]

Given that C crosses the x-axis at the points A and B,

(d) find the length AB, giving your answer in the form $k\sqrt{5}$. [4]

Total: 10

7. Given that for small values of x

$$(1+ax)^n \approx 1 - 24x + 270x^2,$$

where n is an integer and $n > 1$,

(a) show that $n = 16$ and find the value of a, [7]

(b) use your value of a and a suitable value of x to estimate the value of $(0.9985)^{16}$, giving your answer to 5 decimal places. [3]

Total: 10

8. (a) Given that [3]

$$\log_2(y-1) = 1 + \log_2(x),$$

show that

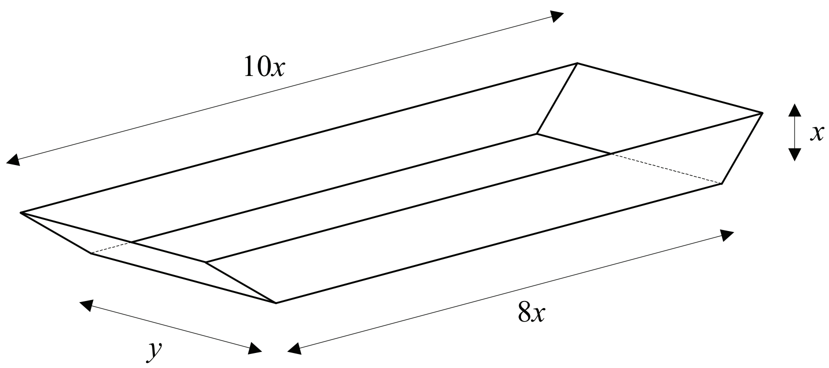
$$y = 2x + 1.$$

(b) Solve the simultaneous equations [7]

$$\begin{aligned} \log_2(y-1) &= 1 + \log_2(x) \\ 2\log_3(y) &= 2 + \log_3(x) \end{aligned}$$

Total: 10

9. Figure shows a tray made from sheet metal.



The horizontal base is a rectangle measuring $8x$ cm by y cm and the two vertical sides are trapezia of height x cm with parallel edges of length $8x$ cm and $10x$ cm. The remaining two sides are rectangles inclined at 45° to the horizontal.

Given that the capacity of the tray is 900 cm^3,

(a) find an expression for y in terms of x, [3]

(b) show that the area of metal used to make the tray, A cm^2, is given by [4]

$$A = 18x^2 + \frac{200(4+\sqrt{2})}{x},$$

(c) find to 3 significant figures, the value of x for which A is stationary, [4]

(d) find the minimum value of A and show that it is a minimum. [3]

Total: 14