**Solomon Practice Paper**

**Pure Mathematics 1H**

**Time allowed:** 90 **minutes**

**Centre:** **www.CasperYC.club**

**Name:**

**Teacher:**

| Question | Points | Score |
|---|---|---|
| 1 | 6 | |
| 2 | 6 | |
| 3 | 8 | |
| 4 | 9 | |
| 5 | 9 | |
| 6 | 10 | |
| 7 | 12 | |
| 8 | 15 | |
| Total: | 75 | |

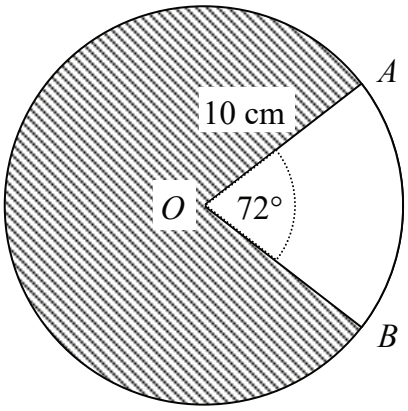
**How I can achieve better:**

- 
- 
- 

BY NC ND

Last updated: December 24, 2025

1. Figure shows a circle, centre $O$, of radius 10 cm.




Points $A$ and $B$ are on the circumference of the circle and the acute angle $AOB$ is 72°.

Giving your answers in terms of $\pi$, calculate

(a) the perimeter of the unshaded minor sector, [3]

(b) the area of the shaded major sector. [3]

Total: 6

2. Given that [6]

$$x(x^2 - A)\left(x - \frac{2}{x}\right) \equiv \left(x^2 + B\right)^2$$

Find the value of the constants $A$ and $B$.

3. The line $x - 2y + 8 = 0$ crosses the $x$-axis at the point $P$ and the $y$-axis at the point $Q$.

   (a) Find the coordinates of the points $P$ and $Q$. [3]

   (b) State the coordinates of the midpoint of $PQ$. [1]

   Given that $P$ and $Q$ are diagonally opposite corners of a square,

   (c) find an equation of the line that passes through the other two corners of the square. [4]

Total: 8

4. (a) Solve the equation [3]

$$3x - \frac{2}{x} = 5.$$

(b) Hence find the values of $\theta$ in the interval $-180° \leq \theta \leq 180°$ for which [6]

$$3\tan(\theta) - \frac{2}{\tan(\theta)} = 5.$$

Give your answers correct to 1 decimal place.

Total: 9

5.

$$\mathrm{f}(x) \equiv 2x^2 + 4px + q.$$

Given that the curve $y = \mathrm{f}(x)$ does not intersect the $x$-axis,

(a) prove that $2p^2 - q < 0$. [3]

Given also that the curve $y = \mathrm{f}(x)$ passes through the point $(2, 18)$,

(b) find an expression for $q$ in terms of $p$. [2]

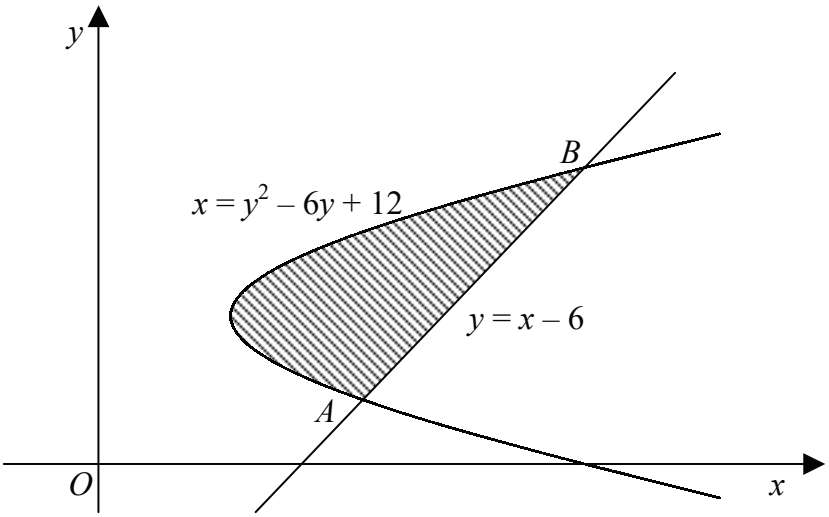
(c) Using your answers to parts (a) and (b), find the set of possible values of $p$. [4]

Total: 9

6. The sum, $S_n$, of the first $n$ terms of a sequence is given by $S_n = 5n^2 + 2n$.
   (a) Evaluate $S_3$ and $S_4$. [3]
   (b) Write down the value of the fourth term of the sequence. [1]
   (c) Show that the sum of the first $(n-1)$ terms is given by $S_{n-1} = 5n^2 - 8n + 3$. [3]
   (d) Hence, or otherwise find an expression for the $n$th term of the sequence in terms of $n$. [3]

Total: 10

7. Figure shows the curve $x = y^2 - 6y + 12$ and the line $y = x - 6$.




The line and the curve intersect at the points $A$ and $B$.

(a) Find the coordinates of the points $A$ and $B$. [7]

(b) Hence show that the area of the shaded region enclosed by the curve and the line is $\frac{125}{6}$. [5]

Total: 12

8.

$$\mathrm{f}(x) \equiv x^2 - 4\sqrt{x}, \quad x \geq 0.$$

(a) Solve the equation $\mathrm{f}(x) = 0$, giving your solutions to an appropriate degree of accuracy. [4]

The curve $y = \mathrm{f}(x)$ has a stationary point, $P$.

(b) Find $\mathrm{f}'(x)$ and determine the coordinates of the point $P$. [5]

(c) Find $\mathrm{f}''(x)$ and hence show that $P$ is a minimum point of the curve. [3]

(d) Sketch the curve $y = \mathrm{f}(x)$, labelling $P$ and the coordinates of any points where the curve crosses the coordinate axes. [3]

Total: 15