

Solomon Practice Paper

Core Mathematics 1G

Time allowed: 90 minutes

Centre: www.CasperYC.club

Name:

Teacher:

Question	Points	Score
1	3	
2	4	
3	6	
4	7	
5	10	
6	10	
7	11	
8	11	
9	13	
Total:	75	

How I can achieve better:

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1. Solve the equation [3]

$$9^x = 3^{x+2}.$$

2. Solve the inequality [4]

$$x(2x + 1) \leq 6$$

3. The curve C has the equation $y = (x - a)^2$ where a is a constant.

Given that

$$\frac{dy}{dx} = 2x - 6.$$

- (a) find the value of a , [4]

- (b) describe fully a single transformation that would map C onto the graph of $y = x^2$. [2]

Total: 6

4. (a) Find in exact form the coordinates of the points where the curve $y = x^2 - 4x + 2$ crosses the x -axis. [4]

- (b) Find the value of the constant k for which the straight line $y = 2x + k$ is a tangent to the curve $y = x^2 - 4x + 2$. [3]

Total: 7

5. The curve C with equation $y = (2 - x)(3 - x)^2$ crosses the x -axis at the point A and touches the x -axis at the point B .

- (a) Sketch the curve C , showing the coordinates of A and B . [3]

- (b) Show that the tangent to C at A has the equation $x + y = 2$. [7]

Total: 10

6.

$$f(x) = 9 + 6x - x^2.$$

- (a) Find the values of A and B such that [4]

$$f(x) = A - (x + B)^2$$

- (b) State the maximum value of $f(x)$. [1]

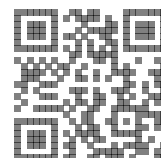
- (c) Solve the equation $f(x) = 0$, giving your answers in the form $a + b\sqrt{2}$ where a and b are integers. [3]

- (d) Sketch the curve $y = f(x)$. [2]

Total: 10

7. (a) An arithmetic series has a common difference of 7. [5]

Given that the sum of the first 20 terms of the series is 530, find



- i. the first term of the series,
- ii. the smallest positive term of the series.

(b) The terms of a sequence are given by

[6]

$$u_n = (n + k)^2, \quad n \geq 1,$$

where k is a positive constant. Given that $u_2 = 2u_1$,

- i. find the value of k ,
- ii. show that $u_3 = 11 + 6\sqrt{2}$.

Total: 11

8. The straight line l_1 passes through the point $A(-2, 5)$ and the point $B(4, 1)$.

(a) Find an equation for l_1 in the form $ax + by = c$, where a, b and c are integers.

[4]

The straight line l_2 passes through B and is perpendicular to l_1 .

(b) Find an equation for l_2 .

[3]

Given that l_2 meets the y -axis at the point C ,

(c) show that triangle ABC is isosceles.

[4]

Total: 11

9. The curve C has the equation $y = f(x)$ where

$$f'(x) = 1 + \frac{2}{\sqrt{x}}, \quad x > 0.$$

The straight line l has the equation $y = 2x - 1$ and is a tangent to C at the point P .

(a) State the gradient of C at P .

[1]

(b) Find the x -coordinate of P .

[3]

(c) Find an equation for C .

[6]

(d) Show that C crosses the x -axis at the point $(1, 0)$ and at no other point.

[3]

Total: 13

