

# Solomon Practice Paper

## Core Mathematics 1L

Time allowed: 90 minutes

Centre: [www.CasperYC.club](http://www.CasperYC.club)

Name:

Teacher:

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

How I can achieve better:

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1. Evaluate  $49^{\frac{1}{2}} + 8^{\frac{2}{3}}$  [3]

2. A sequence is defined by the recurrence relation

$$u_{n+1} = \frac{u_n + 1}{3}, \quad n = 1, 2, 3, \dots,$$

Given that  $u_3 = 5$ ,

(a) find the value of  $u_4$ , [1]

(b) find the value of  $u_1$ . [3]

Total: 4

3.

$$f(x) = 4x^2 + 12x + 9.$$

(a) Determine the number of real roots that exist for the equation  $f(x) = 0$ . [2]

(b) Solve the equation  $f(x) = 8$ , giving your answers in the form  $a + b\sqrt{2}$  where  $a$  and  $b$  are rational. [4]

Total: 6

4. Find the set of values of  $x$  for which

(a)  $6x - 11 > x + 4$ , [2]

(b)  $x^2 - 6x - 16 < 0$ , [3]

(c) both  $6x - 11 > x + 4$  and  $x^2 - 6x - 16 < 0$ . [1]

Total: 6

5.

$$f(x) = (2 - \sqrt{x})^2, \quad x > 0.$$

(a) Solve the equation  $f(x) = 0$ . [2]

(b) Find  $f(3)$ , giving your answer in the form  $a + b\sqrt{3}$ , where  $a$  and  $b$  are integers. [2]

(c) Find  $\int f(x) dx$ . [4]

Total: 8

6. The straight line  $l$  passes through the point  $P(-3, 6)$  and the point  $Q(1, -4)$ .

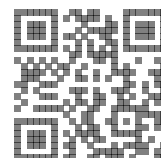
(a) Find an equation for  $l$  in the form  $ax + by + c = 0$ , where  $a, b$  and  $c$  are integers. [4]

The straight line  $m$  has the equation  $2x + ky + 7 = 0$ , where  $k$  is a constant.

Given that  $l$  and  $m$  are perpendicular,

(b) find the value of  $k$ . [4]

Total: 8



7. Given that

$$f'(x) = 5 + \frac{4}{x^2}, \quad x \neq 0,$$

(a) find an expression for  $f(x)$ . [3]

Given also that  $f(2) = 2f(1)$ ,

(b) find  $f(4)$ . [5]

Total: 8

8.

$$f(x) = x^3 - 6x^2 + 5x + 12.$$

(a) Show that [3]

$$(x + 1)(x - 3)(x - 4) \equiv x^3 - 6x^2 + 5x + 12.$$

(b) Sketch the curve  $y = f(x)$ , showing the coordinates of any points of intersection with the coordinate axes. [3]

(c) Showing the coordinates of any points of intersection with the coordinate axes, sketch on separate diagrams the curves [4]

i.  $y = f(x + 3)$ ,

ii.  $y = f(-x)$ .

Total: 10

9. The first two terms of an arithmetic series are  $(t - 1)$  and  $(t^2 - 5)$  respectively, where  $t$  is a positive constant.

(a) Find and simplify expressions in terms of  $t$  for [4]

i. the common difference of the series,

ii. the third term of the series.

Given also that the third term of the series is 19,

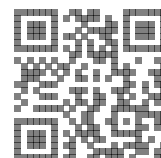
(b) find the value of  $t$ , [2]

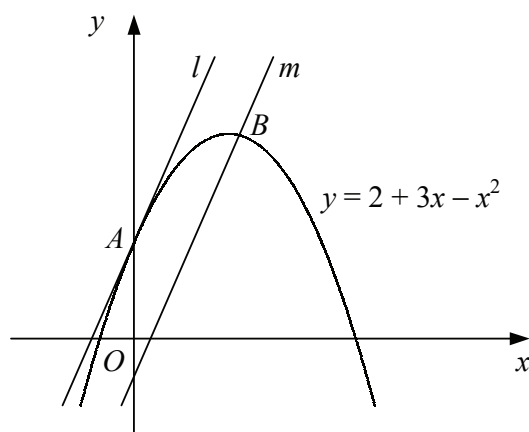
(c) show that the 10th term of the series is 75, [3]

(d) find the sum of the first 40 terms of the series. [2]

Total: 11

10. Figure shows the curve with equation  $y = 2 + 3x - x^2$  and the straight lines  $l$  and  $m$ .





The line  $l$  is the tangent to the curve at the point  $A$  where the curve crosses the  $y$ -axis

(a) Find an equation for  $l$ .

[5]

The line  $m$  is the normal to the curve at the point  $B$ .

Given that  $l$  and  $m$  are parallel,

(b) find the coordinates of  $B$ .

[6]

Total: 11

