## Solomon Practice Paper

Core Mathematics 1F

Time allowed: 90 minutes

Centre: www.CasperYC.club

Name:

Teacher:

How	Ι	can	achieve	better:

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July 14, 2025



Question	Points	Score
1	3	
2	3	
3	4	
4	5	
5	6	
6	8	
7	10	
8	11	
9	12	
10	13	
Total:	75	

1. Find in exact form the real solutions of the equation

$$x^4 = 5x^2 + 14.$$

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2. Express

$$\frac{2}{3\sqrt{5}+7}$$

in the form  $a + b\sqrt{5}$  where a and b are rational.



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(a) Solve the equation $x^{\frac{3}{2}} = 27$ .		
(b) Express $(2\frac{1}{4})^{-\frac{1}{2}}$ as an exact fraction in its simplest form.		
		Total:

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The curve crosses the x-axis at the point (-1, 0) and touches the x-axis at the point (3, 0). Show that a = -5 and find the values of b and c.



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[5]

5. Given that

(a) find 
$$\frac{dy}{dx}$$
,  
(b) show that  

$$\frac{d^2y}{dx^2} = \frac{x^4 - 9}{x^4}.$$
[4]  
[2]  
Total: 6



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- 6. (a) Sketch on the same diagram the curve with equation y = (x 2)<sup>2</sup> and the straight line with equation y = 2x 1.
  Label on your sketch the coordinates of any points where each graph meets the coordinate axes.
  - (b) Find the set of values of x for which

$$(x-2)^2 > 2x - 1.$$

Total: 8

[3]

7. A curve has the equation

$$y=\frac{x}{2}+3-\frac{1}{x}, x\neq 0.$$

The point A on the curve has x-coordinate 2.

- (a) Find the gradient of the curve at A.
- (b) Show that the tangent to the curve at A has equation

$$3x - 4y + 8 = 0.$$

The tangent to the curve at the point B is parallel to the tangent at A.

(c) Find the coordinates of B.

Total: 10

[3]

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[3]

[4]

8.	The straight	line $l_1$ has	gradient $\frac{3}{2}$	$\frac{3}{5}$ and	passes	through	the	point $A(5,3)$	).
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(a) Find an equation for  $l_1$  in the form y = mx + c.

The straight line  $l_2$  has the equation 3x - 4y + 3 = 0 and intersects  $l_1$  at the point B.

- (b) Find the coordinates of B.
- (c) Find the coordinates of the mid-point of AB.
- (d) Show that the straight line parallel to  $l_2$  which passes through the mid-point of AB also [4] passes through the origin.

Total: 11

8

[2]

[3]

[2]



9. The third term of an arithmetic series is 5<sup>1</sup>/<sub>2</sub>. The sum of the first four terms of the series is 22<sup>3</sup>/<sub>4</sub>.
(a) Show that the first term of the series is 6<sup>1</sup>/<sub>4</sub> and find the common difference. [7]
(b) Find the number of positive terms in the series. [3]
(c) Hence, find the greatest value of the sum of the first n terms of the series. [2]
Total: 12



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10. The curve C has the equation y = f(x).

Given that

$$\frac{\mathrm{d}y}{\mathrm{d}x} = 8x - \frac{2}{x^3}, \quad x \neq 0$$

and that the point P(1,1) lies on C,

- (a) find an equation for the tangent to C at P in the form y = mx + c,
- (b) find an equation for C,
- (c) find the x-coordinates of the points where C meets the x-axis, giving your answers in the [5] form  $k\sqrt{2}$ .

Total: 13

[3]

[5]

