

Solomon Practice Paper

Core Mathematics 1D

Time allowed: 90 minutes

Centre: www.CasperYC.club

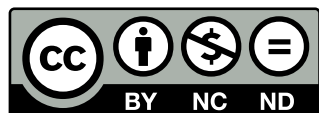
Name:

Teacher:

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

How I can achieve better:

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Last updated: May 5, 2023



1. Express $\sqrt{50} + 3\sqrt{8}$ in the form $k\sqrt{2}$. [3]

2. Differentiate with respect to x [4]

$$3x^2 - \sqrt{x} + \frac{1}{2x}.$$

3. A sequence is defined by the recurrence relation

$$u_{n+1} = u_n - 2, \quad n > 0, \quad u_1 = 50.$$

(a) Write down the first four terms of the sequence. [1]

(b) Evaluate [3]

$$\sum_{r=1}^{20} u_r.$$

Total: 4

4. (a) Find the value of the constant k such that the equation [2]

$$x^2 - 6x + k = 0$$

has equal roots.

(b) Solve the inequality [4]

$$2x^2 - 9x + 4 < 0.$$

Total: 6

5. Solve the simultaneous equations [7]

$$\begin{aligned}x + y &= 2 \\ 3x^2 - 2x + y^2 &= 2\end{aligned}$$

6. Given that [7]

$$\frac{dy}{dx} = 3\sqrt{x} - x^2,$$

and that $y = \frac{2}{3}$ when $x = 1$, find the value of y when $x = 4$.

7. The first three terms of an arithmetic series are $(12 - p)$, $2p$ and $(4p - 5)$ respectively, where p is a constant.

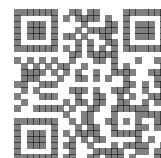
(a) Find the value of p . [2]

(b) Show that the sixth term of the series is 50. [3]

(c) Find the sum of the first 15 terms of the series. [2]

(d) Find how many terms of the series have a value of less than 400. [3]

Total: 10



8.

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

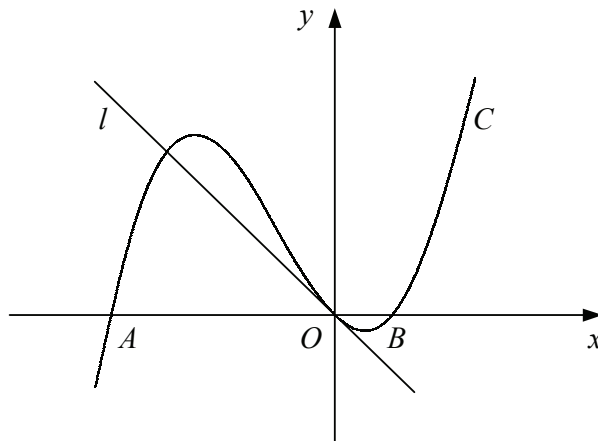
- (a) Solve the equation $f(x) = 0$. [2]
- (b) Sketch the curve with equation $y = f(x)$, showing the coordinates of any points of intersection with the coordinate axes. [2]
- (c) Find the coordinates of the points where the curve with equation $y = f\left(\frac{1}{2}x\right)$ crosses the coordinate axes. [3]

When the graph of $y = f(x)$ is translated by 1 unit in the positive x -direction it maps onto the graph with equation $y = ax^2 + bx + c$, where a, b and c are constants.

- (d) Find the values of a, b and c . [3]

Total: 10

9. Figure shows the curve C with the equation $y = x^3 + 3x^2 - 4x$ and the straight line l .



The curve C crosses the x -axis at the origin, O , and at the points A and B .

- (a) Find the coordinates of A and B . [3]

The line l is the tangent to C at O .

- (b) Find an equation for l . [4]
- (c) Find the coordinates of the point where l intersects C again. [4]

Total: 11

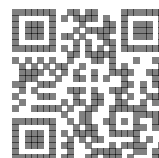
10. The straight line l_1 has equation $2x + y - 14 = 0$ and crosses the x -axis at the point A .

- (a) Find the coordinates of A . [2]

The straight line l_2 is parallel to l_1 and passes through the point $B(-6, 6)$.

- (b) Find an equation for l_2 in the form $y = mx + c$. [3]

The line l_2 crosses the x -axis at the point C .



(c) Find the coordinates of C . [1]

The point D lies on l_1 and is such that CD is perpendicular to l_1 .

(d) Show that D has coordinates $(5, 4)$. [5]

(e) Find the area of triangle ACD . [2]

Total: 13

