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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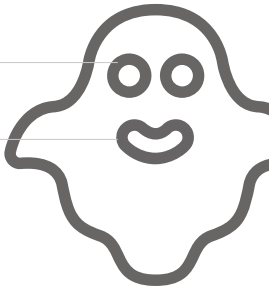
Last updated: July 14, 2025

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]

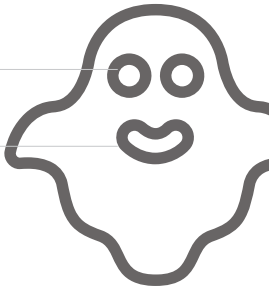
$$x^2 - 6x + k = 0$$

has equal roots.

(b) Solve the inequality [4]

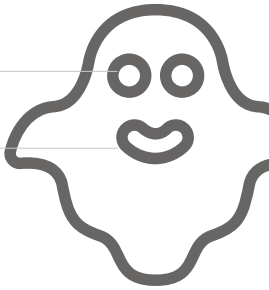
$$2x^2 - 9x + 4 < 0.$$

Total: 6



5. Solve the simultaneous equations [7]

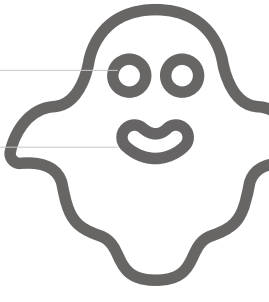
$$x + y = 2$$
$$3x^2 - 2x + y^2 = 2$$



6. Given that [7]

$$\frac{\mathrm{d}y}{\mathrm{d}x} = 3\sqrt{x} - x^2,$$

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.

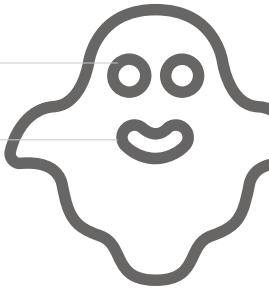
   (a) Find the value of p. [2]

   (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.

$$\mathrm{f}(x) = 2x^2 + 3x - 2.$$

(a) Solve the equation $\mathrm{f}(x) = 0$. [2]

(b) Sketch the curve with equation $y = \mathrm{f}(x)$, showing the coordinates of any points of intersection with the coordinate axes. [2]

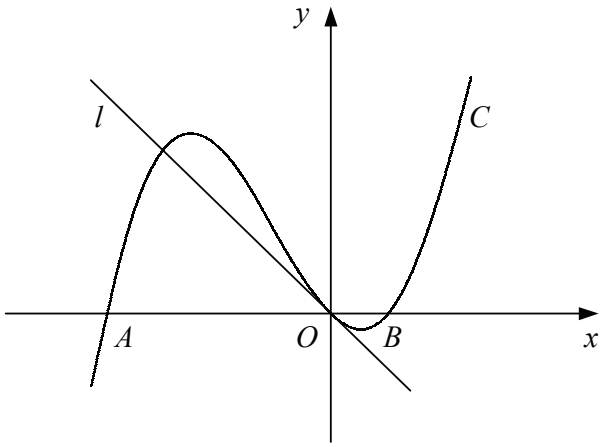
(c) Find the coordinates of the points where the curve with equation $y = \mathrm{f}\left(\frac{1}{2}x\right)$ crosses the coordinate axes. [3]

When the graph of $y = \mathrm{f}(x)$ 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