Solomon Practice Paper

Core Mathematics 1B

Time allowed: 90 **minutes**

Centre: www.CasperYC.club

Name:

Teacher:

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

How I can achieve better:

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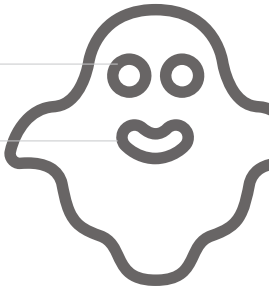
Last updated: July 14, 2025

1. [3]

$$\mathrm{f}(x) = \left(\sqrt{x} + 3\right)^2 + \left(1 - 3\sqrt{x}\right)^2.$$

Show that $\mathrm{f}(x)$ can be written in the form $ax + b$ where a and b are integers to be found.



2. The curve C has the equation [4]

$$y = x^2 + ax + b,$$

where a and b are constants.

Given that the minimum point of C has coordinates $(-2, 5)$, find the values of a and b.

3. The sequence $u_1, u_2, u_3, \ldots$ is define by

$$u_n = 2^n + kn,$$

where k is a constant. Given that $u_1 = u_3$,

(a) find the value of k, [3]

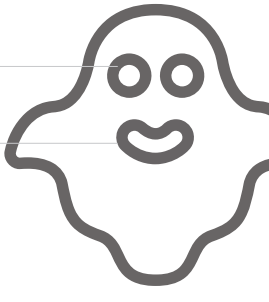
(b) find the value of u_5. [2]

Total: 5

4. Given that [6]

$$\frac{\mathrm{d}y}{\mathrm{d}x} = 2x^3 + 1,$$

and that $y = 3$ when $x = 0$, find the value of y when $x = 2$.



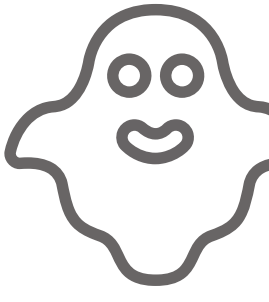
5.

$$\mathrm{f}(x) = 4x - 3x^2 - x^3.$$

(a) Fully factorise $4x - 3x^2 - x^3$. [3]

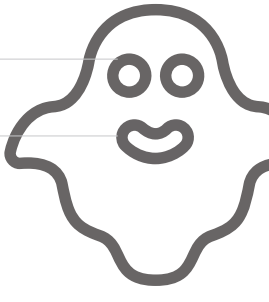
(b) Sketch the curve $y = \mathrm{f}(x)$, showing the coordinates of any points of intersection with the coordinate axes. [3]

Total: 6



6. The straight line l has the equation $x - 2y = 12$ and meets the coordinate axes at the points A and B. [6]

   Find the distance of the mid-point of AB from the origin, giving your answer in the form $k\sqrt{5}$.



7. (a) Given that $y = 2^x$, find expressions in terms of y for [4]

   i. 2^{x+2}

   ii. 2^{3-x}

   (b) Show that using the substitution $y = 2^x$, the equation [2]

$$2^{x+2} + 2^{3-x} = 33$$

   can be rewritten as

$$4y^2 - 33y + 8 = 0.$$

   (c) Hence solve the equation [4]

$$2^{x+2} + 2^{3-x} = 33.$$

Total: 10

8. Given that

$$y = 2x^{\frac{3}{2}} - 1$$

(a) find $\dfrac{\mathrm{d}^2y}{\mathrm{d}x^2}$, [3]

(b) show that [2]

$$4x^2\frac{\mathrm{d}^2y}{\mathrm{d}x^2} - 3y = k,$$

where k is an integer to be found,

(c) find [6]

$$\int y^2 \,\mathrm{d}x.$$

Total: 11

9. The second and fifth terms of an arithmetic series are 26 and 41 repectively.

   (a) Show that the common difference of the series is 5. [4]

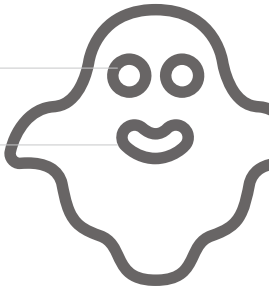
   (b) Find the 12th term of the series. [3]

   Another arithmetic series has first term -12 and common difference 7.

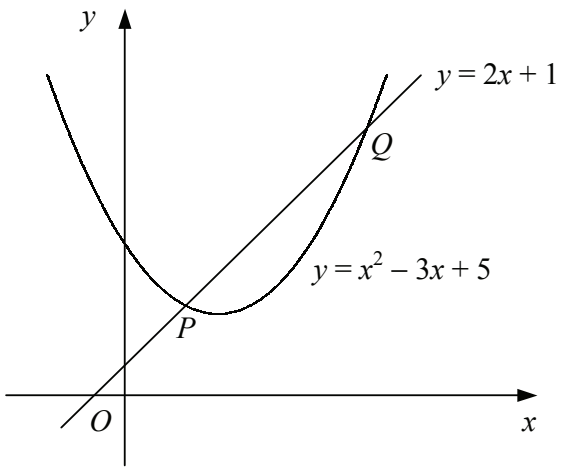
   Given that the sums of the first n terms of these two series are equal,

   (c) find the value of n. [4]

Total: 11



10. Figure shows the curve $y = x^2 - 3x + 5$ and the straight line $y = 2x + 1$.



The curve and line intersect at the points P and Q.

(a) Using algebra, show that P has coordinates $(1, 3)$ and find the coordinates of Q. [4]

(b) Find an equation for the tangent to the curve at P. [4]

(c) Show that the tangent to the curve at Q has the equation $y = 5x - 11$. [2]

(d) Find the coordinates of the point where the tangent to the curve at P intersects the tangent to the curve at Q. [3]

Total: 13