

Solomon Practice Paper

Core Mathematics 4A

Time allowed: 90 minutes

Centre: www.CasperYC.club

Name:

Teacher:

Question	Points	Score
1	6	
2	8	
3	11	
4	12	
5	12	
6	12	
7	14	
Total:	75	

How I can achieve better:

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[6]

Find an expression for $\frac{dy}{dx}$ in terms of x and y .

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2.

$$f(x) = \frac{3}{\sqrt{1-x}}, \quad |x| < 1.$$

- (a) Show that $f\left(\frac{1}{10}\right) = \sqrt{10}$. [2]
- (b) Expand $f(x)$ in ascending powers of x up to and including the term in x^3 , simplifying each coefficient. [3]
- (c) Use your expansion to find an approximate value for $\sqrt{10}$, giving your answer to 8 significant figures. [1]
- (d) Find, to 1 significant figure, the percentage error in your answer to part (c). [2]

Total: 8



$$\mathbf{r} = (\mathbf{i} + p\mathbf{j} - 5\mathbf{k}) + \lambda(3\mathbf{i} - \mathbf{j} + q\mathbf{k}),$$

Given that the point A with coordinates $(-5, 9, -9)$ lies on l ,

- (a) find the values of p and q , [3]
- (b) show that the point B with coordinates $(25, -1, 11)$ also lies on l . [2]

(c) Find the coordinates of C . [4]

(d) Find the ratio $AC:CB$. [2]

Total: 11



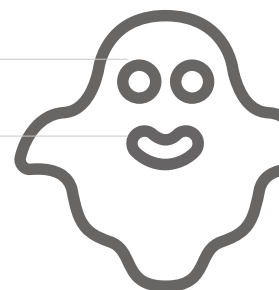


Assuming that $x = 0$ initially, and that

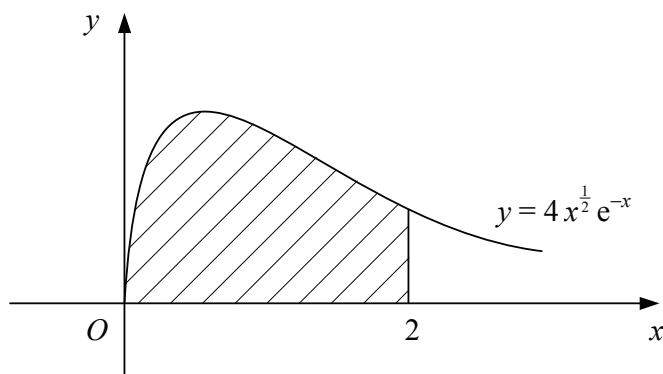
$$\frac{dx}{dt} = 2(x - 6)(x - 3),$$

- (a) show that it takes approximately 7 minutes to produce 2 g of the compound. [10]
- (b) Explain why it is not possible to produce 3 g of the compound. [2]

Total: 12



5. Figure shows the curve with equation $y = 4x^{\frac{1}{2}}e^{-x}$.



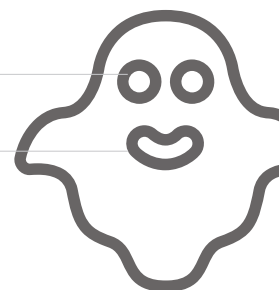
The shaded region is bounded by the curve, the x -axis and the line $x = 2$.

- (a) Use the trapezium rule with four intervals of equal width to estimate the area of the shaded region. [5]

The shaded region is rotated through 2π radians about the x -axis.

- (b) Find, in terms of π and e , the exact volume of the solid formed. [7]

Total: 12



6. (a) Find

[4]

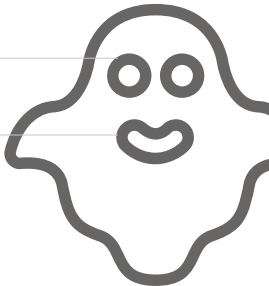
$$\int 2 \sin(3x) \sin(2x) \, dx.$$

(b) Use the substitution $u^2 = x + 1$ to evaluate

[8]

$$\int_0^3 \frac{x^2}{\sqrt{x+1}} \, dx.$$

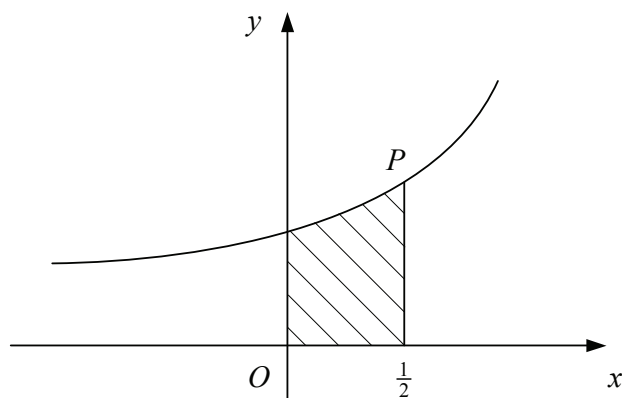
Total: 12





7. Figure shows the curve with parametric equations

$$x = \cos(2t) \quad \text{and} \quad y = \csc(t), \quad 0 < t < \frac{\pi}{2}.$$



The point P on the curve has x -coordinate $\frac{1}{2}$.

(a) Find the value of the parameter t at P . [2]

(b) Show that the tangent to the curve at P has the equation $y = 2x + 1$. [5]

The shaded region is bounded by the curve, the coordinate axes and the line $x = \frac{1}{2}$.

(c) Show that the area of the shaded region is given by [4]

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{4}} k \cos(t) \, dt,$$

where k is a positive integer to be found.

(d) Hence find the exact area of the shaded region. [3]

Total: 14

