

Solomon Practice Paper

Pure Mathematics 1D

Time allowed: 90 minutes

Centre: www.CasperYC.club

Name:

Teacher:

Question	Points	Score
1	5	
2	8	
3	8	
4	8	
5	8	
6	11	
7	13	
8	14	
Total:	75	

How I can achieve better:

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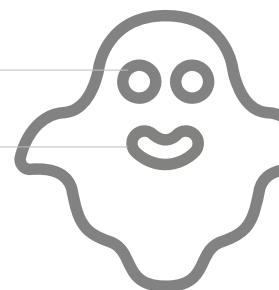


Last updated: July 14, 2025

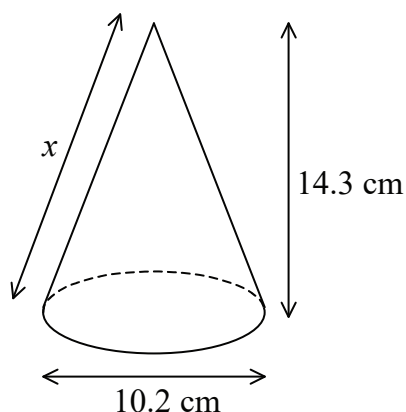


- (b) prove that the equation $f(x) = 0$ will have real roots only if $p \geq -\frac{3}{4}$. [4]

Total: 5



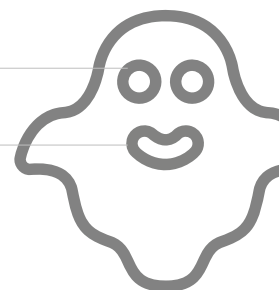
2. Figure shows a solid right-circular cone.



The height of the cone is 14.3 cm and the diameter of its base is 10.2 cm.

- (a) Calculate the slant height of the cone, x , in centimetres correct to 1 decimal place. [3]
- (b) Show that the surface area of the cone is 325 cm^2 , correct to 3 significant figures. [5]

Total: 8

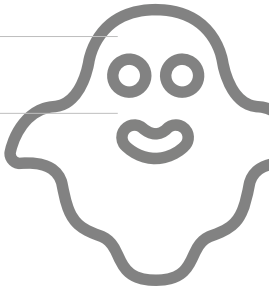


3.

$$f(x) \equiv 3x^3 - 7x^2 - 22x + 8.$$

- (a) Evaluate $f(-2)$. [2]
- (b) Hence state one linear factor of $f(x)$. [1]
- (c) Express $f(x)$ as the product of three linear factors. [5]

Total: 8



4. (a) Find

[4]

$$\int 6x^2 - 20x + \frac{1}{\sqrt{x}} \, dx.$$

(b) Hence, evaluate

[4]

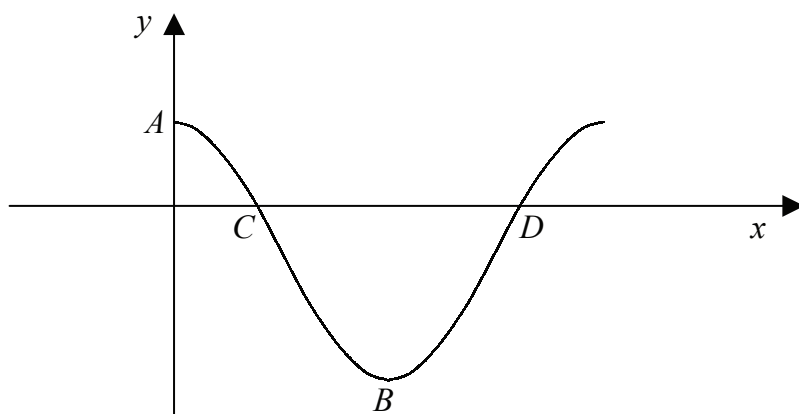
$$\int_4^5 6x^2 - 20x + \frac{1}{\sqrt{x}} \, dx.$$

giving your answer in the form $a + b\sqrt{5}$.

Total: 8



5. Figure shows the curve with equation $y = 4 \cos(x) - 1$, for x in the interval $0 \leq x \leq 2\pi$.



- (a) State the coordinates of the point A , where the curve crosses the y -axis, and the point B , the first minimum on the curve for $x > 0$. [3]
- (b) Find the coordinates of the points C and D , where the curve crosses the x -axis in the interval $0 \leq x \leq 2\pi$. [5]

Total: 8



6. The first term of a geometric series is $8\sqrt{3}$ and the second term is 12.
- (a) Show that the common ratio of the series is $\frac{\sqrt{3}}{2}$. [3]
- (b) Find the sixth term of the series. [3]
- (c) Show that the sum to infinity of the series can be written as $16(2\sqrt{3} + 3)$. [5]

Total: 11



7.

$$f(x) \equiv (x - 1)(x - a).$$

- (a) Sketch the curve $y = f(x)$, indicating the coordinates of any points where the curve crosses the coordinate axes in the cases for which [5]

i. $a > 1$,

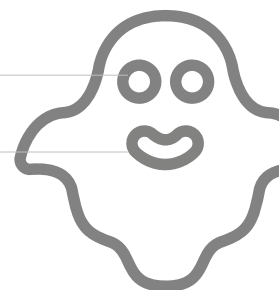
ii. $a < 0$.

- (b) Show that the coordinates of the turning point of the curve $y = f(x)$ can be written as: [7]

$$\left(\frac{a+1}{2}, \frac{-(a-1)^2}{4} \right).$$

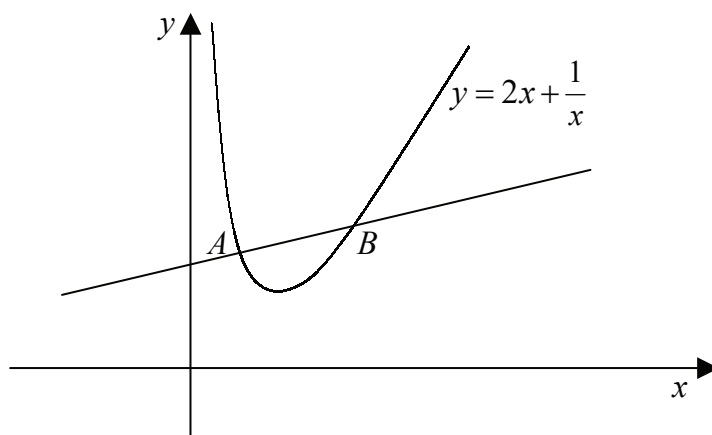
- (c) Hence state the set of values for which $f(x)$ is increasing. [1]

Total: 13





8. Figure shows the curve $y = 2x + \frac{1}{x}$ and the normal to the curve at the point $A \left(\frac{1}{2}, k \right)$.



- (a) Find the value of k . [2]
- (b) Show that the equation of the normal to the curve at A can be written as [6]

$$2x - 4y + 11 = 0.$$

The normal to the curve at A cuts the curve again at the point B .

- (c) Find the coordinates of the point B , giving your answers as exact fractions. [6]

Total: 14

