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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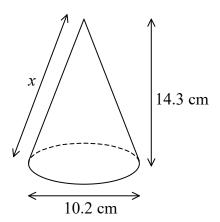
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1.	(a) State the condition for which the equation $ax^2 + bx + c = 0$ will have real roots.	[1]
	Given that $f(x) \equiv x^2 + 2px + 3x + p^2$,	
	(b) prove that the equation $f(x) = 0$ will have real roots only if $p \ge -\frac{3}{4}$.	[4]
		Total: 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]
То	tal: 8

3.

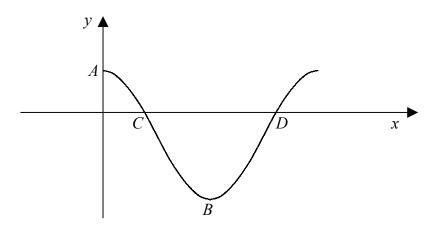
$f(x) \equiv 3x^3 - 7x^2 - 22x + $

(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
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4.	(a) Find $\int 6x^2 - 20x + \frac{1}{\sqrt{x}} dx.$	[4
	(b) Hence, evaluate $\int_4^5 6x^2 - 20x + \frac{1}{\sqrt{x}} dx.$	[4
	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 $0 \le x \le 2\pi$.



- (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.
- (b) Find the coordinates of the points C and D, where the curve crosses the x-axis in the interval $0 \le x \le 2\pi$.

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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
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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]

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

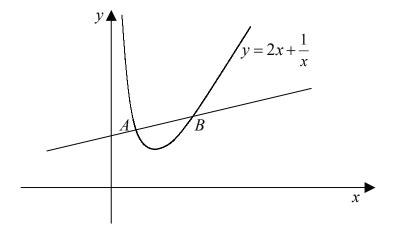
(c) Hence state the set of values for which f(x) is increasing. [1]

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



- [2] (a) Find the value of k.
- (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
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