Solomon Practice Paper

Pure Mathematics 3F

Time allowed: 90 minutes

Centre: www.CasperYC.club

Name:

Teacher:

Question	Points	Score
1	7	
2	8	
3	9	
4	10	
5	11	
6	13	
7	17	
Total:	75	

How I can achieve better:

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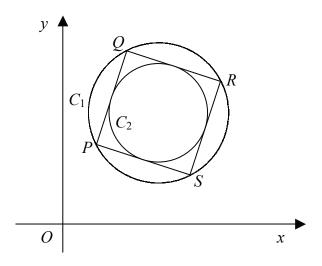
1.

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

Given that when $f(x)$ is divided by $(2x - k)$ the remainder is -8 , (a) find the two possible values of k .	[4]
Given also that when $f(x)$ is divided by $(x-3k)$ the remainder is 27,	
(b) find k .	[3]
	Total: 7
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Last updated: May 5, 2023

2. Figure shows a square PQRS.



The corners of the square have the following coordinates:

$$P(2,5)$$
, $Q(4,11)$, $R(10,9)$, $S(8,3)$.

The circle C_1 circumscribes the square.

- (a) Find the coordinates of the centre of circle C_1 .
- (b) Find the radius of circle C_1 . [2]

The circle C_2 is inscribed in the square

The circle \mathcal{O}_2 is inscribed in the square.	
(c) Find an equation of circle C_2 .	[4]
	Total: 8

[2]

8

3.	With respect to a fixed origin, O , the points A and B have position vectors $(\mathbf{i} - 5\mathbf{j} - 4\mathbf{k})$ and $(3\mathbf{i} + 5\mathbf{j} - 2\mathbf{k})$ respectively.			
	(a) Write down vector \overrightarrow{AB} .	[2]		
	The point C has position vector $(9\mathbf{i} - 7\mathbf{j} - 2\mathbf{k})$.			
	(b) Show that \overrightarrow{AC} is perpendicular to \overrightarrow{AB} .	[3] [4]		
	(c) Find the area of triangle ABC in the form $k\sqrt{6}$.			
		Total: 9		

4.	(a) Given that $ x < \frac{1}{2}$, expand $(1-2x)^{\frac{1}{2}}$ as a series in ascending powers of x , as far as the term in x^3 .	[3]
	(b) Show that when $x = 0.01$,	[3]
	$(1-2x)^{\frac{1}{2}} = \frac{7}{10}\sqrt{2}.$	ι.
	(c) Hence, use your series to find the value of $\sqrt{2}$ correct to 6 decimal places.	[4]
	То	tal: 10
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5.	(a) Show that	[4]
	$\int_0^{\frac{\pi}{4}} (1 - \sin(4x)) \mathrm{d}x = \frac{1}{4} (\pi - 2).$	
	(b) Use integration by parts to find	[7]
	$\int x^2 e^{\frac{1}{2}x} dx.$	
	Tota	l: 11

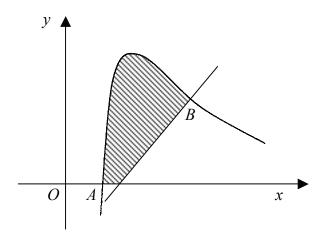
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6.	(a) i. Differentiate 3^{2x} with respect to x .	[7]
	ii. Find the coordinates of the stationary point on the curve	
	$y = 3^{2x} - 18(3^x).$	
	(b) A curve is given by	[6]
	$(x+2y)^2 - 3x^2 = 4.$	
	Find the gradient of the curve at the point $(2, -3)$.	
		otal: 13

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7. Figure shows part of the curve with parametric equations

$$x = \frac{3}{t}$$
, and $y = 4t - t^2$, $t \neq 0$.



(a) Find the value of the parameter t at the point A where the curve meets the x-axis.

[2]

The point B on the curve has parameter t=1.

(b) Find an equation of the normal to the curve at the point B.

[6]

[9]

(c) Show that the area of the shaded region enclosed by the curve, the x-axis and the normal to the curve at B is $12(2\ln(2) - 1)$.

Total: 17

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