

# Solomon Practice Paper

## Core Mathematics 4C

Time allowed: 90 minutes

Centre: [www.CasperYC.club](http://www.CasperYC.club)

Name:

Teacher:

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

How I can achieve better:

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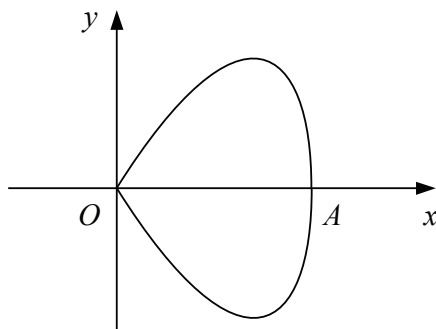






6. Figure shows the curve with parametric equations

$$x = 3 \sin(t) \quad \text{and} \quad y = 2 \sin(2t), \quad 0 \leq t < \pi.$$



The curve meets the  $x$ -axis at the origin,  $O$ , and at the point  $A$ .

(a) Find the value of  $t$  at  $O$  and the value of  $t$  at  $A$ . [2]

The region enclosed by the curve is rotated through  $\pi$  radians about the  $x$ -axis.

(b) Show that the volume of the solid formed is given by [3]

$$\int_0^{\frac{\pi}{2}} 12\pi \sin^2(2t) \cos(t) dt.$$

(c) Using the substitution  $u = \sin(t)$ , or otherwise, evaluate this integral, giving your answer as an exact multiple of  $\pi$ . [8]

Total: 13





7.

$$f(x) = \frac{8 - x}{(1 + x)(2 - x)}, \quad |x| < 1.$$

(a) Express  $f(x)$  in partial fractions.

[3]

(b) Show that

[5]

$$\int_0^{\frac{1}{2}} f(x) \, dx = \ln(k),$$

where  $k$  is an integer to be found.(c) Find the series expansion of  $f(x)$  in ascending powers of  $x$  up to and including the term in  $x^3$ , simplifying each coefficient.

[6]

Total: 14

