

# Solomon Practice Paper

## Core Mathematics 2F

Time allowed: 90 minutes

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

Name:

Teacher:

Question	Points	Score
1	5	
2	6	
3	7	
4	7	
5	8	
6	9	
7	9	
8	12	
9	12	
Total:	75	

How I can achieve better:

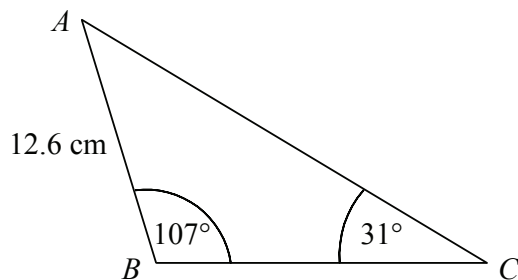
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Last updated: May 5, 2023



1. Figure shows triangle  $ABC$  in which  $AB = 12.6\text{cm}$ ,  $\angle ABC = 107^\circ$  and  $\angle ACB = 31^\circ$ .



Find, to 3 significant figures,

- (a) the length  $BC$ , [3]  
 (b) the area of triangle  $ABC$ . [2]

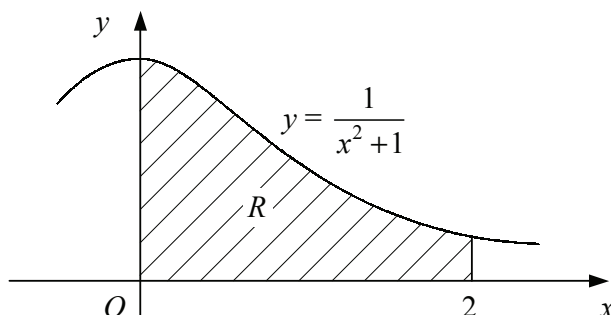
Total: 5

2. Show that [6]

$$\int_2^3 6\sqrt{x} - \frac{4}{\sqrt{x}} dx = k\sqrt{3},$$

where  $k$  is an integer to be found.

3. Figure shows the curve with equation  $y = \frac{1}{x^2+1}$ .



The shaded region  $R$  is bounded by the curve, the coordinate axes and the line  $x = 2$ .

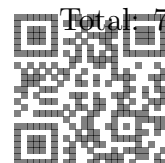
- (a) Use the trapezium rule with four strips of equal width to estimate the area of  $R$ . [5]

The cross-section of a support for a bookshelf is modelled by  $R$  with 1 unit on each axis representing 8 cm. Given that the support is 2 cm thick,

- (b) find an estimate for the volume of the support. [2]

Total: 7

4. (a) Expand  $(2+y)^6$  in ascending powers of  $y$  as far as the term in  $y^3$ , simplifying each coefficient. [4]  
 (b) Hence expand  $(2+x-x^2)^6$  in ascending powers of  $x$  as far as the term in  $x^3$ , simplifying each coefficient. [3]



5. (a) Given that [3]

$$8 \tan(x) - 3 \cos(x) = 0,$$

show that

$$3 \sin^2(x) + 8 \sin(x) - 3 = 0.$$

- (b) Find, to 2 decimal places, the values of  $x$  in the interval  $0 \leq x \leq 2\pi$  such that [5]

$$8 \tan(x) - 3 \cos(x) = 0.$$

Total: 8

6. (a) Given that  $y = 3^x$ , find expressions in terms of  $y$  for [4]

i.  $3^{x+1}$ ,

ii.  $3^{2x-1}$ .

- (b) Hence, or otherwise, solve the equation [5]

$$3^{x+1} - 3^{2x-1} = 6,$$

giving non-exact answers to 2 decimal places.

Total: 9

7. The circle  $C$  has centre  $(5, 2)$  and passes through the point  $(7, 3)$ .

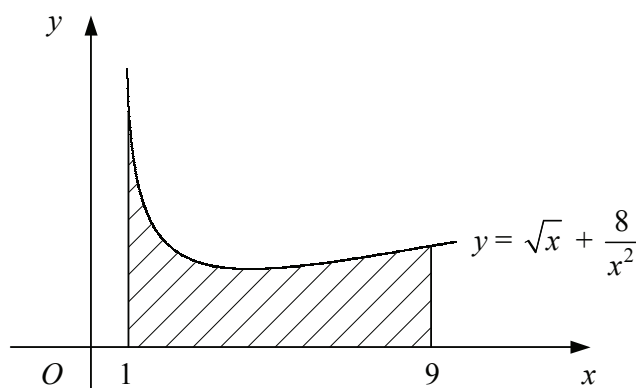
- (a) Find the length of the diameter of  $C$ . [2]

- (b) Find an equation for  $C$ . [2]

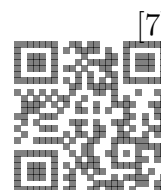
- (c) Show that the line  $y = 2x - 3$  is a tangent to  $C$  and find the coordinates of the point of contact. [5]

Total: 9

8. Figure shows the curve with equation  $y = \sqrt{x} + \frac{8}{x^2}$ ,  $x > 0$ .



- (a) Find the coordinates of the minimum point of the curve. [7]



- (b) Show that the area of the shaded region bounded by the curve, the  $x$ -axis and the lines  $x = 1$  and  $x = 9$  is  $24\frac{4}{9}$ . [5]

Total: 12

9. The first three terms of a geometric series are  $(x - 2)$ ,  $(x + 6)$  and  $x^2$  respectively.

- (a) Show that  $x$  must be a solution of the equation [3]

$$x^3 - 3x^2 - 12x - 36 = 0. \quad (\star)$$

- (b) Verify that  $x = 6$  is a solution of equation  $(\star)$  and show that there are no other real solutions. [6]

Using  $x = 6$ ,

- (c) find the common ratio of the series, [1]

- (d) find the sum of the first eight terms of the series. [2]

Total: 12

