

# Solomon Practice Paper

## Core Mathematics 2B

Time allowed: 90 minutes

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

Name:

Teacher:

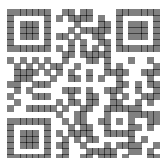
Question	Points	Score
1	4	
2	6	
3	6	
4	7	
5	9	
6	10	
7	10	
8	10	
9	13	
Total:	75	

How I can achieve better:

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Last updated: May 5, 2023



1. Solve the equation

$$\log_5(4x + 3) - \log_5(x - 1) = 2.$$

[4]

2. Given that

$$\int_1^3 x^2 - 2x + k \, dx = 8\frac{2}{3},$$

[6]

find the value of the constant  $k$ .

3. For the binomial expansion in ascending powers of  $x$  of  $(1 + \frac{1}{4}x)^n$ , where  $n$  is an integer and  $n \geq 2$ ,

(a) find and simplify the first three terms,

[3]

(b) find the value of  $n$  for which the coefficient of  $x$  is equal to the coefficient of  $x^2$ .

[3]

Total: 6

4. Solve, for  $0 \leq x < 360$ , the equation

$$3 \cos^2(x^\circ) + \sin^2(x^\circ) + 5 \sin(x^\circ) = 0.$$

[7]

5. The circle  $C$  has centre  $(-1, 6)$  and radius  $2\sqrt{5}$ .

(a) Find an equation for  $C$ .

[2]

The line  $y = 3x - 1$  intersects  $C$  at the points  $A$  and  $B$ .

(b) Find the  $x$ -coordinates of  $A$  and  $B$ .

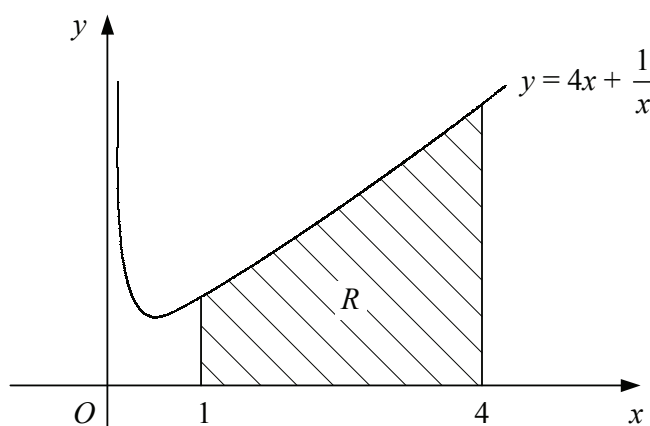
[4]

(c) Show that  $AB = 2\sqrt{10}$ .

[3]

Total: 9

6. Figure shows the curve with equation  $y = 4x + \frac{1}{x}$ ,  $x > 0$ .



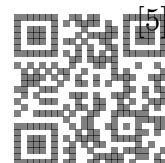
(a) Find the coordinates of the minimum point of the curve.

[5]

The shaded region  $R$  is bounded by the curve, the  $x$ -axis and the lines  $x = 1$  and  $x = 4$ .

(b) Use the trapezium rule with three intervals of equal width to estimate the area of  $R$ .

[5]

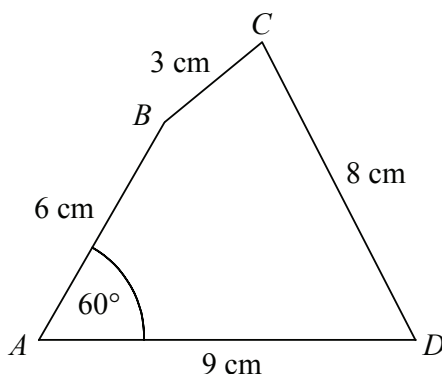


Total: 10

7. A student completes a mathematics course and begins to work through past exam papers. He completes the first paper in 2 hours and the second in 1 hour 54 minutes. Assuming that the times he takes to complete successive papers form a geometric sequence,
- (a) find, to the nearest minute, how long he will take to complete the fifth paper, [3]
- (b) show that the total time he takes to complete the first eight papers is approximately 13 hours 28 minutes, [3]
- (c) find the least number of papers he must work through if he is to complete a paper in less than one hour. [4]

Total: 10

8. Figure shows the quadrilateral  $ABCD$  in which  $AB = 6$  cm,  $BC = 3$  cm,  $CD = 8$  cm,  $AD = 9$  cm and  $\angle BAD = 60^\circ$ .



- (a) Using the cosine rule, show that  $BD = 3\sqrt{7}$  cm. [4]
- (b) Find the size of  $\angle BCD$  in degrees. [3]
- (c) Find the area of quadrilateral  $ABCD$ . [3]

Total: 10

9.

$$f(x) = x^3 - 9x^2 + 24x - 16.$$

- (a) Evaluate  $f(1)$  and hence state a linear factor of  $f(x)$ . [2]
- (b) Show that  $f(x)$  can be expressed in the form [4]

$$f(x) = (x + p)(x + q)^2,$$

where  $p$  and  $q$  are integers to be found.

- (c) Sketch the curve  $y = f(x)$ . [2]
- (d) Using integration, find the area of the region enclosed by the curve  $y = f(x)$  and the  $x$ -axis. [5]

Total: 13

