

Solomon Practice Paper

Core Mathematics 1K

Time allowed: 90 minutes

Centre: www.CasperYC.club

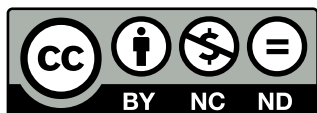
Name:

Teacher:

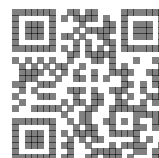
Question	Points	Score
1	3	
2	4	
3	6	
4	6	
5	6	
6	7	
7	7	
8	9	
9	13	
10	14	
Total:	75	

How I can achieve better:

-
-
-



Last updated: May 5, 2023



1. Find the value of
- y
- such that

$$4^{y+3} = 8.$$

[3]

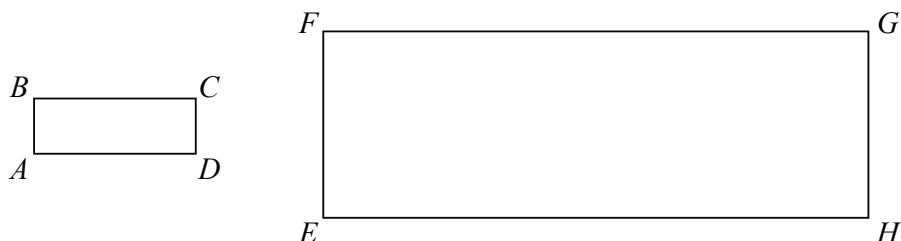
2. Find

$$\int 3x^2 + \frac{1}{2x^2} dx.$$

[4]

3. Figure shows the rectangles
- $ABCD$
- and
- $EFGH$
- which are similar.

[6]



Given that $AB = (3 - \sqrt{5})$ cm, $AD = \sqrt{5}$ cm and $EF = (1 + \sqrt{5})$ cm, find the length EH in cm, giving your answer in the form $a + b\sqrt{5}$ where a and b are integers.

4. (a) Sketch on the same diagram the curves
- $y = x^2 - 4x$
- and
- $y = -\frac{1}{x}$
- .

[4]

- (b) State, with a reason, the number of real solutions to the equation

[2]

$$x^2 - 4x + \frac{1}{x} = 0.$$

Total: 6

5. (a) By completing the square, find in terms of the constant
- k
- the roots of the equation

[4]

$$x^2 + 2kx + 4 = 0.$$

- (b) Hence find the exact roots of the equation

[2]

$$x^2 + 6x + 4 = 0.$$

Total: 6

6. (a) Evaluate

[3]

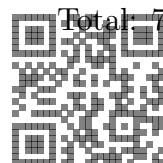
$$\sum_{r=1}^{50} 80 - 3r.$$

- (b) Show that

[4]

$$\sum_{r=1}^n \frac{r+3}{2} = kn(n+7),$$

where k is a rational constant to be found.



7. Solve the simultaneous equations

$$\begin{aligned}x - 3y + 7 &= 0 \\x^2 + 2xy - y^2 &= 7\end{aligned}$$

[7]

8. Given that

$$\frac{dy}{dx} = \frac{x^3 - 4}{x^3}, \quad x \neq 0,$$

(a) find $\frac{d^2y}{dx^2}$.

[3]

Given also that $y = 0$ when $x = -1$,

(b) find the value of y when $x = 2$.

[6]

Total: 9

9. A curve has the equation $y = (\sqrt{x} - 3)^2, x \geq 0$.

(a) Show that

$$\frac{dy}{dx} = 1 - \frac{3}{\sqrt{x}}.$$

[4]

The point P on the curve has x -coordinate 4.

(b) Find an equation for the normal to the curve at P in the form $y = mx + c$.

[5]

(c) Show that the normal to the curve at P does not intersect the curve again.

[4]

Total: 13

10. The straight line l has gradient 3 and passes through the point $A(-6, 4)$.

(a) Find an equation for l in the form $y = mx + c$.

[2]

The straight line m has the equation $x - 7y + 14 = 0$.

Given that m crosses the y -axis at the point B and intersects l at the point C ,

(b) find the coordinates of B and C ,

[4]

(c) show that $\angle BAC = 90^\circ$,

[4]

(d) find the area of triangle ABC .

[4]

Total: 14

