

# Solomon Practice Paper

## Core Mathematics 1H

Time allowed: 90 minutes

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

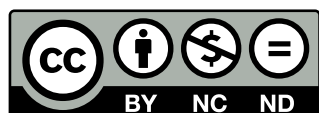
Name:

Teacher:

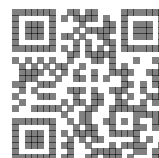
Question	Points	Score
1	3	
2	4	
3	6	
4	7	
5	7	
6	8	
7	8	
8	9	
9	10	
10	13	
Total:	75	

How I can achieve better:

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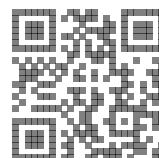
Last updated: May 5, 2023



1. Evaluate

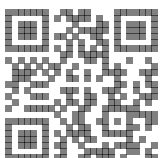
[3]

$$\sum_{r=1}^{30} (3r + 4).$$



2. (a) Express  $x^2 + 6x + 7$  in the form  $(x + a)^2 + b$ . [3]
- (b) State the coordinates of the minimum point of the curve  $y = x^2 + 6x + 7$ . [1]

Total: 4



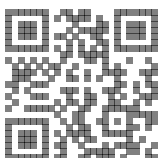
3. The straight line  $l_1$  has the equation  $3x - y = 0$ .

The straight line  $l_2$  has the equation  $x + 2y - 4 = 0$ .

(a) Sketch  $l_1$  and  $l_2$  on the same diagram, showing the coordinates of any points where each line meets the coordinate axes. [3]

(b) Find, as exact fractions, the coordinates of the point where  $l_1$  and  $l_2$  intersect. [3]

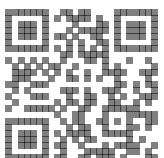
Total: 6



4. Find the pairs of values  $(x, y)$  which satisfy the simultaneous equations

[7]

$$\begin{cases} 3x^2 + y^2 = 21 \\ 5x + y = 7 \end{cases}$$



5. (a) Sketch on the same diagram the graphs of  $y = (x - 1)^2(x - 5)$  and  $y = 8 - 2x$ . [5]  
Label on your diagram the coordinates of any points where each graph meets the coordinate axes.

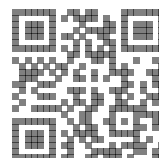
- (b) Explain how your diagram shows that there is only one solution,  $\alpha$ , to the equation [1]

$$(x - 1)^2(x - 5) = 8 - 2x.$$

- (c) State the integer,  $n$ , such that [1]

$$n < \alpha < n + 1.$$

Total: 7

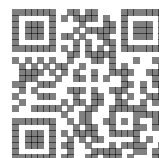


6. The curve with equation  $y = x^2 + 2x$  passes through the origin,  $O$ .

(a) Find an equation for the normal to the curve at  $O$ . [5]

(b) Find the coordinates of the point where the normal to the curve at  $O$  intersects the curve again. [3]

Total: 8



7. Given that

$$y = \sqrt{x} - \frac{4}{\sqrt{x}},$$

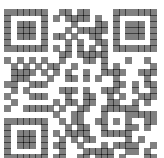
(a) find  $\frac{dy}{dx}$ , [3]

(b) find  $\frac{d^2y}{dx^2}$ , [2]

(c) show that [3]

$$4x^2 \frac{d^2y}{dx^2} + 4x \frac{dy}{dx} - y = 0.$$

Total: 8





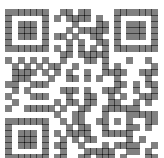
8. (a) Prove that the sum of the first  $n$  positive integers is given by [4]

$$\frac{1}{2}n(n + 1).$$

- (b) Hence, find the sum of [5]

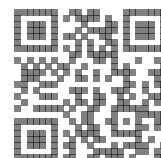
- i. the integers from 100 to 200 inclusive,
- ii. the integers between 300 to 600 inclusive which are divisible by 3.

Total: 9

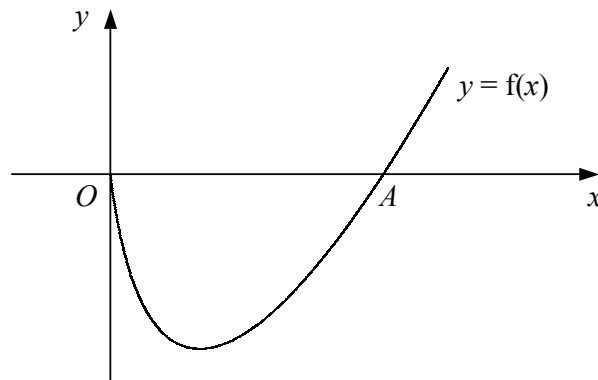


9. (a) Express each of the following in the form  $p + q\sqrt{2}$  where  $p$  and  $q$  are rational. [5]
- i.  $(4 - 3\sqrt{2})^2$
  - ii.  $\frac{1}{2+\sqrt{2}}$
- (b) i. Solve the equation  $y^2 + 8 = 9y$ . [5]
- ii. Hence solve the equation  $x^3 + 8 = 9x^{\frac{3}{2}}$ .

Total: 10



10. Figure shows the curve with equation  $y = f(x)$ .



The curve meets the  $x$ -axis at the origin and at the point  $A$ . Given that

$$f'(x) = 3x^{\frac{1}{2}} - 4x^{-\frac{1}{2}},$$

- (a) find  $f(x)$ , [5]
- (b) find the coordinate of  $A$ . [2]

The point  $B$  on the curve has  $x$ -coordinate 2.

- (c) Find an equation for the tangent to the curve at  $B$  in the form  $y = mx + c$ . [6]

Total: 13

