

# Solomon Practice Paper

## Core Mathematics 1I

Time allowed: 90 minutes

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

Name:

Teacher:

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

How I can achieve better:

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Last updated: May 5, 2023

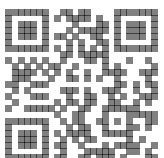


1. The  $n$ th term of a sequence is defined by

[3]

$$u_n = n^2 - 6n + 11, n \geq 1.$$

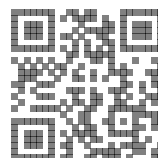
Given that the  $k$ th term of the sequence is 38, find the value of  $k$ .



2. Find

$$\int 4x^2 - \sqrt{x} \, dx.$$

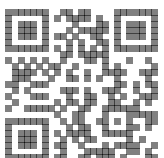
[3]



3. Find the integer  $n$  such that

$$4\sqrt{12} - \sqrt{75} = \sqrt{n}.$$

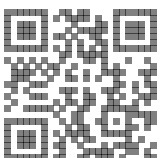
[4]



4. (a) Evaluate  $\left(36^{\frac{1}{2}} + 16^{\frac{1}{4}}\right)$ . [3]

(b) Solve the equation  $3x^{-\frac{1}{2}} - 4 = 0$ . [3]

Total: 6



5. The curve  $y = f(x)$  passes through the point  $P(-1, 3)$  and is such that

$$\frac{dy}{dx} = -\frac{1}{x^2}, \quad x \neq 0.$$

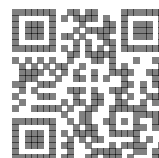
(a) Using integration, find  $f(x)$ .

[4]

(b) Sketch the curve  $y = f(x)$  and write down the equations of its asymptotes.

[3]

Total: 7

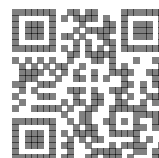


6.

$$f(x) = x^2 - 10x + 17.$$

- (a) Express  $f(x)$  in the form  $a(x + b)^2 + c$ . [3]
- (b) State the coordinates of the minimum point of the curve  $y = f(x)$ . [1]
- (c) Deduce the coordinates of the minimum point of each of the following curves: [4]
- $y = f(x) + 4$ ,
  - $y = f(2x)$ .

Total: 8



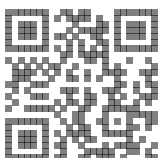
7. Given that the equation

$$4x^2 - kx + k - 3 = 0,$$

where  $k$  is a constant, has real roots,

- (a) show that  $k^2 - 16k + 48 \geq 0$ , [2]
- (b) find the set of possible values of  $k$ , [3]
- (c) state the smallest value of  $k$  for which the roots are equal and solve the equation when  $k$  takes this value. [3]

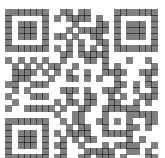
Total: 8





8. (a) The first and third terms of an arithmetic series are 3 and 27 respectively. [5]
- i. Find the common difference of the series.
  - ii. Find the sum of the first 11 terms of the series.
- (b) Find the sum of the integers between 50 and 150 which are divisible by 8. [5]

Total: 10



9. A curve has the equation  $y = x^3 - 5x^2 + 7x$ .

(a) Show that the curve only crosses the  $x$ -axis at one point. [4]

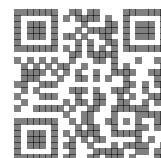
The point  $P$  on the curve has coordinates  $(3, 3)$ .

(b) Find an equation for the normal to the curve at  $P$ , giving your answer in the form  $ax + by = c$ , [6]  
where  $a, b$  and  $c$  are integers.

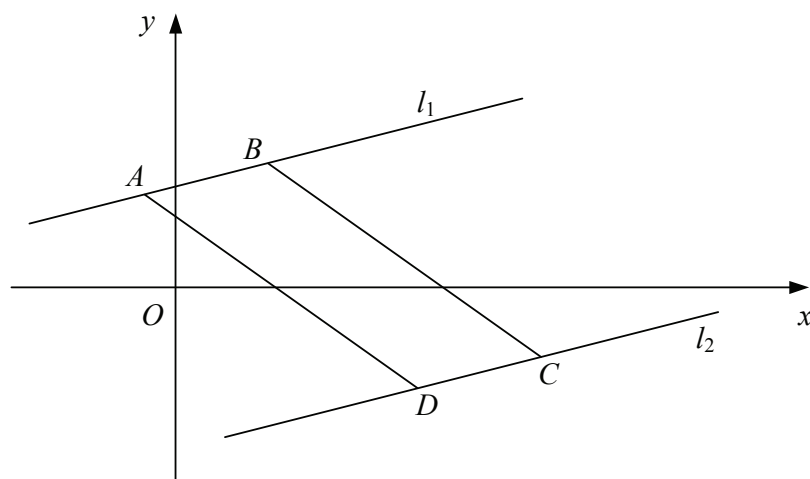
The normal to the curve at  $P$  meets the coordinate axes at  $Q$  and  $R$ .

(c) Show that triangle  $OQR$ , where  $O$  is the origin, has area  $28\frac{1}{8}$ . [3]

Total: 13



10. Figure shows the parallelogram  $ABCD$ .



The points  $A$  and  $B$  have coordinates  $(-1, 3)$  and  $(3, 4)$  respectively and lie on the straight line  $l_1$ .

- (a) Find an equation for  $l_1$ , giving your answer in the form  $ax + by + c = 0$ , where  $a, b$  and  $c$  are integers. [4]

The points  $C$  and  $D$  lie on the straight line  $l_2$  which has the equation  $x - 4y - 21 = 0$ .

- (b) Show that the distance between  $l_1$  and  $l_2$  is  $k\sqrt{17}$ , where  $k$  is an integer to be found. [7]
- (c) Find the area of parallelogram  $ABCD$ . [2]

Total: 13

