

Solomon Practice Paper

Core Mathematics 1F

Time allowed: 90 minutes

Centre: www.CasperYC.club

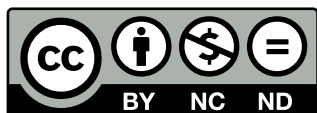
Name:

Teacher:

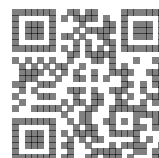
Question	Points	Score
1	3	
2	3	
3	4	
4	5	
5	6	
6	8	
7	10	
8	11	
9	12	
10	13	
Total:	75	

How I can achieve better:

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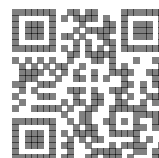
Last updated: May 5, 2023



1. Find in exact form the real solutions of the equation

[3]

$$x^4 = 5x^2 + 14.$$

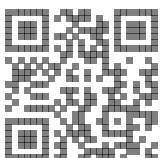


2. Express

$$\frac{2}{3\sqrt{5} + 7}$$

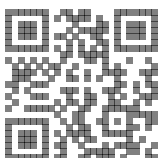
[3]

in the form $a + b\sqrt{5}$ where a and b are rational.

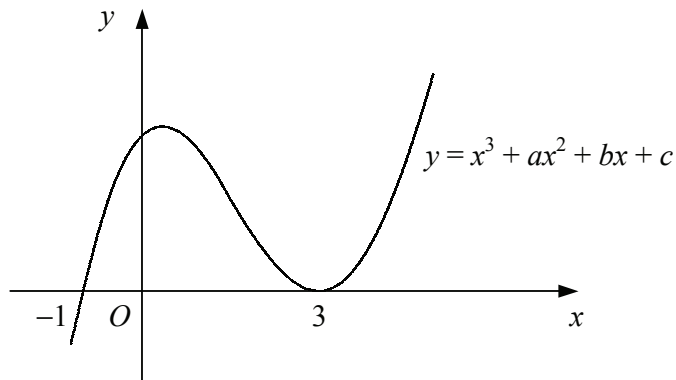


3. (a) Solve the equation $x^{\frac{3}{2}} = 27$. [2]
- (b) Express $(2\frac{1}{4})^{-\frac{1}{2}}$ as an exact fraction in its simplest form. [2]

Total: 4

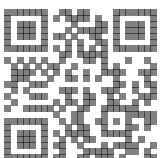


4. Figure shows the curve with equation $y = x^3 + ax^2 + bx + c$, where a, b and c are constants. [5]



The curve crosses the x -axis at the point $(-1, 0)$ and touches the x -axis at the point $(3, 0)$.

Show that $a = -5$ and find the values of b and c .



5. Given that

$$y = \frac{x^4 - 3}{2x^2},$$

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

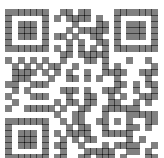
[4]

(b) show that

[2]

$$\frac{d^2y}{dx^2} = \frac{x^4 - 9}{x^4}.$$

Total: 6



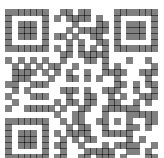
6. (a) Sketch on the same diagram the curve with equation $y = (x - 2)^2$ and the straight line with equation $y = 2x - 1$. [5]

Label on your sketch the coordinates of any points where each graph meets the coordinate axes.

- (b) Find the set of values of x for which [3]

$$(x - 2)^2 > 2x - 1.$$

Total: 8



7. A curve has the equation

$$y = \frac{x}{2} + 3 - \frac{1}{x}, x \neq 0.$$

The point A on the curve has x -coordinate 2.

(a) Find the gradient of the curve at A .

[4]

(b) Show that the tangent to the curve at A has equation

[3]

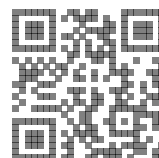
$$3x - 4y + 8 = 0.$$

The tangent to the curve at the point B is parallel to the tangent at A .

(c) Find the coordinates of B .

[3]

Total: 10



8. The straight line l_1 has gradient $\frac{3}{2}$ and passes through the point $A(5, 3)$.

(a) Find an equation for l_1 in the form $y = mx + c$. [2]

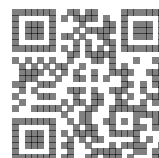
The straight line l_2 has the equation $3x - 4y + 3 = 0$ and intersects l_1 at the point B .

(b) Find the coordinates of B . [3]

(c) Find the coordinates of the mid-point of AB . [2]

(d) Show that the straight line parallel to l_2 which passes through the mid-point of AB also passes through the origin. [4]

Total: 11



9. The third term of an arithmetic series is $5\frac{1}{2}$.

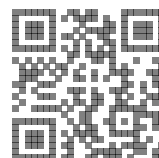
The sum of the first four terms of the series is $22\frac{3}{4}$.

(a) Show that the first term of the series is $6\frac{1}{4}$ and find the common difference. [7]

(b) Find the number of positive terms in the series. [3]

(c) Hence, find the greatest value of the sum of the first n terms of the series. [2]

Total: 12



10. The curve C has the equation $y = f(x)$.

Given that

$$\frac{dy}{dx} = 8x - \frac{2}{x^3}, \quad x \neq 0.$$

and that the point $P(1, 1)$ lies on C ,

- (a) find an equation for the tangent to C at P in the form $y = mx + c$, [3]
- (b) find an equation for C , [5]
- (c) find the x -coordinates of the points where C meets the x -axis, giving your answers in the form $k\sqrt{2}$. [5]

Total: 13

