

# Solomon Practice Paper

## Core Mathematics 3A

Time allowed: 90 minutes

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

Name:

Teacher:

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

How I can achieve better:

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5. (a) Express

$$3 \cos(x^\circ) + \sin(x^\circ)$$

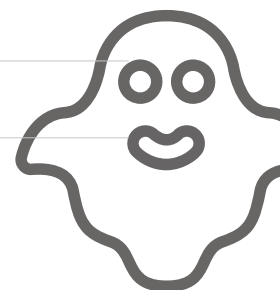
in the form  $R \cos(x - \alpha)^\circ$  where  $R > 0$  and  $0 < \alpha < 90$ .

(b) Using your answer to part (a), or otherwise, solve the equation

$$6 \cos^2(x^\circ) + \sin(2x^\circ) = 0,$$

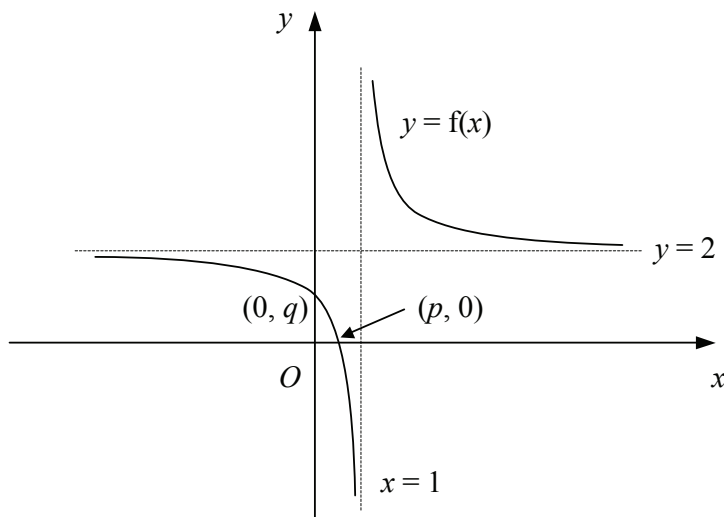
for  $x$  in the interval  $0^\circ \leq x \leq 360^\circ$ , giving your answers to 1 decimal place where appropriate.

Total: 10





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



The curve crosses the axes at  $(p, 0)$  and  $(0, q)$  and the lines  $x = 1$  and  $y = 2$  are asymptotes of the curve.

- (a) Showing the coordinates of any points of intersection with the axes and the equations of any asymptotes, sketch on separate diagrams the graphs of [6]
- i.  $y = |f(x)|$ ,
  - ii.  $y = 2f(x + 1)$ .

Given also that

$$f(x) \equiv \frac{2x - 1}{x - 1}, \quad x \in \mathbb{R}, x \neq 1,$$

- (b) find the values of  $p$  and  $q$ , [3]
- (c) find an expression for  $f^{-1}(x)$ . [3]

Total: 12

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7. (a) i. Show that

$$\sin(x + 30)^\circ + \sin(x - 30)^\circ \equiv a \sin(x^\circ),$$

where  $a$  is a constant to be found.

ii. Hence find the exact value of  $\sin(75^\circ) + \sin(15^\circ)$ , giving your answer in the form  $b\sqrt{6}$ .

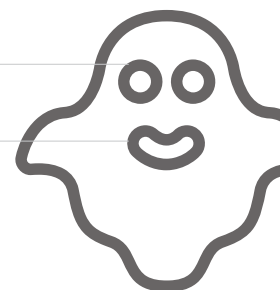
(b) Solve, for  $0 \leq y^\circ \leq 360^\circ$ , the equation

$$2 \cot^2(y^\circ) + 5 \csc(y^\circ) + \csc^2(y^\circ) = 0.$$

[6]

[6]

Total: 12





8.

$$f(x) = \frac{x^4 + x^3 - 5x^2 - 9}{x^2 + x - 6}.$$

(a) Using algebraic division, show that

[5]

$$f(x) = x^2 + A + \frac{B}{x + C},$$

where  $A$ ,  $B$  and  $C$  are integers to be found.(b) By sketching two suitable graphs on the same set of axes, show that the equation  $f(x) = 0$  has exactly one real root.

[3]

(c) Use the iterative formula

[5]

$$x_{n+1} = 2 + \frac{1}{x_n^2 + 1},$$

with a suitable starting value to find the root of the equation  $f(x) = 0$  correct to 3 significant figures and justify the accuracy of your answer.

Total: 13

