

# Solomon Practice Paper

## Pure Mathematics 1G

Time allowed: 90 minutes

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

Name:

Teacher:

Question	Points	Score
1	5	
2	6	
3	7	
4	9	
5	9	
6	11	
7	14	
8	14	
Total:	75	

How I can achieve better:

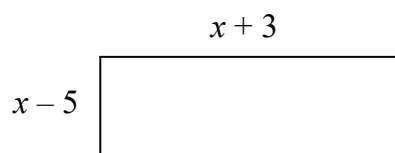
- 
- 
- 



Last updated: July 14, 2025

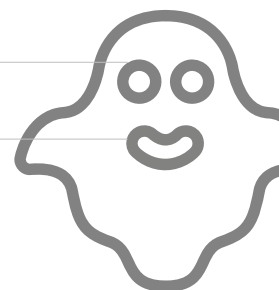


[5]



The frame is to have a width of  $(x + 3)$  centimetres and a height of  $(x - 5)$  centimetres.

Given that the area enclosed by the edge of the frame is to be at most  $105 \text{ cm}^2$ , find the set of possible values of  $x$ .



2. (a) Solve the equation

[3]

$$y - \frac{2}{y} = 5,$$

giving your answers correct to 2 decimal places.

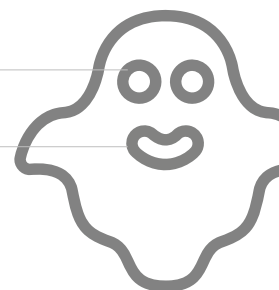
(b) Given that  $p$  and  $q$  are constants, prove that the equation

[3]

$$x^2 - 2px + 3q - 1 = 0$$

has no real solutions only if  $q > \frac{p^2 + 1}{3}$ .

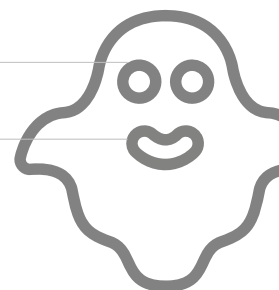
Total: 6



- For an investor paying this minimum amount in each year,

- (b) find the amount in the scheme after the payment of interest at the end of 12 years. [4]

Total: 7



- $$\cos \left( \theta - \frac{\pi}{3} \right) = \frac{\sqrt{3}}{2}.$$

- Your graph should show clearly where the curve intersects each of the coordinate axes.

Total: 9



5.

$f(x) \equiv x^3 + 2x^2 + ax + 2.$

- (a) Given that  $(x - 2)$  is a factor of  $f(x)$ , show that  $a = -9$ . [3]
- (b) Hence write  $f(x)$  as the product of a linear factor and a quadratic factor. [3]
- (c) Solve the equation  $f(x) = 0$ , giving your answers in surd form when appropriate. [3]

Total: 9

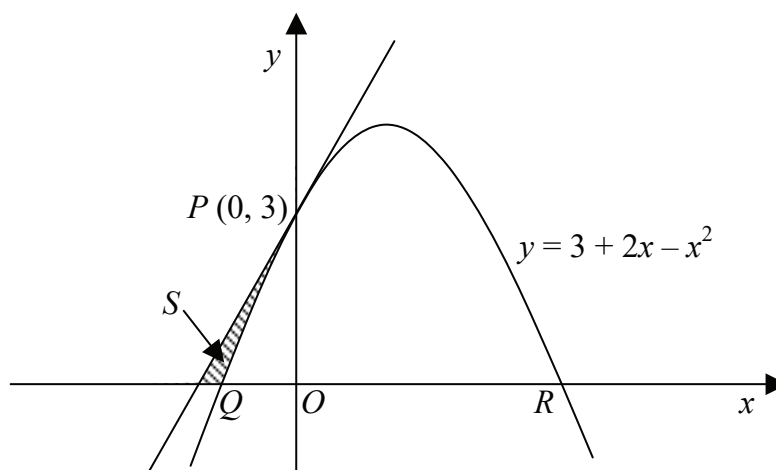


6. The straight line  $l$  passes through the points  $A(-1, k)$  and  $B(8, 2)$  and has a gradient of  $-\frac{1}{2}$ .
- (a) Show that  $k = \frac{13}{2}$ . [2]
- (b) Find the equation of the line  $m$  that is perpendicular to  $l$  and passes through the mid-point of  $AB$ . Give the equation in the form  $ax + by + c = 0$  where  $a, b$  and  $c$  are integers to be found and  $a > 0$ . [5]
- (c) Find the exact area of the triangle enclosed by the line  $m$  and the coordinate axes. [4]

Total: 11



7. Figure shows the line  $y = 3 + 2x - x^2$  and its tangent at the point  $P(0, 3)$ .



The curve cuts the  $x$ -axis at  $Q$  and  $R$  as shown.

- (a) Find the coordinates of the points  $Q$  and  $R$ . [3]
- (b) Find an equation of the tangent to the curve at  $P$ . [4]

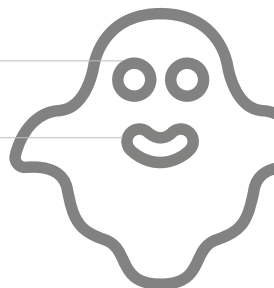
The shaded region  $S$  is bounded by the curve, the tangent and the  $x$ -axis.

- (c) Find the exact area of the region  $S$ . [7]

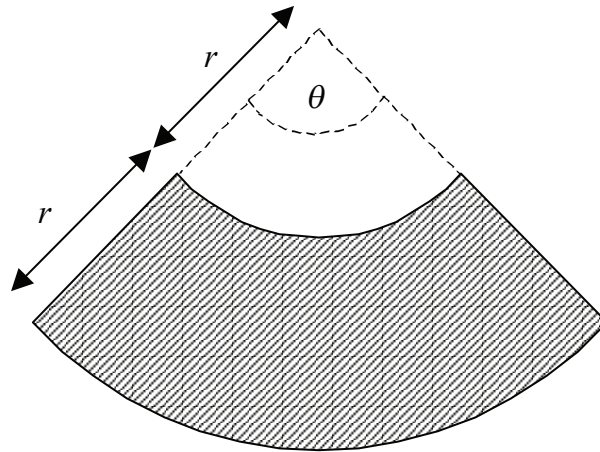
Total: 14







8. Figure shows the shape of a company logo.



The shape is made by removing a circular sector of radius  $r$  cm, angle  $\theta$  radians from a larger circular sector of radius  $2r$  cm, angle  $\theta$  radians.

- (a) Show that the area,  $A \text{ cm}^2$ , of the shape is given by  $A = \frac{3}{2}r^2\theta$ . [2]
- (b) Given that  $A = 90$ , show that the perimeter,  $P \text{ cm}$ , of the shape is given by [4]

$$P = 2r + 180r^{-1}.$$

Given that  $r$  can vary,

- (c) find the value of  $r$  for which  $P$  is a minimum and the corresponding value of  $P$ , giving your answers in the form  $a\sqrt{10}$ , [6]
- (d) justify that your value of  $P$  is a minimum. [2]

Total: 14

