

Solomon Practice Paper

Further Pure Mathematics 2H

Time allowed: 90 minutes

Centre: www.CasperYC.club

Name:

Teacher:

| Question | Points | Score |
|----------|--------|-------|
| 1 | 8 | |
| 2 | 8 | |
| 3 | 8 | |
| 4 | 9 | |
| 5 | 11 | |
| 6 | 13 | |
| 7 | 18 | |
| Total: | 75 | |

How I can achieve better:

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-
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Last updated:

July 14, 2025

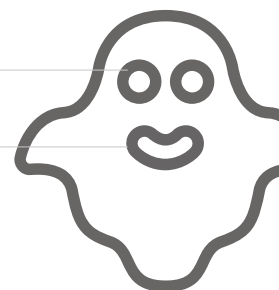


1. A curve has the equation

[8]

$$2x^2 + y^2 = 4.$$

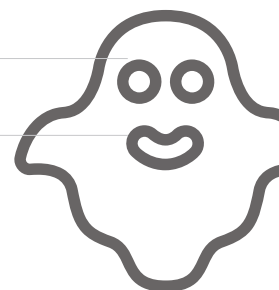
Find the radius of curvature of the curve at the point $(1, -\sqrt{2})$.



2. (a) Using the definition of $\cosh(x)$ in terms of exponential functions show that $\cosh(x)$ is an even function. [2]
- (b) Given that $x > 0$ and $y > 0$, solve the simultaneous equations [6]

$$\begin{aligned}\ln(xy) &= \cosh^{-1}\left(\frac{5}{3}\right) \\ \cosh(3x - y) &= 1\end{aligned}$$

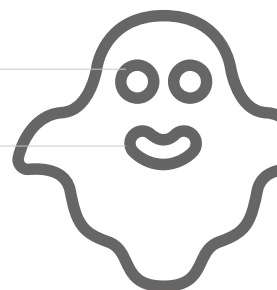
Total: 8



3. Find

[8]

$$\int \frac{1}{13 \cosh(x) - 5 \sinh(x)} dx.$$

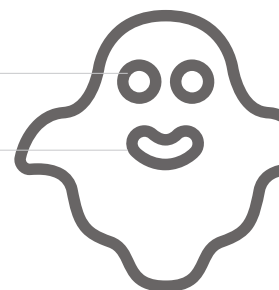


[4]

$$\frac{dy}{dx} = \frac{1}{\sqrt{x - x^2}}.$$

[5]

Total: 9



5. The point $P(at^2, 2at)$, $t \neq 0$, lies on the parabola C with equation $y^2 = 4ax$.

- (a) Show that an equation of the tangent to C at P is

$$yt = x + at^2.$$

The tangent to C at P meets the x -axis at Q and the y -axis at R .

M is the mid-point of QR .

- (b) Find the coordinates of M .

Given that OM is perpendicular to OP , where O is the origin,

- (c) show that $t^2 = 2$.

Total: 11



6.

$$I_n = \int \frac{\cos(n\theta)}{\sin(\theta)} d\theta, \quad n \in \mathbb{N}.$$

(a) By considering $I_n - I_{n-2}$, or otherwise, show that

[5]

$$I_n = \frac{2 \cos((n-1)\theta)}{n-1} + I_{n-2}.$$

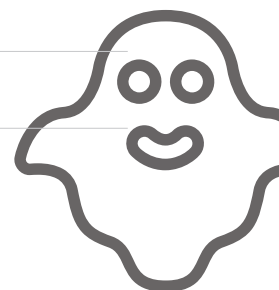
(b) Hence evaluate

[8]

$$\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \frac{\cos(5\theta)}{\sin(\theta)} d\theta,$$

leaving your answer in terms of natural logarithms.

Total: 13



$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1,$$

The coordinates of the foci of C are $(\pm\sqrt{3}, 0)$, and the equations of its directrices are $x = \pm\frac{4}{\sqrt{3}}$.

[4]

[6]

$$A = \frac{\pi}{2} \int_{-2}^2 \sqrt{16 - 3x^2} \, dx.$$

[8]

$$A = \frac{8}{9}\pi^2\sqrt{3} + 2\pi.$$

