

# 2022 ADDITIONAL MATHEMATICS PRELIM PAPER 2

## Answer Key

|   |                                                                                                                                                                                        |    |                                                                                                                                                |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | $-2 < k < 6$                                                                                                                                                                           | 8  | (a) -<br>(b) $P = \sqrt{136} \cos(2\theta - 31.0^\circ) + 6$<br>(c) Max value of $P = 17.7$ (3 sf)<br>$\theta = 15.5^\circ$ (1 dp)             |
| 2 | $x < -\sqrt{6}$ or $x > \sqrt{6}$<br>$x < -2.45$ or $x > 2.45$                                                                                                                         | 9  | (i) Centre of circle = $(-5, 3)$<br>Radius of circle = 5 units<br>(ii) -<br>(iii) $k = -36$                                                    |
| 3 | $x = -2$ or $x = \frac{2}{3}$ or $x = -4$                                                                                                                                              | 10 | (a) $\frac{dy}{dx} = 2 + 8(\cot 4x + \tan 4x)$<br>(b) $y = 18x - \pi$                                                                          |
| 4 | $x = 1.29$ (3 sf)                                                                                                                                                                      | 11 | $\frac{dy}{dx} = \frac{1}{(\cos x - \sin x)^2}$<br>$\int_0^{\frac{3\pi}{4}} \frac{2\cos^2 x - \cos 2x}{(\cos x - \sin x)^2} dx = -\frac{1}{2}$ |
| 5 | (a) Since $0 \leq r \leq 10$ and $r \geq 7.5$ ,<br>Therefore $r = 8, 9, 10$<br>there are only three terms of<br>non-negative powers of $x$ .<br>(b) $n = 15$ or $-\frac{137}{10}$ (NA) | 12 | (i) $t = \frac{5}{3}$ or $t = 5$<br>(ii) $s = t^3 - 10t^2 + 25t - 6$<br>(iii) 8 cm<br>(iv) -                                                   |
| 6 | $a = 1, b = 2$                                                                                                                                                                         | 13 | (a) -<br>(b) $y = \frac{1.22}{x^2}$                                                                                                            |
| 7 | (a) -<br>(b) -<br>(c) -                                                                                                                                                                |    |                                                                                                                                                |