



TEST 1 – POLAR COORDINATES & COMPLEX NUMBERS

NAME: _____ DATE: _____

[To achieve full marks, working and reasoning should be shown.]

[A maximum of 2 marks will be deducted for incorrect rounding, units, notation, etc.]

This is Resource Free – 40 minutes for 36 marks:

1. [2, 2, 2 = 6 marks]

Determine $\frac{dy}{dx}$ for each of the following

a) $y = (e^{2x} + 1)^3$

b) $y = \frac{3x - 1}{x^2 + 1}$

c) $y = \ln[x^2(x + 1)]$

2. [4 marks]

Express $(1, -1)$ and $(1, \sqrt{3})$ into **exact** polar form for $-\pi < \theta \leq \pi$.

3. [2 marks]

Find the **exact** distance between the points A $[6, 25^\circ]$ and B $[10, 145^\circ]$.

4. [3 marks]

Find the polar equation and the Cartesian equation of a circle of centre $(0,0)$ and radius 3.

5. [1, 2, 2 = 5 marks]

Given $z = 3 - 3i$, calculate:

a) \bar{z}

b) z^2

c) $z \times \bar{z}$

6. [1, 1, 1 = 3 marks]

For each of the following, express p in terms of q .

a) $q^4 = \frac{p^3}{8}$

b) $\log_e p = 2 \log_e q$

c) $\frac{e^{2p}}{3} = q$

7. [3 marks]

The Cartesian equation of a circle is $x^2 + y^2 = 10$. Find the polar equation of this circle.

8. [1, 4, 2 = 7 marks]

If $z = \text{cis } \frac{\pi}{4}$ and $w = \text{cis } \frac{\pi}{6}$,

a) express $\frac{z}{w}$ in polar form,

b) express z , w and $\frac{z}{w}$ in Cartesian form, and

c) give $\frac{z}{w}$ with a rationalised denominator.

9. [3 marks]

Find the polar equation of this curve.

