

MATHEMATICS

Level Three

Polar and Rectangular

A point on a polar coordinate system is located at $r = 2.0$ and $\theta = 25^\circ$.

- 1) Find the Cartesian (x and y) coordinates of the point
- 2) Verify the solution using the Pythagoras theorem and trigonometric ratios.

Repeat the problems for the following radii and θ

- | | |
|--------------|------------------------|
| a) $r = 4.0$ | $\theta = 36$ degrees |
| b) $r = 3.5$ | $\theta = 154$ degrees |
| c) $r = 15$ | $\theta = 213$ degrees |
| d) $r = 26$ | $\theta = 86$ degrees |
| e) $r = 41$ | $\theta = 276$ degrees |

- 3) Graph the above points in polar form – on an Argand diagram.

- 4) Find the bearing and distance from the origin to each of these points:
 - a) (3,6)
 - b) (-5,2)
 - c) (4,-9)

- 5) If the origin of your coordinate system is 400000mE (East – x axis) and 800000mN (North – y axis), calculate the bearing and distance to each of the following points:

- a) 489620mE, 875126mN
- b) 471256mE, 812359mN
- c) 403485mE, 843650mN
- d) 435945mE, 865148mN
- e) (extension: Calculate the bearings in degrees, minutes and seconds?)

- 6) Compute the distance between the following coordinates (as listed in Q.5)
 - a) a-b
 - b) b-c
 - c) c-d
 - d) d-a

- 7) In setting out the base of a building platform for a new shopping mall in Hastings, a post is driven into the ground at coordinates 458159mE and 862157mN. From that post, Anna (the surveyor) traverses 100m East, and then traverses 176m on a bearing of 165° , turns to 260° and traverses 125m and then back to the post in a straight line.
- a) Compute the coordinates at each change in direction. Label them B, C and D
 - b) What is the distance and bearing from the last mark back to the start?
 - c) How far in total did Anna traverse?