

3.14 Polar Function Graphs

Name: _____ Class: _____ Date: _____ Total: 8 marks

KEY WORDS polar function 极坐标函数

Objective

Build the skills to answer exam questions on **polar function graphs**.

You must be able to:

- interpret a **polar function** 极坐标函数 $r = f(\theta)$
- recognise the circle $r = \text{constant}$

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ Polar graphs

A polar function $r = f(\theta)$ gives the distance r from the origin at each angle θ .

- $r = \text{constant}$ is a **circle** centred at the origin;
- $r = a \cos \theta$ is a circle through the origin;
- $r = a + b \cos \theta$ is a **limaçon**.

■ Example

$r = 4$ is a circle of radius 4 centred at the origin.

2 Practice

2.1 State what $r = 3$ graphs in polar form. [1]

2.2 State what $r = f(\theta)$ represents. [1]

2.3 For $r = 2$, state the radius of the circle. [1]

3 Exam-style questions

3.1 The polar graph $r = 5$ is [1]

- **A** a line
- **B** a circle of radius 5
- **C** a spiral
- **D** a single point

3.2 In $r = f(\theta)$, r represents the [1]

- **A** angle
- **B** distance from the origin
- **C** slope
- **D** area

3.3 Consider $r = 4$.

(a) State the shape. [1]

(b) State the radius. [1]

(c) State the centre. [1]

Solutions

2.1 a circle of radius 3 centred at the origin.

2.2 the distance from the origin as a function of the angle.

2.3 2.

3.1 B.

3.2 B.

3.3 (a) a circle. (b) 4. (c) the origin.