

Exercise walk-through

Parametrically Defined Circles and Lines ■ 4.4

eXercise

You must be able to

- write parametric equations for a **circle** 圆 and a **line** 直线

Method — Circles and lines

- **circle** of radius r (centred at the origin): $x = r \cos t$, $y = r \sin t$;
- **line** through (x_0, y_0) with direction (a, b) : $x = x_0 + at$, $y = y_0 + bt$.

Method — Example

$x = 3 \cos t$, $y = 3 \sin t$ is a circle of radius 3.

Practice 2.1 ■ 2 marks

Write parametric equations for a circle of radius 5.

Solution 2.1

Method: Circles and lines

Worked steps

$$x = 5 \cos t, y = 5 \sin t \quad \text{M1} \quad \text{A1}.$$

Practice 2.2 ■ 1 mark

State the radius of $x = 2 \cos t$, $y = 2 \sin t$.

Solution 2.2

Method: Circles and lines

Worked steps

2 **B1**.

Practice 2.3 ■ 1 mark

For the line $x = 1 + 2t$, $y = 3 + t$, state the point at $t = 0$.

Solution 2.3

Method: Circles and lines

Worked steps

$(1, 3)$ **B1**.

Exam-style 3.1 ■ 1 mark

A circle of radius r is

A $x = rt, y = rt$

B $x = r \cos t, y = r \sin t$

C $x = t, y = r$

D $x = r + t, y = r - t$

Solution 3.1

Method: Circles and lines

A $x = rt, y = rt$

B $x = r \cos t, y = r \sin t$ 

C $x = t, y = r$

D $x = r + t, y = r - t$

Worked steps

B.

Exam-style 3.2 ■ 1 mark

The line $x = x_0 + at$, $y = y_0 + bt$ passes through

A the origin

B (x_0, y_0) at $t = 0$

C (a, b)

D (t, t)

Solution 3.2

Method: Circles and lines

A the origin

B (x_0, y_0) at $t = 0$



C (a, b)

D (t, t)

Worked steps

B.

Exam-style 3.3 ■ 1 mark

$$x = 4 \cos t, y = 4 \sin t.$$

- (a) State the shape.
- (b) State the radius.
- (c) State the point at $t = 0$.

Solution 3.3

Worked steps

(a) a circle **B1**. (b) 4 **B1**. (c) $(4, 0)$ **B1**.