

**1** Transform each of the following equations from Cartesian to polar form.

**a**  $3x - 4y - 8 = 0$

**b**  $x^2 = 4ay$

**c**  $x^2 + y^2 = a^2x$

**d**  $xy = k$

**e**  $y^2 = \frac{x^3}{a-x}$

**2** Transform each of the following equations from polar to Cartesian form.

**a**  $r = 2 \cos \theta$

**b**  $r = -3 \operatorname{cosec} \theta$

**c**  $r = \sec \theta + 2$

**3** For  $z = 12 + 16i$  and  $w = 5 + 12i$ , find:

**a**  $\bar{z}$

**b**  $z + w$

**c**  $2z$

**d**  $|z|$

**e**  $-z + 2w$

**f**  $zw$

**g**  $\frac{z}{w}$

**h**  $|z + w|$

**i**  $\operatorname{Arg}(z)$

**j**  $\operatorname{Arg}(zw)$

**4** Write  $3 - 3i$  in polar form.

**5** For  $z = 2 \operatorname{cis}\left(\frac{\pi}{6}\right)$  and  $w = 4 \operatorname{cis}\left(\frac{-3\pi}{4}\right)$ , find in polar form:

**a**  $z^2$

**b**  $w^3$

**c**  $zw$

**d**  $z^{-1}$

**e**  $\frac{z}{w}$

**f**  $\frac{w}{z}$

**g**  $iz$

**h**  $\frac{w}{i}$

**6** Write  $6 \operatorname{cis}\left(\frac{-5\pi}{6}\right)$  in Cartesian form.

**7** Solve each of the following equations over  $C$ .

**a**  $(2 + 3i)z = 6$

**b**  $z^2 = -11$

**c**  $(3 + i)z + 1 + i = 4 - i$

**d**  $(x + 2)^2 = -10$

**e**  $(x + 4)^2 + 10 = 0$

**f**  $z^2 + z + 1 = 0$

**g**  $2z^2 + 2z + 8 = 0$