## Exercise 3C

**1 a** Speed $= |3\mathbf{i} + 4\mathbf{j}|$

$= \sqrt{3^2 + 4^2}$

$= \sqrt{9+16}$

$= \sqrt{25}$

$= 5 \text{ m s}^{-1}$

**b** Speed $= |24\mathbf{i} - 7\mathbf{j}|$

$= \sqrt{24^2 + (-7)^2}$

$= \sqrt{576+49}$

$= \sqrt{625}$

$= 25 \text{ km h}^{-1}$

**c** Speed $= |5\mathbf{i} + 2\mathbf{j}|$

$= \sqrt{5^2 + 2^2}$

$= \sqrt{25+4}$

$= \sqrt{29}$

$= 5.39 \text{ m s}^{-1}$ (3 s.f.)

**d** Speed $= |-7\mathbf{i} + 4\mathbf{j}|$

$= \sqrt{(-7)^2 + 4^2}$

$= \sqrt{49+16}$

$= \sqrt{65}$

$= 8.06 \text{ cm s}^{-1}$ (3 s.f.)

**2 a** Distance = speed × time

$= \sqrt{8^2 + 6^2} \times 5$

$= 5 \times \sqrt{64+36}$

$= 5 \times \sqrt{100}$

$= 50 \text{ km}$

**b** Distance = speed × time

$= \sqrt{5^2 + (-1)^2} \times 10$

$= 10 \times \sqrt{25+1}$

$= 10 \times \sqrt{26}$

$= 51.0 \text{ m}$ (3 s.f.)

**2 c** Distance = speed × time

$= \sqrt{6^2 + 2^2} \times 0.75$

$= 0.75 \times \sqrt{36+4}$

$= 0.75 \times \sqrt{40}$

$= 4.74 \text{ km}$ (3 s.f.)

**d** Distance = speed × time

$= \sqrt{(-4)^2 + (-7)^2} \times 120$

$= 120 \times \sqrt{16+49}$

$= 120 \times \sqrt{65}$

$= 967 \text{ cm}$ (3 s.f.)

**3 a** Speed $= \sqrt{(-3)^2 + 4^2}$

$= \sqrt{9+16}$

$= \sqrt{25}$

$= 5 \text{ m s}^{-1}$

Distance $= 5 \times 15 = 75 \text{ m}$

**b** Speed $= \sqrt{2^2 + 5^2}$

$= \sqrt{4+25}$

$= \sqrt{29}$

$= 5.39 \text{ m s}^{-1}$ (3 s.f.)

Distance $= 3 \times 5.39 = 16.2 \text{ m}$ (3 s.f.)

**c** Speed $= \sqrt{5^2 + (-2)^2}$

$= \sqrt{25+4}$

$= \sqrt{29}$

$= 5.39 \text{ km h}^{-1}$ (3 s.f.)

Distance $= 3 \times 5.39 = 16.2 \text{ km}$ (3 s.f.)

**3 d** Speed $= \sqrt{12^2 + (-5)^2}$

$= \sqrt{144 + 25}$

$= \sqrt{169}$

$= 13 \text{ km h}^{-1}$

Distance $= 0.5 \times 13 = 6.5 \text{ km}$