Section 1: Working with radians

Solutions to Exercise level 1

1. (i) $120° = 120 \times \frac{\pi}{180} = \frac{2\pi}{3}$ radians

(ii) $40° = 40 \times \frac{\pi}{180} = \frac{2\pi}{9}$ radians

(iii) $255° = 255 \times \frac{\pi}{180} = \frac{17\pi}{12}$ radians

2. (i) $39° = 39 \times \frac{\pi}{180} = 0.681$ radians (3 s.f.)

(ii) $152° = 152 \times \frac{\pi}{180} = 2.65$ radians (3 s.f.)

(iii) $304° = 304 \times \frac{\pi}{180} = 5.31$ radians (3 s.f.)

3. (i) $\frac{11\pi}{20}$ radians $= \frac{11\pi}{20} \times \frac{180}{\pi} = 99°$

(ii) 2 radians $= 2 \times \frac{180}{\pi} = 114.6°$

(iii) 0.45 radians $= 0.45 \times \frac{180}{\pi} = 25.8°$

4. (i) $\sin\theta = \frac{\sqrt{3}}{2}$

$\sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$ and solutions are in the first and second quadrants

so $\theta = \frac{\pi}{3}$ or $\pi - \frac{\pi}{3}$

$\theta = \frac{\pi}{3}$ or $\frac{2\pi}{3}$

(ii) $\cos\theta = -\frac{\sqrt{3}}{2}$

$\cos\frac{\pi}{6} = -\frac{\sqrt{3}}{2}$ and solutions are in the second and third quadrants

so $\theta = \pi - \frac{\pi}{6}$ or $\pi + \frac{\pi}{6}$

$\theta = \frac{5\pi}{6}$ or $\frac{7\pi}{6}$

(iii) $\tan\theta = \sqrt{3}$

$\tan\frac{\pi}{3} = \sqrt{3}$ and solutions are in the first and third quadrants

so $\theta = \frac{\pi}{3}$ or $\pi + \frac{\pi}{3}$

$\theta = \frac{\pi}{3}$ or $\frac{4\pi}{3}$