Worksheet 5

1. $5 + \csc(\theta + 270^\circ) = \frac{15 + 2\sqrt{3}}{3}$

$\csc(\theta + 270^\circ) = \frac{15 + 2\sqrt{3}}{3} - \frac{15}{3}$

$\csc(\theta + 270^\circ) = \frac{2\sqrt{3}}{3}$

$\sin\theta = \frac{\sqrt{3}}{2}$

$\theta = 60^\circ$

$\theta + 270^\circ = 60^\circ$

$\boxed{\theta = -210^\circ}$

2. $-\frac{3 + 2\sqrt{3}}{3} = -1 + \csc(\theta + 30^\circ)$

$-\frac{3}{3} + \frac{2\sqrt{3}}{3} + \frac{3}{3} = \csc(\theta + 30^\circ)$

$\frac{2\sqrt{3}}{3} = \csc(\theta + 30^\circ)$

$\frac{\sqrt{3}}{2} = \sin\theta$

$\theta = 60^\circ$

$\theta + 30^\circ = 60^\circ$

$\boxed{\theta = 30^\circ}$

3. $4\sin(\theta+60^\circ) = -2\sqrt{3}$

$$\sin(\theta+60^\circ) = \frac{-2\sqrt{3}}{4}$$

$$\sin\theta = -\frac{\sqrt{3}}{2}$$

$$\theta = -60^\circ$$

$$\theta + 60^\circ = -60^\circ$$

$$\boxed{\theta = -120^\circ}$$

4. $-\frac{1}{2} \cdot \sin(-30) = -\frac{1}{4}$

$$\sin(-30) = \frac{-1}{4} \cdot \frac{-2}{1}$$

$$\sin(-30) = \frac{1}{2}$$

$$\theta = 30^\circ$$

$$B = -3 \qquad -3$$

$$\theta = -10^\circ$$

5. $4 + \sin 3\theta = \frac{8-\sqrt{2}}{2}$

$$\sin 3\theta = \frac{8}{2} - \frac{\sqrt{2}}{2} - \frac{8}{2}$$

$$\sin 3\theta = -\frac{\sqrt{2}}{2}$$

$$\theta = -45^\circ/3 \rightarrow \boxed{\theta = -15^\circ}$$

6. $2\csc(-3\theta+\pi)=2$

$\csc(-3\theta+\pi)=1$

$\sin\theta=1$

$\theta=90^\circ$

$-3\theta+\pi=\cancel{90^\circ}\ \frac{\pi}{2}$

$-30^\circ=-\frac{\pi}{2}$

$$\boxed{\theta=\frac{\pi}{6}}$$

7. $\sqrt{3}=3\tan\left(\frac{\theta}{3}+\frac{7\pi}{4}\right)$

$\frac{\sqrt{3}}{3}=\tan\left(\frac{\theta}{3}+\frac{7\pi}{4}\right)$

$\tan\theta=\frac{\sqrt{3}}{3}$

$\theta=\frac{\pi}{6}$

$\frac{\theta}{3}+\frac{7\pi}{4}=\frac{\pi}{6}$

$\frac{\theta}{3}=\frac{2\pi}{12}-\frac{21\pi}{12}$

$\frac{\theta}{3}=-\frac{19\pi}{12}$

$\theta=-\frac{57\pi}{12}$

$$\boxed{\theta=-\frac{19\pi}{4}}$$

8. $4\cos\left(-3\theta + \frac{4\pi}{3}\right) = 2$

$\cos\left(-3\theta + \frac{4\pi}{3}\right) = \frac{1}{2}$

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

$-3\theta + \frac{4\pi}{3} = \frac{\pi}{3}$

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

$-3\theta = -\pi$

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

9. $4\cos\left(2\theta + \frac{3\pi}{4}\right) = 4$

$\cos\left(2\theta + \frac{3\pi}{4}\right) = 1$

$\cos\theta = 1$

$\theta = 0$

$2\theta + \frac{3\pi}{4} = 0$

$2\theta = -\frac{3\pi}{4}$

$\theta = -\frac{3\pi}{8}$

10. $5 + \sin\left(-2\theta + \frac{\pi}{3}\right) = \frac{11}{2}$

$\sin\left(-2\theta + \frac{\pi}{3}\right) = \frac{1}{2}$

$\sin\theta = \frac{1}{2}$

$\theta = \frac{\pi}{6}$

$-2\theta + \frac{\pi}{3} = \frac{\pi}{6}$

$-2\theta = -\frac{\pi}{6}$

$\theta = \frac{\pi}{12}$