

Unit 4.3 Sum and Difference Identities (Sine & Cosine) PRACTICE

Simplify.

1) $\cos 6u \cos -3u - \sin 6u \sin -3u$

$\cos 3u$

2) $\cos x \cos x - \sin x \sin x$

$\cos 2x$

3) $\cos -3v \cos 3v + \sin -3v \sin 3v$

$\cos -6v$

4) $\cos -4\theta \cos -5\theta - \sin -4\theta \sin -5\theta$

$\cos -9\theta$

5) $\sin 6v \cos -2v + \cos 6v \sin -2v$

$\sin 4v$

6) $\cos -4v \cos -3v + \sin -4v \sin -3v$

$\cos -v$

7) $\sin 3v \cos -4v + \cos 3v \sin -4v$

$\sin -v$

8) $\sin 4\theta \cos 2\theta - \cos 4\theta \sin 2\theta$

$\sin 2\theta$

9) $\sin -6v \cos -2v + \cos -6v \sin -2v$

$\sin -8v$

10) $\sin 6u \cos -3u + \cos 6u \sin -3u$

$\sin 3u$

11) $\sin -6v \cos -6v + \cos -6v \sin -6v$

$\sin -12v$

12) $\cos v \cos -3v - \sin v \sin -3v$

$\cos -2v$

Verify each identity.

$$13) \cos\left(\theta + \frac{\pi}{2}\right) = -\sin \theta$$

$$\begin{aligned} & \cos\left(\theta + \frac{\pi}{2}\right) \\ &= \cos \theta \cos \frac{\pi}{2} - \sin \theta \sin \frac{\pi}{2} \\ &= \cos \theta \cdot 0 - \sin \theta \cdot 1 \\ &= -\sin \theta \end{aligned}$$

$$15) \sin(\theta + 90^\circ) = \cos \theta$$

$$\begin{aligned} & \sin(\theta + 90^\circ) \\ &= \sin \theta \cos 90^\circ + \cos \theta \sin 90^\circ \\ &= \sin \theta \cdot 0 + \cos \theta \cdot 1 \\ &= \cos \theta \end{aligned}$$

$$17) \sin(180^\circ + \theta) = -\sin \theta$$

$$\begin{aligned} & \sin(180^\circ + \theta) \\ &= \sin 180^\circ \cos \theta + \cos 180^\circ \sin \theta \\ &= 0 \cos \theta - \sin \theta \\ &= -\sin \theta \end{aligned}$$

$$19) \cos(\pi + \theta) = -\cos \theta$$

$$\begin{aligned} & \cos(\pi + \theta) \\ &= \cos \pi \cos \theta - \sin \pi \sin \theta \\ &= -\cos \theta - 0 \sin \theta \\ &= -\cos \theta \end{aligned}$$

$$21) \sin\left(\frac{3\pi}{2} + \theta\right) = -\cos \theta$$

$$\begin{aligned} & \sin\left(\frac{3\pi}{2} + \theta\right) \\ &= \sin \frac{3\pi}{2} \cos \theta + \cos \frac{3\pi}{2} \sin \theta \\ &= -\cos \theta + 0 \sin \theta \\ &= -\cos \theta \end{aligned}$$

$$23) \sin(270^\circ - \theta) = -\cos \theta$$

$$\begin{aligned} & \sin(270^\circ - \theta) \\ &= \sin 270^\circ \cos \theta - \cos 270^\circ \sin \theta \\ &= -\cos \theta - 0 \sin \theta \\ &= -\cos \theta \end{aligned}$$

$$14) \cos(\theta - 270^\circ) = -\sin \theta$$

$$\begin{aligned} & \cos(\theta - 270^\circ) \\ &= \cos \theta \cos 270^\circ + \sin \theta \sin 270^\circ \\ &= \cos \theta \cdot 0 + \sin \theta \cdot -1 \\ &= -\sin \theta \end{aligned}$$

$$16) \sin(\theta - \pi) = -\sin \theta$$

$$\begin{aligned} & \sin(\theta - \pi) \\ &= \sin \theta \cos \pi - \cos \theta \sin \pi \\ &= \sin \theta \cdot -1 - \cos \theta \cdot 0 \\ &= -\sin \theta \end{aligned}$$

$$18) \cos(270^\circ + \theta) = \sin \theta$$

$$\begin{aligned} & \cos(270^\circ + \theta) \\ &= \cos 270^\circ \cos \theta - \sin 270^\circ \sin \theta \\ &= 0 \cos \theta - -\sin \theta \\ &= \sin \theta \end{aligned}$$

$$20) \cos(\theta - 90^\circ) = \sin \theta$$

$$\begin{aligned} & \cos(\theta - 90^\circ) \\ &= \cos \theta \cos 90^\circ + \sin \theta \sin 90^\circ \\ &= \cos \theta \cdot 0 + \sin \theta \cdot 1 \\ &= \sin \theta \end{aligned}$$

$$22) \cos(\theta - 180^\circ) = -\cos \theta$$

$$\begin{aligned} & \cos(\theta - 180^\circ) \\ &= \cos \theta \cos 180^\circ + \sin \theta \sin 180^\circ \\ &= \cos \theta \cdot -1 + \sin \theta \cdot 0 \\ &= -\cos \theta \end{aligned}$$

$$24) \sin(180^\circ - \theta) = \sin \theta$$

$$\begin{aligned} & \sin(180^\circ - \theta) \\ &= \sin 180^\circ \cos \theta - \cos 180^\circ \sin \theta \\ &= 0 \cos \theta - -\sin \theta \\ &= \sin \theta \end{aligned}$$