

## Double and half angle identities

Date \_\_\_\_\_ Period \_\_\_\_\_

**Use the half-angle identities to find the exact value of each.**

1)  $\sin 337.5^\circ$

2)  $\sin 157.5^\circ$

3)  $\tan 15^\circ$

4)  $\tan 75^\circ$

**Find the exact value of each.**

5)  $\sin \theta = -\frac{15}{17}$  where  $180 \leq \theta < 270$

Find  $\sin 2\theta$ 

6)  $\tan \theta = -\frac{12}{5}$  where  $270 \leq \theta < 360$

Find  $\sin 2\theta$

7)  $\sin \theta = \frac{15}{17}$  where  $0 \leq \theta < 90$

Find  $\tan 2\theta$

8)  $\cos \theta = \frac{\sqrt{35}}{6}$  where  $270 \leq \theta < 360$

Find  $\cos 2\theta$

9)  $\sin \theta = \frac{4}{5}$  where  $90 \leq \theta < 180$

Find  $\tan \frac{\theta}{2}$

10)  $\tan \theta = -\frac{4}{3}$  where  $90 \leq \theta < 180$

Find  $\cos \frac{\theta}{2}$

11)  $\cos \theta = -\frac{3}{5}$  where  $180 \leq \theta < 270$

Find  $\sin \frac{\theta}{2}$

12)  $\tan \theta = \frac{5}{3}$  where  $180 \leq \theta < 270$

Find  $\sin \frac{\theta}{2}$

Solve each equation for  $0 \leq \theta < 2\pi$ .

13)  $\sin^2 2\theta - 2\cos^2 \theta = 2\cos^2 \theta$

14)  $2\sin \theta + \sin 2\theta = 2\sin 2\theta$

15)  $2\cos^2 \theta + \cos 2\theta = 2$

16)  $4\sin^2 \theta = 3\sin \theta - \cos 2\theta$

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

18)  $-1 + \cos \frac{\theta}{2} = \cos \theta$

19)  $\sin \frac{\theta}{2} = \cos \theta$

20)  $2\cos \theta + 3 = 4\cos \frac{\theta}{2}$

## Answers to Double and half angle identities (ID: 1)

$$1) -\frac{\sqrt{2-\sqrt{2}}}{2}$$

$$2) \frac{\sqrt{2-\sqrt{2}}}{2}$$

$$3) 2 - \sqrt{3}$$

$$4) 2 + \sqrt{3}$$

$$5) \frac{240}{289}$$

$$6) -\frac{120}{169}$$

$$7) -\frac{240}{161}$$

$$8) \frac{17}{18}$$

$$9) 2$$

$$10) \frac{\sqrt{5}}{5}$$

$$11) \frac{2\sqrt{5}}{5}$$

$$12) \frac{\sqrt{578 + 51\sqrt{34}}}{34}$$

$$13) \left\{ \frac{\pi}{2}, \frac{3\pi}{2} \right\}$$

$$14) \{0, \pi\}$$

$$15) \left\{ \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6} \right\}$$

$$16) \left\{ \frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6} \right\}$$

$$17) \left\{ 0, \frac{5\pi}{3} \right\}$$

$$18) \left\{ \frac{2\pi}{3}, \pi \right\}$$

$$19) \left\{ \frac{\pi}{3}, \frac{5\pi}{3} \right\}$$

$$20) \left\{ \frac{2\pi}{3} \right\}$$