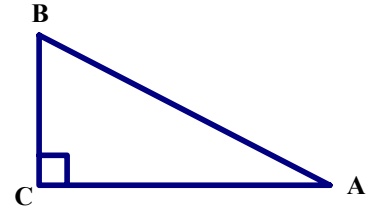


C. Trigonometric Functions

1. Write each of the following in terms of the co-related angle:

- (a) $\sin\left(\frac{\pi}{12}\right)$ (b) $\sin\left(\frac{2\pi}{5}\right)$ (c) $\sin\left(\frac{5\pi}{8}\right)$ (d) $\sin\left(\frac{5\pi}{12}\right)$
 (e) $\cos\left(\frac{5\pi}{18}\right)$ (f) $\cos\left(\frac{\pi}{9}\right)$ (g) $\cos\left(\frac{7\pi}{36}\right)$ (h) $\cos\left(\frac{5\pi}{7}\right)$

2. For right triangle ABC, if $\sin A = \frac{\sqrt{3}}{3}$, what is the value of $\cos B$?



3. If $\cos A = 0.109$, what is $\sin\left(\frac{\pi}{2} - A\right)$?

4. If $\cos\frac{11\pi}{180} = 0.9816$, what is $\sin\frac{79\pi}{180}$?

5. Solve for x , $0 \leq x \leq 2\pi$.

- (a) $\sin x = 0.4255$ (b) $\cos x = 0.1576$ (c) $\tan x = -0.6341$
 (d) $3 \sin x = \sin x + 1$ (e) $5 \cos x - \sqrt{3} = 3 \cos x$ (f) $\cos x - 1 = -\cos x$

6. Solve for x , $0 \leq x \leq 360^\circ$.

- (a) $2 \sin(2x) = -1$ (b) $5 \tan\left(\frac{x}{2}\right) = 1$ (c) $-1 \cos(3x) = 1$

7. Solve for x , $0 \leq x \leq 2\pi$.

- (a) $5 \cos^2 + 6 \cos x = 8$ (b) $3 \sin^2 x - 8 \sin x - 3 = 0$ (c) $\cos^2 x - 1 = 0$
 (d) $\sin x + 2 \cos x \sin x = 0$ (e) $\sin^2 x + \sin x = 0$ (f) $4 \sin^2 x - 3 \sin x - 1 = 0$

8. Use a double angle formula to re-write each expression:

- (a) $\cos 2(2x)$ (b) $\sin(6x)$

9. Express as a single sine or cosine function:

- (a) $2 \sin(5x) \cos(5x)$ (b) $\cos^2(2\theta) - \sin^2(2\theta)$ (c) $1 - 2 \sin^2(3x)$

10. If $\cos \theta = -\frac{4}{5}$ and $\frac{\pi}{2} \leq \theta \leq \pi$, find the value of $\sin 2\theta$ and $\cos 2\theta$.

11. If $\sin \theta = \frac{12}{13}$ and $0 \leq \theta \leq \frac{\pi}{2}$, find the value of $\sin 2\theta$ and $\cos 2\theta$.

12. Express as a single trigonometric function:

(a) $\cos 2a \cos a - \sin 2a \sin a$

(b) $\cos x \cos 4x + \sin x \sin 4x$

(c) $\sin 5 \cos 2 - \cos 5 \sin 2$

(d) $\sin 2m \cos m + \cos 2m \sin m$

13. Find the exact value of each of the following:

(a) $\sin\left(\frac{\pi}{4} - \frac{\pi}{3}\right)$

(b) $\cos\left(\frac{\pi}{6} + \frac{\pi}{4}\right)$

(c) $\sin(105^\circ)$

(d) $\cos(-15^\circ)$

(e) $\sin 50^\circ \cos 20^\circ - \cos 50^\circ \sin 20^\circ$

(f) $\cos \frac{\pi}{7} \cos \frac{4\pi}{21} - \sin \frac{\pi}{7} \sin \frac{4\pi}{21}$

14. If x and y are in the interval $(0, 90^\circ)$ and $\sin x = \frac{3}{5}$ and $\cos y = \frac{12}{13}$, evaluate:

(a) $\sin(x - y)$

(b) $\cos(x + y)$

15. If x is in the interval $(90^\circ, 180^\circ)$ and y is in the interval $(180^\circ, 270^\circ)$ and

$\cos x = \frac{-5}{13}$ and $\tan y = \frac{4}{3}$, evaluate:

(a) $\sin(x + y)$

(b) $\cos(x - y)$

ANSWERS

1. (a) $\cos\left(\frac{5\pi}{12}\right)$ (b) $\cos\left(\frac{\pi}{10}\right)$ (c) $\cos\left(\frac{\pi}{8}\right)$ (d) $\cos\left(\frac{\pi}{12}\right)$ (e) $\sin\left(\frac{2\pi}{9}\right)$ (f) $\sin\left(\frac{7\pi}{18}\right)$ (g) $\sin\left(\frac{11\pi}{36}\right)$ (h) $\sin\left(\frac{17\pi}{14}\right)$

2. $\cos B = \frac{\sqrt{3}}{3}$

3. 0.109

4. 0.9816

5. (a) 0.44, 2.70

(b) 1.41, 4.87

(c) 2.58, 5.72

(d) 0.52, 2.62

(e) 0.52, 5.76

(f) 1.05, 5.24

6. (a) 105, 165, 285, 345

(b) 22.6

(c) 60, 180, 300

7. (a) 0.64, 5.64

(b) 3.48, 5.97

(c) 0, 3.14, 6.28

(d) 0, 2.09, 3.14, 4.19, 6.28

(e) 0, 3.14, 4.71, 6.28

(f) 1.57, 3.39, 6.03

8. (a) $\cos^2(2x) - \sin^2(2x)$

(b) $2 \sin(3x) \cos(3x)$

9. (a) $\sin(10x)$

(b) $\cos 4\theta$

(c) $\cos 6x$

10. $\sin 2\theta = -\frac{24}{25}$

$\cos 2\theta = \frac{7}{25}$

11. $\sin 2\theta = \frac{120}{169}$

$\cos 2\theta = -\frac{119}{169}$

12. (a) $\cos 3a$

(b) $\cos 3x$

(c) $\sin 3$

(d) $\sin 3m$

13. (a) $\frac{1-\sqrt{3}}{2\sqrt{2}}$

(b) $\frac{\sqrt{3}-1}{2\sqrt{2}}$

(c) $\frac{\sqrt{3}+1}{2\sqrt{2}}$

(d) $\frac{\sqrt{3}+1}{2\sqrt{2}}$

(e) $\frac{1}{2}$

(f) $\frac{1}{2}$

14. (a) $\frac{16}{65}$

(b) $\frac{33}{65}$

15. (a) $-\frac{16}{65}$

(b) $-\frac{33}{65}$