

For Problems 1 through 4, find exact values of the six trigonometric functions of an angle  $\theta$  whose terminal side passes through the given point.

1.  $(4, -3)$
2.  $(-12, 5)$
3.  $(-5, -7)$
4.  $(2, 3)$

For Problems 5 through 8, find exact values of the six trigonometric functions of  $\theta$  if  $\theta$  terminates in the given quadrant and has the given function value.

5. Quadrant II,  $\sin \theta = \frac{4}{5}$
6. Quadrant III,  $\cos \theta = -\frac{1}{3}$
7. Quadrant IV,  $\sec \theta = 4$
8. Quadrant I,  $\csc \theta = \frac{13}{12}$

For Problems 9 through 14, find exact values of the six trigonometric functions of the given angle.

9.  $60^\circ$
10.  $135^\circ$
11.  $-315^\circ$
12.  $330^\circ$
13.  $180^\circ$
14.  $-270^\circ$

For Problems 15 through 26, find the exact value of the given trigonometric function. You should try to do this *quickly*, either from memory or by visualizing the diagram in your head.

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|----------------------|----------------------|
| 15. $\sin 180^\circ$ | 16. $\sin 225^\circ$ |
| 17. $\cos 240^\circ$ | 18. $\cos 120^\circ$ |
| 19. $\tan 315^\circ$ | 20. $\tan 270^\circ$ |
| 21. $\cot 0^\circ$   | 22. $\cot 300^\circ$ |
| 23. $\sec 150^\circ$ | 24. $\sec 0^\circ$   |
| 25. $\csc 45^\circ$  | 26. $\csc 330^\circ$ |

For Problems 27 through 46, evaluate the given expression. Leave the answer in simple radical form, that is, with no radicals in denominators.

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|---|---|
| 27. $\sin 30^\circ + \cos 60^\circ$   | 28. $\tan 120^\circ + \cot (-30^\circ)$                           |
| 29. $\tan 300^\circ \sec 300^\circ$   | 30. $\sin 300^\circ \csc 300^\circ$                               |
| 31. $12 \sin 45^\circ \cos 45^\circ$  | 32. $20 \sin 60^\circ \cos 240^\circ$                             |
| 33. $\cos 45^\circ \sin 210^\circ - \sin 30^\circ \cos 135^\circ$           | 34. $\cos 180^\circ \cos 45^\circ - \sin 180^\circ \sin 45^\circ$ |
| 35. $\tan 30^\circ \cot 30^\circ + \tan 60^\circ \cot 60^\circ$             | 36. $\sec 60^\circ \tan 135^\circ - \cot 60^\circ \sin 60^\circ$  |
| 37. $\cos^2 60^\circ + \sin^2 60^\circ$                                     | 38. $\cos^2 150^\circ + \sin^2 150^\circ$                         |
| 39. $\cot^2 330^\circ - \csc^2 330^\circ$                                   | 40. $\tan^2 240^\circ - \sec^2 240^\circ$                         |
| 41. $\cos^2 45^\circ - \sin^2 135^\circ$                                    | 42. $\sin^2 150^\circ + \cos^2 30^\circ$                          |
| 43. $\frac{\sec 30^\circ}{\cos 30^\circ}$                                   | 44. $\frac{\sin 120^\circ}{\cos 120^\circ}$                       |
| 45. $\sin^2 30^\circ + \cos^2 30^\circ + \tan^2 30^\circ - \sec^2 30^\circ$ | 46. $\sin^2 30^\circ + \cos^2 150^\circ + \tan^2 60^\circ$        |

Answers

	$\sin \theta$	$\cos \theta$	$\tan \theta$	$\cot \theta$	$\sec \theta$	$\csc \theta$
1.	$-\frac{3}{5}$	$\frac{4}{5}$	$-\frac{3}{4}$	$-\frac{4}{3}$	$\frac{5}{4}$	$-\frac{5}{3}$
2.	$\frac{5}{13}$	$-\frac{12}{13}$	$-\frac{5}{12}$	$-\frac{12}{5}$	$-\frac{13}{12}$	$\frac{13}{5}$
3.	$-\frac{7\sqrt{74}}{74}$	$-\frac{5\sqrt{74}}{74}$	$\frac{7}{5}$	$\frac{5}{7}$	$-\frac{\sqrt{74}}{5}$	$-\frac{\sqrt{74}}{7}$
4.	$\frac{3\sqrt{13}}{13}$	$\frac{2\sqrt{13}}{13}$	$\frac{3}{2}$	$\frac{2}{3}$	$\frac{\sqrt{13}}{2}$	$\frac{\sqrt{13}}{3}$
5.	$\frac{4}{5}$	$-\frac{3}{5}$	$-\frac{4}{3}$	$-\frac{3}{4}$	$-\frac{5}{3}$	$\frac{5}{4}$
6.	$-\frac{2\sqrt{2}}{3}$	$-\frac{1}{3}$	$2\sqrt{2}$	$\frac{\sqrt{2}}{4}$	$-3$	$-\frac{3\sqrt{2}}{4}$
7.	$-\frac{\sqrt{15}}{4}$	$\frac{1}{4}$	$-\sqrt{15}$	$-\frac{\sqrt{15}}{15}$	$4$	$-\frac{4\sqrt{15}}{15}$
8.	$\frac{12}{13}$	$\frac{5}{13}$	$\frac{12}{5}$	$\frac{5}{12}$	$\frac{13}{5}$	$\frac{13}{12}$
9.	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$	$\frac{\sqrt{3}}{3}$	$2$	$\frac{2\sqrt{3}}{3}$
10.	$\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{2}}{2}$	$-1$	$-1$	$-\sqrt{2}$	$\sqrt{2}$
11.	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	$1$	$1$	$\sqrt{2}$	$\sqrt{2}$
12.	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{3}}{3}$	$-\sqrt{3}$	$\frac{2\sqrt{3}}{3}$	$-2$
13.	$0$	$-1$	$0$	Undefined	$-1$	Undefined
14.	$1$	$0$	Undefined	$0$	Undefined	$1$

15. 0

16.  $-\frac{\sqrt{2}}{2}$

17.  $-\frac{1}{2}$

18.  $-\frac{1}{2}$

19. -1

20. undefined

21. undefined

22.  $-\frac{\sqrt{3}}{3}$

23.  $-\frac{2\sqrt{3}}{3}$

24. 1

25.  $\sqrt{2}$

26. -2

27. 1

28.  $-2\sqrt{3}$

29.  $-2\sqrt{3}$

30. 1

31. 6

32.  $-5\sqrt{3}$

33. 0

34.  $-\frac{\sqrt{2}}{2}$

35. 2

36.  $-\frac{5}{2}$

37. 1

38. 1

39. -1

40. -1

41. 0

42. 1

43.  $\frac{4}{3}$

44.  $-\sqrt{3}$

45. 0

46. 4