

Now that we have $\sin 0^\circ$ and $\cos 0^\circ$, we can find $\tan 0^\circ$ by using a ratio identity.

$$\tan 0^\circ = \frac{\sin 0^\circ}{\cos 0^\circ} = \frac{0}{1} = 0$$

To conclude this section, we take the information just obtained for 0° and 90° , along with the exact values in Table 1, and summarize them in Table 2. To make the information in Table 2 a little easier to memorize, we have written some of the exact values differently than we usually do. For example, in Table 2 we have written 2 as $\sqrt{4}$, 0 as $\sqrt{0}$, and 1 as $\sqrt{1}$.

TABLE 2

θ	0°	30°	45°	60°	90°
$\sin \theta$	$\frac{\sqrt{0}}{2}$	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{4}}{2}$
$\cos \theta$	$\frac{\sqrt{4}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{0}}{2}$
$\tan \theta$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	undefined

GETTING READY FOR CLASS

After reading through the preceding section, respond in your own words and in complete sentences.

- In a right triangle, which side is opposite the right angle?
- If A is an acute angle in a right triangle, how do you define $\sin A$, $\cos A$, and $\tan A$?
- State the Cofunction Theorem.
- How are $\sin 30^\circ$ and $\cos 60^\circ$ related?

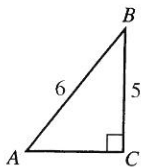
PROBLEM SET 2.1

Problems 1 through 6 refer to right triangle ABC with $C = 90^\circ$. In each case, use the given information to find the six trigonometric functions of A .

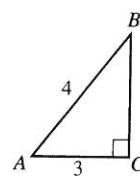
- $b = 3, c = 5$
- $b = 5, c = 13$
- $a = 2, b = 1$
- $a = 3, b = 2$
- $a = 2, b = \sqrt{5}$
- $a = 3, b = \sqrt{7}$

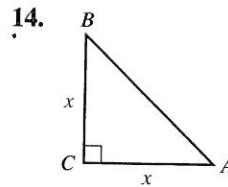
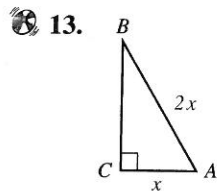
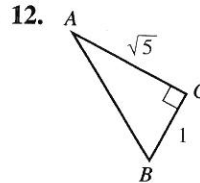
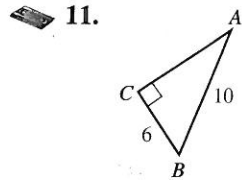
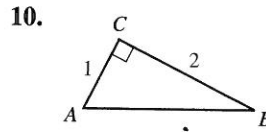
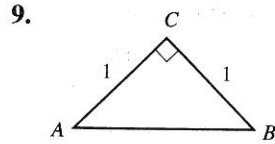
In each right triangle below, find $\sin A$, $\cos A$, $\tan A$, and $\sin B$, $\cos B$, $\tan B$.

7.

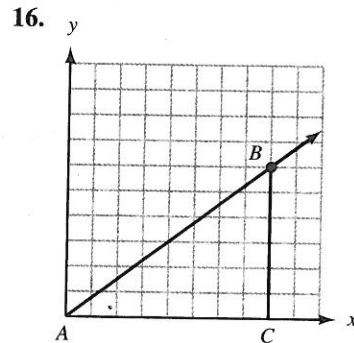
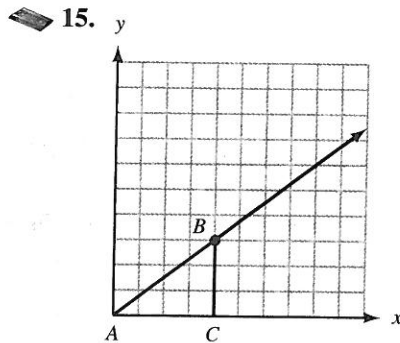


8.





In each diagram below, angle A is in standard position. In each case, find the coordinates of point B and then find $\sin A$, $\cos A$, and $\tan A$.



Use the Cofunction Theorem to fill in the blanks so that each expression becomes a true statement.

17. $\sin 10^\circ = \cos \underline{\hspace{1cm}}$

18. $\cos 40^\circ = \sin \underline{\hspace{1cm}}$

19. $\tan 8^\circ = \cot \underline{\hspace{1cm}}$

20. $\cot 12^\circ = \tan \underline{\hspace{1cm}}$

21. $\sin x = \cos \underline{\hspace{1cm}}$

22. $\sin y = \cos \underline{\hspace{1cm}}$

23. $\tan (90^\circ - x) = \cot \underline{\hspace{1cm}}$

24. $\tan (90^\circ - y) = \cot \underline{\hspace{1cm}}$

Complete the following tables using exact values. Do not rationalize any denominators.

25.

x	$\sin x$	$\csc x$
0°	0	
30°	$\frac{1}{2}$	
45°	$\frac{1}{\sqrt{2}}$	
60°	$\frac{\sqrt{3}}{2}$	
90°	1	

26.

x	$\cos x$	$\sec x$
0°	1	
30°	$\frac{\sqrt{3}}{2}$	
45°	$\frac{1}{\sqrt{2}}$	
60°	$\frac{1}{2}$	
90°	0	

Simplify each expression by first substituting values from the table of exact values and then simplifying the resulting expression.

- | | |
|---|---|
| 27. $4 \sin 30^\circ$ | 28. $5 \sin^2 30^\circ$ |
| 29. $(2 \cos 30^\circ)^2$ | 30. $\sin^3 30^\circ$ |
| 31. $(\sin 60^\circ + \cos 60^\circ)^2$ | 32. $\sin^2 60^\circ + \cos^2 60^\circ$ |
| 33. $\sin^2 45^\circ - 2 \sin 45^\circ \cos 45^\circ + \cos^2 45^\circ$ | |
| 34. $(\sin 45^\circ - \cos 45^\circ)^2$ | |
| 35. $(\tan 45^\circ + \tan 60^\circ)^2$ | 36. $\tan^2 45^\circ + \tan^2 60^\circ$ |

For each expression that follows, replace x with 30° , y with 45° , and z with 60° , and then simplify as much as possible.

- | | |
|------------------------------|------------------------------|
| 37. $2 \sin x$ | 38. $4 \cos y$ |
| 39. $4 \cos (z - 30^\circ)$ | 40. $-2 \sin (y + 45^\circ)$ |
| 41. $-3 \sin 2x$ | 42. $3 \sin 2y$ |
| 43. $2 \cos (3x - 45^\circ)$ | 44. $2 \sin (90^\circ - z)$ |

Find exact values for each of the following:

- | | | | |
|---------------------|---------------------|---------------------|---------------------|
| 45. $\sec 30^\circ$ | 46. $\csc 30^\circ$ | 47. $\csc 60^\circ$ | 48. $\sec 60^\circ$ |
| 49. $\cot 45^\circ$ | 50. $\cot 30^\circ$ | 51. $\sec 45^\circ$ | 52. $\csc 45^\circ$ |

Problems 53 through 56 refer to right triangle ABC with $C = 90^\circ$. In each case, use a calculator to find $\sin A$, $\cos A$, $\sin B$, and $\cos B$. Round your answers to the nearest hundredth.

- | | |
|---------------------------|---------------------------|
| 53. $a = 3.42, c = 5.70$ | 54. $b = 8.88, c = 9.62$ |
| 55. $a = 19.44, b = 5.67$ | 56. $a = 11.28, b = 8.46$ |

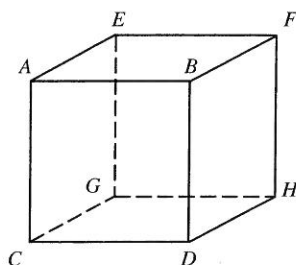


Figure 8

57. Suppose each edge of the cube shown in Figure 8 is 5 inches long. Find the sine and cosine of the angle formed by diagonals CF and CH .
58. Suppose each edge of the cube shown in Figure 8 is 3 inches long. Find the sine and cosine of the angle formed by diagonals DE and DG .
59. Suppose each edge of the cube shown in Figure 8 is x inches long. Find the sine and cosine of the angle formed by diagonals CF and CH .
60. Suppose each edge of the cube shown in Figure 8 is x inches long. Find the sine and cosine of the angle formed by diagonals DE and DG .

REVIEW PROBLEMS

From here on, each Problem Set will end with a series of review problems. In mathematics, it is very important to review. The more you review, the better you will understand the topics we cover and the longer you will remember them. Also, there will be times when material that seemed confusing earlier will be less confusing the second time around.

The problems that follow review material we covered in Section 1.2.

Find the distance between each pair of points.

- | | |
|--|-----------------------------------|
| 61. $(5, 1), (2, 5)$ | 62. $(3, -2), (-1, -4)$ |
| 63. Find x so that the distance between $(x, 2)$ and $(1, 5)$ is $\sqrt{13}$. | |
| 64. Graph the line $2x - 3y = 6$. | 65. Graph the line $y = 2x - 1$. |

Draw each angle in standard position and name a point on the terminal side.

- | | |
|-----------------|----------------|
| 66. 135° | 67. 45° |
|-----------------|----------------|

For each angle below, name a coterminal angle between 0° and 360° .

- | | | | |
|-----------------|------------------|------------------|------------------|
| 68. -90° | 69. -135° | 70. -210° | 71. -300° |
|-----------------|------------------|------------------|------------------|