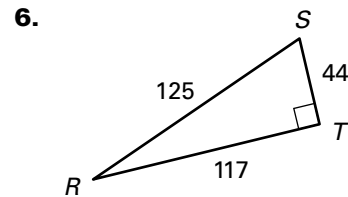
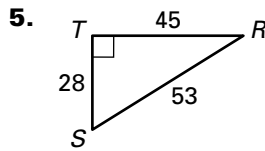
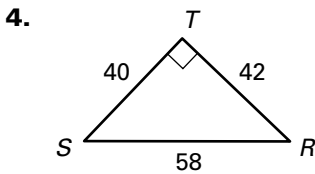
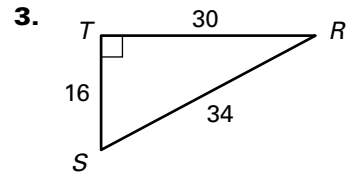
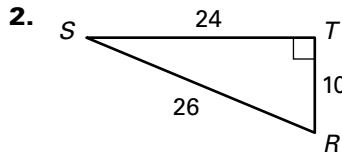
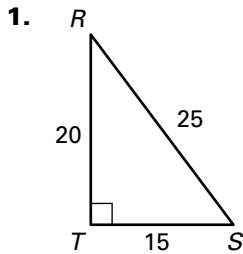


LESSON
7.6

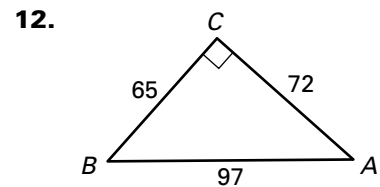
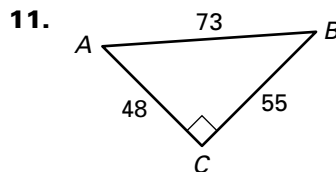
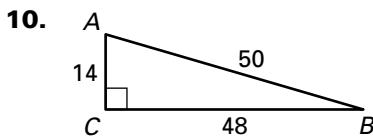
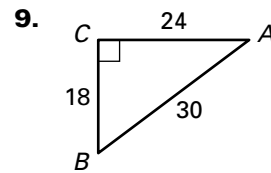
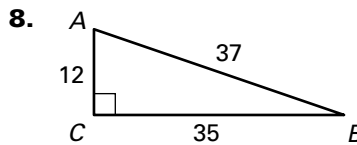
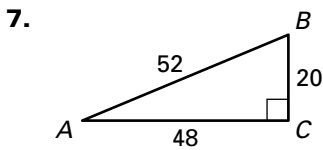
Practice B

For use with pages 491–498

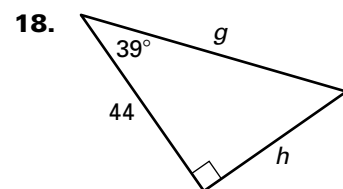
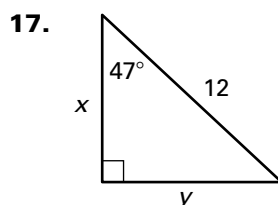
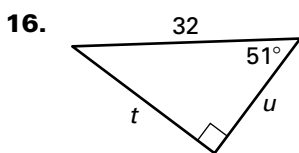
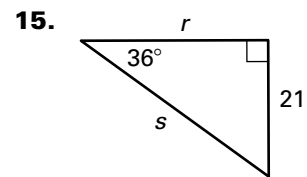
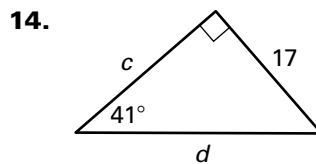
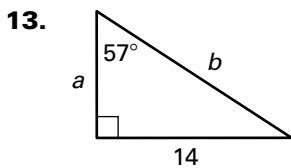
Find $\sin R$ and $\sin S$. Write each answer as a fraction and as a decimal. Round to four decimal places, if necessary.



Find $\cos A$ and $\cos B$. Write each answer as a fraction and as a decimal. Round to four decimal places, if necessary.



Use a cosine or sine ratio to find the value of each variable. Round decimals to the nearest tenth.



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LESSON
7.6

Practice B *continued*

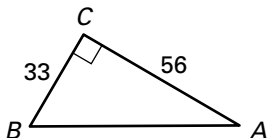
For use with pages 491–498

Use the 45°-45°-90° Triangle Theorem or the 30°-60°-90° Triangle Theorem to find the sine and cosine of the angle.

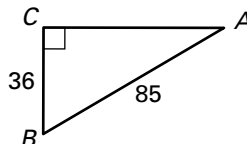
19. a 30° angle 20. a 45° angle 21. a 60° angle

Find the unknown side length. Then find $\sin A$ and $\cos A$. Write each answer as a fraction in simplest form and as a decimal. Round to four decimal places, if necessary.

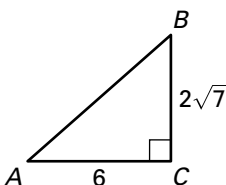
22.



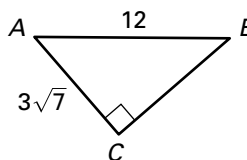
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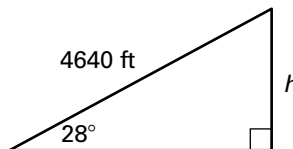
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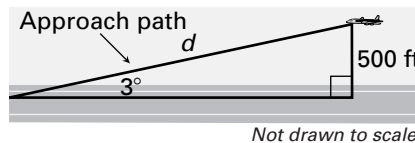
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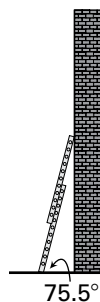
26. **Ski Lift** A chair lift on a ski slope has an angle of elevation of 28° and covers a total distance of 4640 feet. To the nearest foot, what is the vertical height h covered by the chair lift?



27. **Airplane Landing** You are preparing to land an airplane. You are on a straight line approach path that forms a 3° angle with the runway. What is the distance d along this approach path to your touchdown point when you are 500 feet above the ground? Round your answer to the nearest foot.



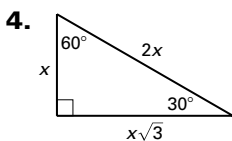
28. **Extension Ladders** You are using extension ladders to paint a chimney that is 33 feet tall. The length of an extension ladder ranges in one-foot increments from its minimum length to its maximum length. For safety, you should always use an angle of about 75.5° between the ground and the ladder.



- Your smallest extension ladder has a maximum length of 17 feet. How high does this ladder safely reach on a vertical wall?
- You place the base of the ladder 3 feet from the chimney. How many feet long should the ladder be?
- To reach the top of the chimney, you need a ladder that reaches 30 feet high. How many feet long should the ladder be?

Lesson 7.5, continued

3. True in all cases except when $x = 90^\circ$ or $x = 0^\circ$; because $\tan 0^\circ = 0$ and $\tan 90^\circ$ is undefined.



Using the diagram, $\tan 30^\circ = \frac{1}{\sqrt{3}}$ and

$\tan 60^\circ = \sqrt{3}$. If $a^\circ = b^\circ = 30^\circ$,

$\tan a^\circ + \tan b^\circ = \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{3}} + \frac{2}{\sqrt{3}}$, but

$\tan(a^\circ + b^\circ) = \tan(30^\circ + 30^\circ) = \tan 60^\circ = \sqrt{3}$.

So, $\tan a^\circ + \tan b^\circ \neq \tan(a^\circ + b^\circ)$.

5. Sketch 1 6. Sketch 2 7. Sketch 3

Lesson 7.6

Practice Level A

- $\sin R = \frac{4}{5} = 0.8$, $\sin S = \frac{3}{5} = 0.6$
- $\sin R = \frac{15}{17} \approx 0.8824$, $\sin S = \frac{8}{17} \approx 0.4706$
- $\sin R = \frac{12}{13} \approx 0.9231$, $\sin S = \frac{5}{13} \approx 0.3846$
- $\sin R = \frac{7}{25} = 0.28$, $\sin S = \frac{24}{25} = 0.96$
- $\sin R = \frac{20}{29} \approx 0.6897$, $\sin S = \frac{21}{29} \approx 0.7241$
- $\sin R = \frac{55}{73} \approx 0.7534$, $\sin S = \frac{48}{73} \approx 0.6575$
- $\cos A = \frac{15}{17} \approx 0.8824$, $\cos B = \frac{8}{17} \approx 0.4706$
- $\cos A = \frac{5}{13} \approx 0.3846$, $\cos B = \frac{12}{13} \approx 0.9231$
- $\cos A = \frac{4}{5} = 0.8$, $\cos B = \frac{3}{5} = 0.6$
- $\cos A = \frac{7}{25} = 0.28$, $\cos B = \frac{24}{25} = 0.96$
- $\cos A = \frac{20}{29} \approx 0.6897$, $\cos B = \frac{21}{29} \approx 0.7241$
- $\cos A = \frac{72}{97} \approx 0.7423$, $\cos B = \frac{65}{97} \approx 0.6701$
- $a \approx 6.4$, $b \approx 7.7$ 14. $c \approx 4.7$, $d \approx 5.2$
- $e \approx 6.9$, $f \approx 9.8$ 16. $g \approx 12.3$, $h \approx 8.6$
- $j \approx 14.1$, $k \approx 15.6$ 18. $m \approx 30.9$, $n \approx 39.7$
- $\sin 30^\circ = 0.5$, $\cos 30^\circ = \frac{\sqrt{3}}{2}$
- $\sin 45^\circ = \cos 45^\circ = \frac{\sqrt{2}}{2}$

21. $\sin 60^\circ = \frac{\sqrt{3}}{2}$, $\cos 60^\circ = 0.5$

22. $AB = 53$, $\sin A = \frac{28}{53} \approx 0.5283$,

$\cos A = \frac{45}{53} \approx 0.8491$

23. $AC = 48$, $\sin A = \frac{7}{25} = 0.28$,

$\cos A = \frac{24}{25} = 0.96$

24. $AB = 40$, $\sin A = \frac{3}{5} = 0.6$, $\cos A = \frac{4}{5} = 0.8$

25. $BC = 21$, $\sin A = \frac{21}{29} \approx 0.7241$,

$\cos A = \frac{20}{29} \approx 0.6897$ 26. 8 ft

27. $v \approx 1,841$ ft, $h \approx 21,040$ ft 28. 5.5 ft

Practice Level B

- $\sin R = \frac{3}{5} = 0.6$, $\sin S = \frac{4}{5} = 0.8$
- $\sin R = \frac{12}{13} \approx 0.9231$, $\sin S = \frac{5}{13} \approx 0.3846$
- $\sin R = \frac{8}{17} \approx 0.4706$, $\sin S = \frac{15}{17} \approx 0.8824$
- $\sin R = \frac{20}{29} \approx 0.6897$, $\sin S = \frac{21}{29} \approx 0.7241$
- $\sin R = \frac{28}{53} \approx 0.5283$, $\sin S = \frac{45}{53} \approx 0.8491$
- $\sin R = \frac{44}{125} = 0.352$, $\sin S = \frac{117}{125} = 0.936$
- $\cos A = \frac{12}{13} \approx 0.9231$, $\cos B = \frac{5}{13} \approx 0.3846$
- $\cos A = \frac{12}{37} \approx 0.3243$, $\cos B = \frac{35}{37} \approx 0.9459$
- $\cos A = \frac{4}{5} = 0.8$, $\cos B = \frac{3}{5} = 0.6$
- $\cos A = \frac{7}{25} = 0.28$, $\cos B = \frac{24}{25} = 0.96$
- $\cos A = \frac{48}{73} \approx 0.6575$, $\cos B = \frac{55}{73} \approx 0.7534$
- $\cos A = \frac{72}{97} \approx 0.7423$, $\cos B = \frac{65}{97} \approx 0.6701$
- $a \approx 9.1$, $b \approx 16.7$ 14. $c \approx 19.6$, $d \approx 25.9$
- $r \approx 28.9$, $s \approx 35.7$ 16. $t \approx 24.9$, $u \approx 20.1$
- $x \approx 8.2$, $y \approx 8.8$ 18. $g \approx 56.6$, $h \approx 35.6$
- $\sin 30^\circ = 0.5$, $\cos 30^\circ = \frac{\sqrt{3}}{2}$
- $\sin 45^\circ = \cos 45^\circ = \frac{\sqrt{2}}{2}$

Lesson 7.6, continued

21. $\sin 60^\circ = \frac{\sqrt{3}}{2}$, $\cos 60^\circ = 0.5$

22. $AB = 65$, $\sin A = \frac{33}{65} \approx 0.5077$,

$\cos A = \frac{56}{65} \approx 0.8615$

23. $AC = 77$, $\sin A = \frac{36}{85} \approx 0.4235$,

$\cos A = \frac{77}{85} \approx 0.9059$

24. $AB = 8$, $\sin A = \frac{\sqrt{7}}{4} \approx 0.6614$,

$\cos A = \frac{3}{4} = 0.75$

25. $BC = 9$, $\sin A = \frac{3}{4} = 0.75$,

$\cos A = \frac{\sqrt{7}}{4} \approx 0.6614$

26. 2178 ft 27. about 9554 ft

28. a. about 16.5 ft b. 12 ft c. 31 ft

Practice Level C

1. $\sin R = \frac{72}{97} \approx 0.7423$, $\sin S = \frac{65}{97} \approx 0.6701$

2. $\sin R = \frac{28}{53} \approx 0.5283$, $\sin S = \frac{45}{53} \approx 0.8491$

3. $\sin R = \frac{91}{109} \approx 0.8349$, $\sin S = \frac{60}{109} \approx 0.5505$

4. $\cos A = \frac{77}{85} \approx 0.9059$, $\cos B = \frac{36}{85} \approx 0.4235$

5. $\cos A = \frac{51}{149} \approx 0.3423$, $\cos B = \frac{140}{149} \approx 0.9396$

6. $\cos A = \frac{21}{29} \approx 0.7241$, $\cos B = \frac{20}{29} \approx 0.6897$

7. $a \approx 16.6$, $b \approx 27.5$ 8. $c \approx 45.7$, $d \approx 58.8$

9. $e \approx 3.1$, $f \approx 4.3$ 10. $g \approx 15.9$, $h \approx 18.8$

11. $j \approx 62.9$, $k \approx 69.9$ 12. $m \approx 92.2$, $n \approx 47.5$

13. 346.9 in. 14. D

15. $AB = 149$, $\sin A = \frac{51}{149} \approx 0.3423$,

$\cos A = \frac{140}{149} \approx 0.9396$

16. $AC = 160$, $\sin A = \frac{9}{41} \approx 0.2195$,

$\cos A = \frac{40}{41} \approx 0.9756$

17. $AC = 20$, $\sin A = \frac{6\sqrt{61}}{61} \approx 0.7682$,

$\cos A = \frac{5\sqrt{61}}{61} = 0.6402$

18. $BC = 24$, $\sin A = \frac{3}{4} = 0.75$,

$\cos A = \frac{\sqrt{7}}{4} \approx 0.6614$

19. 321.4 m 20. $b \sin A$ 21. $a \sin B$

22. Since $h = b \sin A$ and $h = a \sin B$, by substitution $b \sin A = a \sin B$. So $\frac{\sin A}{a} = \frac{\sin B}{b}$.

23. 386 ft apart, 270 ft tall

Review for Mastery

1. $\sin A \approx 0.2195$; $\sin B \approx 0.9756$

2. $\sin A \approx 0.8349$; $\sin B \approx 0.5505$

3. $\cos A \approx 0.5283$; $\cos B \approx 0.8491$

4. $\cos A \approx 0.5077$; $\cos B \approx 0.8615$

5. 8.4 6. 48.3

Challenge Practice

1. *Sample answer:* Since $PT = QT$, we have $\angle PQT \cong \angle P$, so $m\angle PQT = 36^\circ$.

So by the Exterior Angle Theorem,

$$m\angle QTR = m\angle P + m\angle PQT = 36^\circ + 36^\circ = 72^\circ.$$

Applying the Base Angles Theorem again, since

$QT = QR$, we have $m\angle R = m\angle QTR = 72^\circ$, so

$$m\angle RQT = 180^\circ - 72^\circ - 72^\circ = 36^\circ.$$

So $\angle RQT \cong \angle RPQ$, and $\angle R \cong \angle R$ (Reflexive Property of Congruence); therefore,

$\triangle PRQ \sim \triangle QRT$ (AA Similarity Postulate).

2. $\frac{1}{2x} = \frac{1+2x}{1}$; $x = \frac{-1 \pm \sqrt{5}}{4}$

3. $\angle SQT$ (or $\angle RQS$); $\frac{-1 + \sqrt{5}}{4}$

4. $(\sin a^\circ)^2 + (\cos a^\circ)^2 = \left(\frac{x}{z}\right)^2 + \left(\frac{y}{z}\right)^2 =$

$$\frac{x^2 + y^2}{z^2} = \frac{z^2}{z^2} = 1$$
 5. 0.8

6. $AB \approx 36.5$, $BC \approx 26.1$

7.  $\sin x^\circ = \frac{a}{c}$

In any right triangle, $a \leq c$ so $\sin x^\circ = \frac{a}{c} \leq 1$.

8.  $\cos x^\circ = \frac{b}{c}$

In any right triangle, $b \leq c$ so $\cos x^\circ = \frac{b}{c} \leq 1$.