Name Key Date

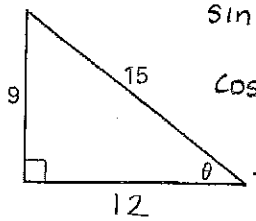
LESSON 8.1

Practice B

For use with pages 852–858

Evaluate the six trigonometric functions of the angle θ.

1.



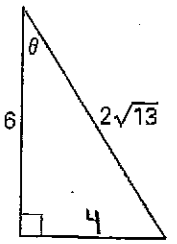
$9^2 + x^2 = 15^2$

$\sin\theta = \frac{9}{15} = \frac{3}{5}$ $\csc\theta = \frac{5}{3}$

$\cos\theta = \frac{12}{15} = \frac{4}{5}$ $\sec\theta = \frac{5}{4}$

$\tan\theta = \frac{9}{12} = \frac{3}{4}$ $\cot\theta = \frac{4}{3}$

2.



$6^2 + x^2 = (2\sqrt{13})^2$

$36 + x^2 = 52$

$x^2 = 16$

$x = 4$

$\sin\theta = \frac{4}{2\sqrt{13}} = \frac{2\sqrt{13}}{13}$ $\csc\theta = \frac{\sqrt{13}}{2}$

$\cos\theta = \frac{6}{2\sqrt{13}} = \frac{3\sqrt{13}}{13}$ $\sec\theta = \frac{\sqrt{13}}{3}$

$\tan\theta = \frac{4}{6} = \frac{2}{3}$ $\cot\theta = \frac{3}{2}$

Let θ be an acute angle of a right triangle. Find the values of the other five trigonometric functions of θ.

3. $\sin\theta = \frac{4}{5}$

See paper

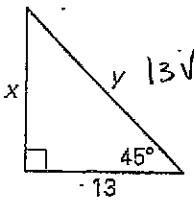
4. $\cos\theta = \frac{5}{6}$

5. $\sec\theta = \frac{\sqrt{73}}{8}$

6. $\cot\theta = \sqrt{3}$

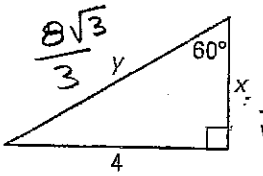
Find the exact values of x and y.

7.



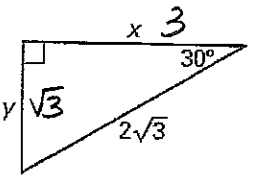
13 $13\sqrt{2}$

8.



$\frac{8\sqrt{3}}{3}$ $\frac{4}{\sqrt{3}} = \frac{4\sqrt{3}}{3}$

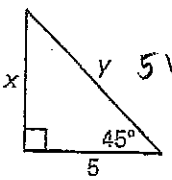
9.



3 $\sqrt{3}$

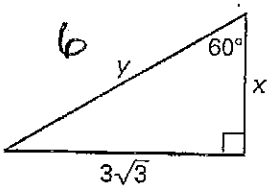
Find the exact values of x and y.

7.



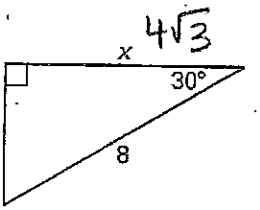
5 $5\sqrt{2}$

8.



6 3

9.



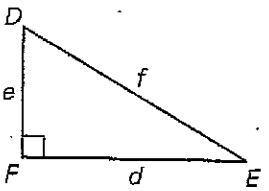
$4\sqrt{3}$ 4

Solve $\triangle DEF$ using the diagram and the given measurements.

10. $D = 40°, f = 8$

11. $E = 53°, d = 13$

12. $D = 67°, e = 10.5$



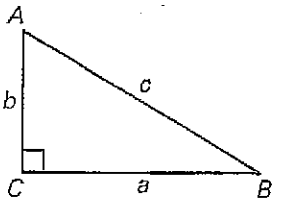
See paper

Solve $\triangle ABC$ using the diagram and the given measurements.

10. $B = 35°, c = 10$

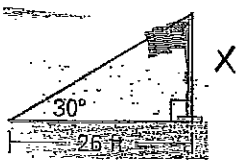
11. $B = 48°, a = 8$

12. $A = 52°, b = 7$



See paper

13. Shadow A flagpole projects a shadow on the ground that is 26 feet long. The angle of elevation is 30°. What is the approximate height of the flagpole?



$\tan 30° = \frac{x}{26}$

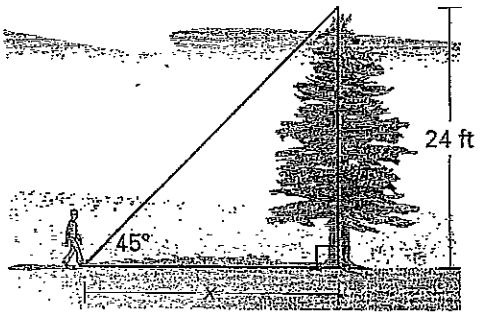
$26 \tan 30° = x$

$x = 15$ ft

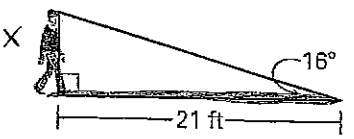
14. Trees A hiker stands x feet from the base of a 24 foot tall tree. The angle of elevation to the top of the tree is 45°. How far is the hiker from the base?

special triangle

$x = 24$ ft.



13. Shadow A person casts the shadow shown. What is the approximate height of the person?



$\tan 16° = \frac{x}{21}$

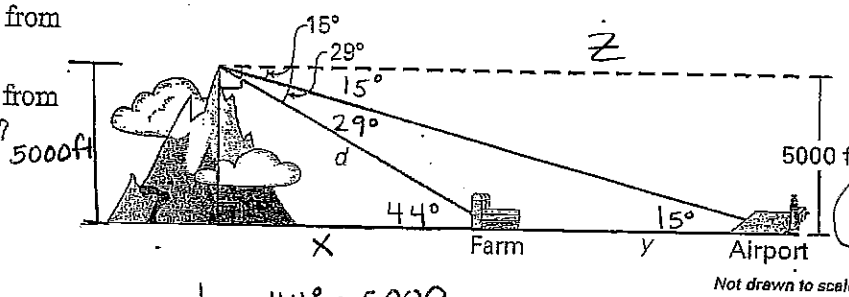
$21 \tan 16° = x$

$x \approx 6$ ft

14. Mountains A hiker at the top of a mountain sees a farm and an airport in the distance.

a. What is the distance d from the hiker to the farm?

b. What is the distance y from the farm to the airport?



z

$y = z - x$

$y = 13482.65$ ft

$\sin 44° = \frac{5000}{d}$

$d = \frac{5000}{\sin 44°}$

$d = 7197.8$ ft

$\tan 44° = \frac{5000}{x}$

$x = \frac{5000}{\tan 44°}$

$x = 5177.6$ ft

$\tan 15° = \frac{5000}{z}$

$z = \frac{5000}{\tan 15°}$

$z = 18660.25$ ft

Convert the degree measure to radians or the radian measure to degrees.

8. $270°$

$270°\left(\frac{\pi}{180°}\right)$

$\frac{3\pi}{2}$

9. $-135°$

$-135°\left(\frac{\pi}{180°}\right)$

$\frac{-3\pi}{4}$

10. $\frac{11\pi}{6}$

$\frac{11\pi}{6}\left(\frac{180°}{\pi}\right)$

$330°$

11. $-\frac{\pi}{18}$

$-\frac{\pi}{18}\left(\frac{180°}{\pi}\right)$

$-10°$

Find the arc length and area of a sector with the given radius *r* and central angle θ.

12. $r = 5$ m, $\theta = \frac{\pi}{2}$

$S = r\theta$

$S = 5(\pi/2)$

$S = 2.5\pi$ or 7.85m

$A = \frac{1}{2}r^2\theta$

$A = \frac{1}{2}(5)^2\left(\frac{\pi}{2}\right)$

$A = 19.6\text{m}^2$

13. $r = 7$ in., $\theta = \frac{3\pi}{4}$

$S = r\theta$

$S = 7\left(\frac{3\pi}{4}\right)$

$S = \frac{21\pi}{4}$ or 16.5 in.

$A = \frac{1}{2}r^2\theta$

$A = \frac{1}{2}(7)^2\left(\frac{3\pi}{4}\right)$

$A = 57.7\text{ in}^2$

14. $r = 11$ ft, $\theta = 200°$

$200°\left(\frac{\pi}{180°}\right)$

$\frac{10\pi}{9}$

$S = r\theta$

$S = 11\left(\frac{10\pi}{9}\right)$

$S = \frac{110\pi}{9}$ or 38.4 ft

$A = \frac{1}{2}r^2\theta$

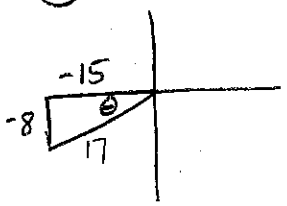
$A = \frac{1}{2}(11)^2\left(\frac{10\pi}{9}\right)$

$A = 211.2\text{ ft}^2$

Use the given point on the terminal side of an angle θ in standard position to evaluate the six trigonometric functions of θ. Find the reference angle

1. $(-15, -8)$ 2. $(1, -1)$ 3. $(1, \sqrt{3})$ 4. $(-3, 4)$

1



$\sin\theta = \frac{-8}{17}$

$\cos\theta = \frac{-15}{17}$

$\tan\theta = \frac{8}{15}$

$\csc\theta = \frac{-17}{8}$

$\sec\theta = \frac{-17}{15}$

$\cot\theta = \frac{15}{8}$

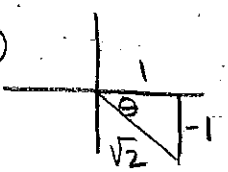
ref $\angle$ =

$\tan\theta = \frac{8}{15}$

$\tan^{-1}(8/15) = \theta$

$\theta = 28.1°$

2



$\sin\theta = \frac{-1}{\sqrt{2}} = \frac{-\sqrt{2}}{2}$

$\cos\theta = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\tan\theta = \frac{-1}{1} = -1$

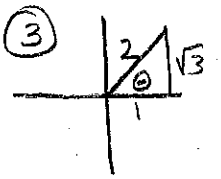
$\csc\theta = -\sqrt{2}$

$\sec\theta = \sqrt{2}$

$\cot\theta = -1$

ref. $\angle = 45°$

3



$\sin\theta = \frac{\sqrt{3}}{2}$

$\cos\theta = \frac{1}{2}$

$\tan\theta = \sqrt{3}$

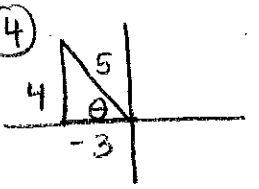
$\csc\theta = \frac{2\sqrt{3}}{3}$

$\sec\theta = 2$

$\cot\theta = \frac{\sqrt{3}}{3}$

ref $\angle = 60°$

4



$\sin\theta = \frac{4}{5}$

$\cos\theta = \frac{-3}{5}$

$\tan\theta = -\frac{4}{3}$

$\csc\theta = \frac{5}{4}$

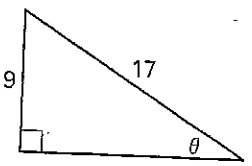
$\sec\theta = -\frac{5}{3}$

$\cot\theta = -\frac{3}{4}$

ref $\angle = 53.1°$

Find the measure of the angle θ.

17.

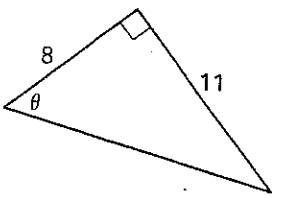


$\sin\theta = \frac{9}{17}$

$\sin^{-1}\left(\frac{9}{17}\right) = \theta$

$\theta = 31.96°$

18.

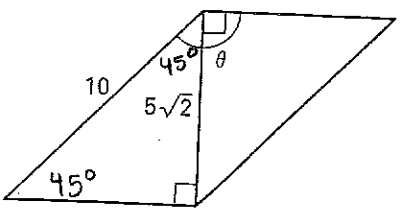


$\tan\theta = \frac{11}{8}$

$\tan^{-1}\left(\frac{11}{8}\right) = \theta$

$\theta = 53.97°$

19.

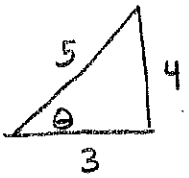


$\frac{10}{\sqrt{2}} \frac{\sqrt{2}}{\sqrt{2}} =$

$5\sqrt{2}$

$\theta = 135°$

3) $\sin\theta = \frac{4}{5}$



$\cos\theta = \frac{3}{5}$

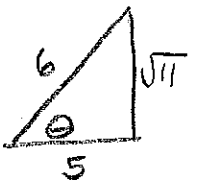
$\tan\theta = \frac{4}{3}$

$\csc\theta = \frac{5}{4}$

$\sec\theta = \frac{5}{3}$

$\cot\theta = \frac{3}{4}$

4)



$\sin\theta = \frac{\sqrt{11}}{6}$

$\cos\theta = \frac{5}{6}$

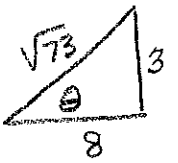
$\tan\theta = \frac{\sqrt{11}}{5}$

$\csc\theta = \frac{6\sqrt{11}}{11}$

$\sec\theta = \frac{6}{5}$

$\cot\theta = \frac{5\sqrt{11}}{11}$

5) $\sec\theta = \frac{\sqrt{73}}{8}$



$\sin\theta = \frac{3\sqrt{73}}{73}$

$\cos\theta = \frac{8\sqrt{73}}{73}$

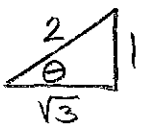
$\tan\theta = \frac{3}{8}$

$\csc\theta = \frac{\sqrt{73}}{3}$

$\sec\theta = \frac{\sqrt{73}}{8}$

$\cot\theta = 8/3$

6) $\cot\theta = \frac{\sqrt{3}}{1}$ $\frac{\text{adj}}{\text{opp}}$



$\sin\theta = \frac{1}{2}$

$\cos\theta = \frac{\sqrt{3}}{2}$

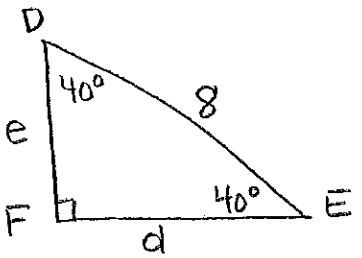
$\tan\theta = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

$\csc\theta = 2$

$\sec\theta = \frac{2\sqrt{3}}{3}$

$\cot\theta = \sqrt{3}$

10)



$\angle E = 40°$

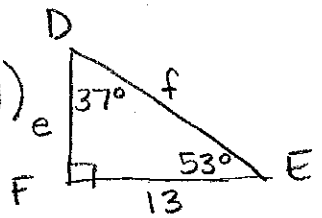
$\sin 40° = \frac{d}{8}$

$d = 8\sin 40° = \underline{\underline{5.14}}$

$\cos 40° = \frac{e}{8}$

$e = 8\cos 40° = \underline{\underline{6.12}}$

11)



$\tan 53° = \frac{e}{13}$

$13\tan 53° = e$

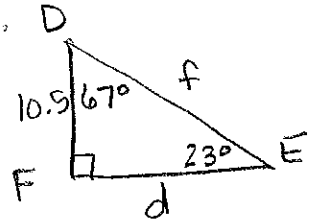
$e = \underline{\underline{17.25}}$

$\cos 53° = \frac{13}{f}$

$f = \frac{13}{\cos 53°}$

$f = \underline{\underline{21.6}}$

12)



$\tan 67° = \frac{d}{10.5}$

$d = 10.5 \tan 67°$

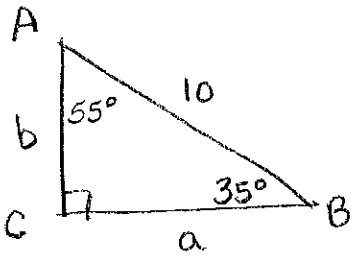
$d = 24.7$

$\cos 67° = \frac{10.5}{f}$

$f = \frac{10.5}{\cos 67°}$

$f = 26.9$

10)



$\sin 35° = \frac{b}{10}$

$b = 10 \sin 35°$

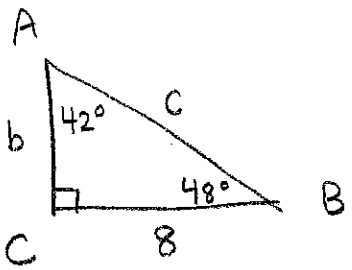
$b = 5.7$

$\cos 35° = \frac{a}{10}$

$10 \cos 35° = a$

$a = 8.2$

11)



$\tan 48° = \frac{b}{8}$

$8 \tan 48° = b$

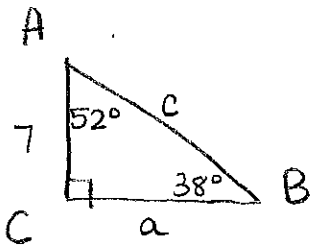
$b = 8.9$

$\cos 48° = \frac{8}{c}$

$c = \frac{8}{\cos 48°}$

$c = 11.95$

12)



$\tan 52° = \frac{a}{7}$

$a = 7 \tan 52°$

$a = 8.96$

$\cos 52° = \frac{7}{c}$

$c = \frac{7}{\cos 52°}$

$c = 11.37$