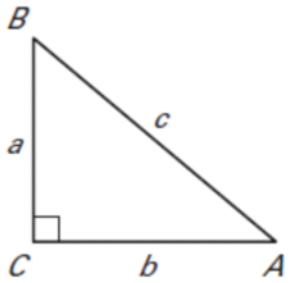
Advanced Algebra with Trig
Chapter 13 Review - Checkpoints

Name: Key
Period:

13.1

(1-2) Solve ΔABC using the following diagram and the given measurements.



1. $A = 40°, a = 13$ B=180-(40+90)

tan40= 13/b B = 50°

b = 13/tan40 = 15.49

sin40 = 13/c

c = 13/sin40 = 20.22

2. $B = 37°, c = 18$

A=180-(90+37)

A=53°

cos37 = a/18

18cos37 = a

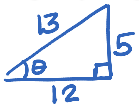
14.38 = a

sin37 = b/18

10.83 = b

(3-4) Let θ be an acute angle of a right triangle. Find the value of the other five trigonometric functions of θ.

3. $\sin\theta = \frac{5}{13}$

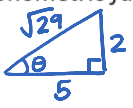


cosθ = 12/13 secθ = 13/12

tanθ = 5/12 cotθ = 12/5

cscθ = 13/5

4. $\tan\theta = \frac{2}{5}$



$2^2+5^2 = c^2$

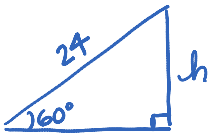
$\sqrt{29} = c$

sinθ = 2√29/29 cscθ = √29/2

cosθ = 5√29/29 secθ = √29/5

cotθ = 5/2

5. A stepladder has an angle of elevation 60° with the front of the house. The length of the stepladder is 24 feet. At what height does the stepladder meet the house?



sin60 = h/24

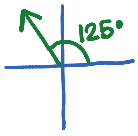
24sin60 = h

20.78 ft

13.2

(6-9) Sketch the angle. Then find one positive angle and one negative angle that is coterminal with the given angle.

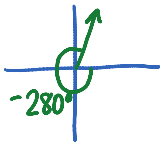
6. 125°



125 + 360 = 485°

125 − 360 = −235°

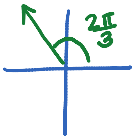
7. −280°



−280 + 360 = 80°

−280 − 360 = −640°

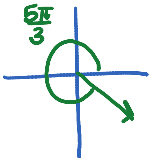
8. $\frac{2\pi}{3}$



2π/3 + 6π/3 = 8π/3

2π/3 − 6π/3 = −4π/3

9. $\frac{5\pi}{3}$



5π/3 + 6π/3 = 11π/3

5π/3 − 6π/3 = −π/3

(10-13) Convert the degree measure to radians or the radian measure to degrees.

10. 315°

315 × π/180 = 7π/4

11. −260°

−260 × π/180 = −13π/9

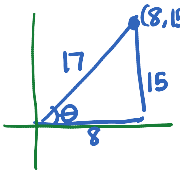
12. $\frac{\pi}{9} \times \frac{180}{\pi} = 20°$

13. $\frac{14\pi}{15} \times \frac{180}{\pi} = 168°$

13.3

(14-16) Use the given point on the terminal side of an angle θ in standard position to evaluate the six trigonometric functions of θ.

14. $(8,15)$

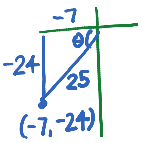


$\sin\theta = \frac{15}{17}$ $\csc\theta = \frac{17}{15}$

$\cos\theta = \frac{8}{17}$ $\sec\theta = \frac{17}{8}$

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

15. $(-7,-24)$



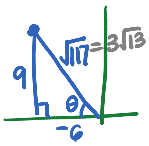
$\sin\theta = -\frac{24}{25}$ $\csc\theta = -\frac{25}{24}$

$\cos\theta = \frac{-7}{25}$ $\sec\theta = -\frac{25}{7}$

$\tan\theta = \frac{24}{7}$ $\cot\theta = \frac{7}{24}$

16. $(-6,9)$

$\sqrt{117} = \sqrt{9\cdot 13} = 3\sqrt{13}$



$\sin\theta = \frac{9}{3\sqrt{13}} = \frac{3\sqrt{13}}{13}$

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

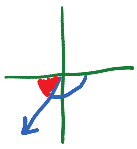
$\tan\theta = -\frac{9}{6} = -\frac{3}{2}$ $\cot\theta = -\frac{2}{3}$

$\csc\theta = \frac{3\sqrt{13}}{9} = \frac{\sqrt{13}}{3}$

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

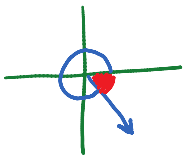
(17-22) Sketch the angle. Then find its reference angle.

17. $-100°$



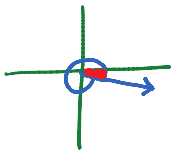
$180 - 100 = 80°$

18. $320°$



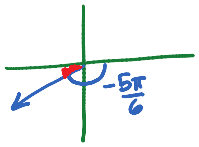
$360 - 320 = 40°$

19. $-370°$



$370 - 360 = 10°$

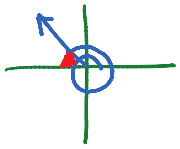
20. $-\frac{5\pi}{6}$



$\pi - \frac{5\pi}{6} = \frac{6\pi}{6} - \frac{5\pi}{6} = \frac{\pi}{6}$

21. $\frac{8\pi}{3}$

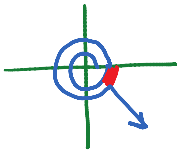
$\frac{8\pi}{3} - 2\pi = \frac{8\pi}{3} - \frac{6\pi}{3} = \frac{2\pi}{3}$



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

22. $\frac{15\pi}{4}$

$\frac{15\pi}{4} - 2\pi = \frac{15\pi}{4} - \frac{8\pi}{4} = \frac{7\pi}{4}$

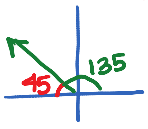


$2\pi - \frac{7\pi}{4} = \frac{8\pi}{4} - \frac{7\pi}{4} = \frac{\pi}{4}$

(23-30) Evaluate the function without using a calculator.

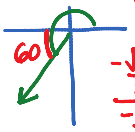
23. $\sec 135°$ QUAD 2

$(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$



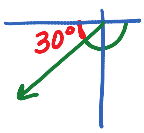
$\frac{1}{-\frac{\sqrt{2}}{2}} = 1\cdot\frac{2}{-\sqrt{2}} = -\frac{2\sqrt{2}}{2} = -\sqrt{2}$

24. $\tan 240°$ $(-\frac{1}{2}, -\frac{\sqrt{3}}{2})$



$\frac{-\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = \frac{\sqrt{3}}{2}\cdot\frac{2}{1} = \sqrt{3}$

25. $\sin(-150°)$ $(-\frac{\sqrt{3}}{2}, -\frac{1}{2})$



$-\frac{1}{2}$

26. $\csc(540°)$ $540 - 360 = 180$

$(-1,0)$

$\frac{1}{0}$ = UNDefined

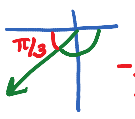
27. $\cos\left(\frac{7\pi}{4}\right)$

$(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$

$\frac{\sqrt{2}}{2}$

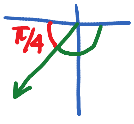
28. $\cot\left(-\frac{8\pi}{3}\right)$ $-\frac{8\pi}{3} + 2\pi = -\frac{2\pi}{3}$

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



$-\frac{1}{2}\cdot\frac{-2}{\sqrt{3}} = \frac{1}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

29. $\tan\left(-\frac{3\pi}{4}\right)$ $(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$



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

30. $\sec\left(\frac{11\pi}{6}\right)$ $(\frac{\sqrt{3}}{2}, -\frac{1}{2})$

$\frac{1}{\frac{\sqrt{3}}{2}} = 1\cdot\frac{2}{\sqrt{3}} = \frac{2}{\sqrt{3}}$

$\frac{2\sqrt{3}}{3}$

(31-38) Evaluate the expression without using a calculator. Give your answer in both radians and degrees.

31. $\sin^{-1} 1$

$90°$ or $\frac{\pi}{2}$

32. $\tan^{-1}(-1)$

$-45°$ or $-\frac{\pi}{4}$

33. $\cos^{-1} 0$

$90°$ or $\frac{\pi}{2}$

34. $\cos^{-1}(-2)$

Undefined

31. $\sin^{-1} 1$

$90°$ or $\frac{\pi}{2}$

32. $\tan^{-1}(-1)$

$-45°$ or $-\frac{\pi}{4}$

33. $\cos^{-1} 0$

$90°$ or $\frac{\pi}{2}$

34. $\cos^{-1}(-2)$

undefined

35. $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

$60°$ or $\frac{\pi}{3}$

36. $\sin^{-1}\frac{1}{2}$

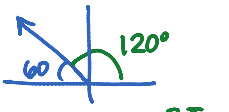
$30°$ or $\frac{\pi}{6}$

37. $\tan^{-1}\left(-\frac{\sqrt{3}}{3}\right)$

$-30°$ or $-\frac{\pi}{6}$

38. $\cos^{-1}\left(-\frac{1}{2}\right)$ $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

$60°$

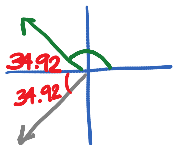


$120°$ or $\frac{2\pi}{3}$

(39-42) Solve the equation for θ.

39. $\cos\theta = -0.82; 180° < \theta < 270°$

$\theta = \cos^{-1}(-0.82) = 145.08$



$180 + 34.92 = 214.92°$

check! $\cos(214.92) = -0.82$ ✓

40. $\sin\theta = 0.15; 90° < \theta < 180°$

$\theta = \sin^{-1}(0.15)$

$\theta = 8.63$

$180 - 8.63 = 171.37°$

check! $\sin(171.37) = 0.15$ ✓

41. $\cos\theta = 0.25; 270° < \theta < 360°$

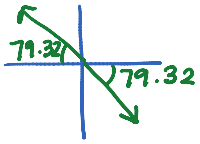
$\theta = \cos^{-1}(0.25) = 75.52$

$360 - 75.52 = 284.48°$

check! $\cos(284.48) = .25$

42. $\tan\theta = -5.3; 90° < \theta < 180°$

$\theta = \tan^{-1}(-5.3) = -79.32$



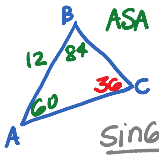
$180 - 79.32 = 100.68°$

check! $\tan(100.68) = -5.3$ ✓

13.5-13.6

(43-48) Use the law of sines, the law of cosines, or the Pythagorean theorem to solve ΔABC. Hint: some of the "triangles" have no solutions and some have two solutions.

43. $A = 60°, B = 84°, c = 12$



ASA $\quad C = 180 - (84 + 60)$

$C = 36°$

$\frac{\sin 84}{b} = \frac{\sin 36}{12}$

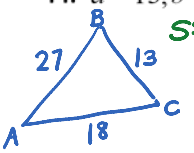
$\frac{\sin 60}{a} = \frac{\sin 36}{12}$

$b = \frac{12 \sin 84}{\sin 36}$

$a = \frac{12 \sin 60}{\sin 36} = 17.68$

$b = 20.30$

44. $a = 13, b = 18, c = 27$



SSS $\quad 13^2 = 18^2 + 27^2 - 2(18)(27)\cos A$

$169 = 1053 - 972\cos A$

$.91 = \cos A$

$24.57° = A$

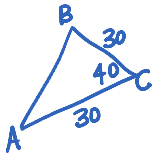
$\frac{\sin 24.57}{13} = \frac{\sin B}{18}$

$B = 35.15°$

$C = 180 - (24.57 + 35.15)$

$C = 120.28°$

45. $C = 40°, a = 30, b = 30$



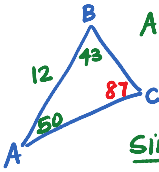
SAS $\quad C^2 = 30^2 + 30^2 - 2(30)(30)\cos 40$

$C = 20.52$

$\frac{\sin 40}{20.52} = \frac{\sin A}{30}$

$B = 70°$

46. $A = 50°, B = 43°, c = 12$



ASA $\quad C = 180 - (43 + 50)$

$C = 87°$

$\frac{\sin 87}{12} = \frac{\sin 43}{b}$ $\quad \frac{\sin 87}{12} = \frac{\sin 50}{a}$

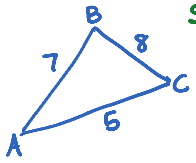
$\frac{\sin 40}{20.52} = \frac{\sin A}{30}$ $B = 70°$

$A = 70.0°$

$\frac{\sin 87}{12} = \frac{\sin 43}{b}$ $\frac{\sin 87}{12} = \frac{\sin 50}{a}$

$b = 8.20$ $a = 9.21$

47. $a = 8, b = 5, c = 7$



SSS

$5^2 = 7^2 + 8^2 - 2(7)(8)\cos B$

$25 = 113 - 112\cos B$

$.79 = \cos B$

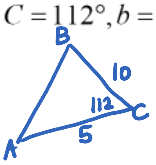
$38.21° = B$

$\frac{\sin 38.21}{5} = \frac{\sin C}{7}$

$C = 60°$

$A = 180 - (38.21 + 60) = 81.79°$

48. $C = 112°, b = 5, a = 10$



SAS

$c^2 = 5^2 + 10^2 - 2(5)(10)\cos 112$

$c = 12.75$

$\frac{\sin 112}{12.75} = \frac{\sin B}{5}$

$B = 21.33°$

$A = 180 - (112 + 21.33)$

$A = 46.67°$