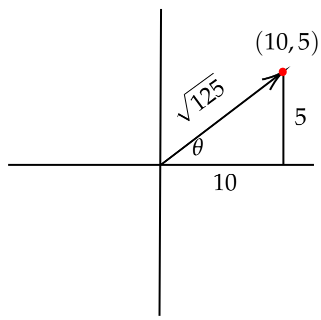
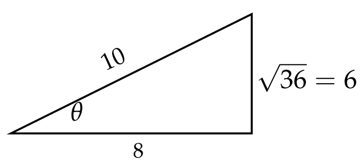
Trigonometry Final Review Key

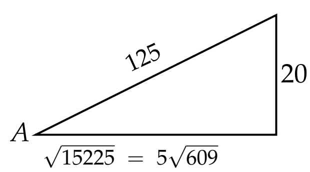
1. $7°15'14.4''$
2. $\frac{\pi}{4}$
3. $143° + 360°n$
4. $106°$
5. $110°$
6. $360 * .40 = 144° \iff 144^{\circ}00'00''$
7. $? = 9$
8. $\sin(\theta) = \frac{5}{\sqrt{125}} = \frac{5}{5\sqrt{5}} = \frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5}$



9. Quadruant 3
10. $\csc(\theta) = \frac{6}{10}$ but as it is in Quadrant 3, $\csc(\theta) = \frac{-10}{6}$.

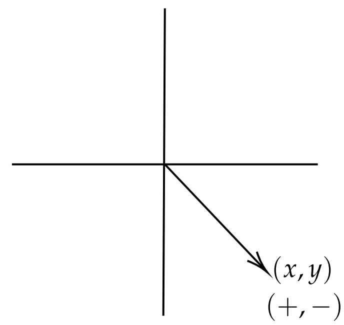


11. $\tan(A) = \frac{20}{5\sqrt{609}} = \frac{4}{\sqrt{609}} = \frac{4\sqrt{609}}{\sqrt{609}}$

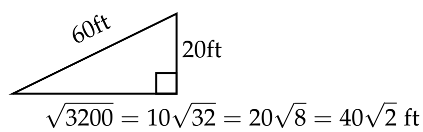


12. Refer to the unit circle. Can be written in degrees as 135° and 225° OR in radians as $\frac{3\pi}{4}$ and $\frac{5\pi}{4}$.

13. $\frac{x}{y}$ is negative.

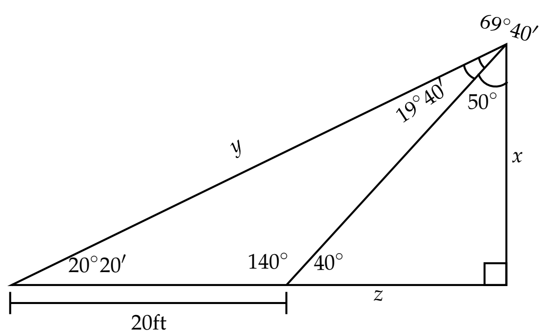


14. The flag pole is $40\sqrt{2}$ or approximately 56.5685 ft away.



15. $\tan(0.000001) = \frac{1}{x}$; $x = \frac{1}{\tan(0.000001)} = 57295779.57$ ft

16. There are two possible ways to find x.



Method 1.) $\frac{20\text{ft}}{\sin(19^\circ 40')} = \frac{y}{\sin(140^\circ)} \implies y = 38.199$ ft
Now see that $\sin(20^\circ 20') = \frac{x}{38.199} \implies x = 13.287$ft.

Method 2.) $\tan(20^\circ 20') = \frac{x}{20+z} \implies (20+z)\tan(20^\circ 20') = x$
$20(\tan(20^\circ 20')) + z((\tan(20^\circ 20')) = x$
$20(.371) + .371z = z(.839) \implies 7.42 = .468z$
$z = 15.855$
Now see that $\tan(20^\circ 20') = \frac{x}{35.855} \implies x = 13.287$ ft.

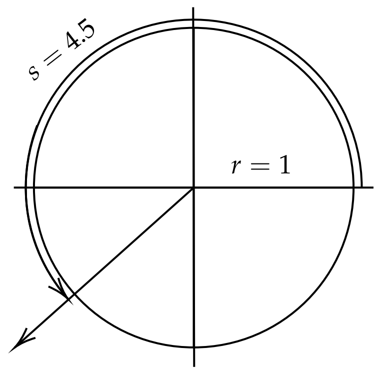
17. $1215^\circ \frac{\pi}{180} = \frac{27\pi}{4}$

18. $\frac{12\pi}{5} \frac{180}{\pi} = 432^\circ$

19. $\sec(B) = \frac{\sqrt{85}}{2}$

20. $s = r * \theta$
Recognize $35^{\circ} \implies \frac{7\pi}{36}$
$100 \text{ ft} = x\frac{7\pi]}{36} \implies x = 163.7 \text{ ft}$

21. $4.5 = 1 * \theta \implies \theta = 4.5$ radi
$\sin(4.5) = .07846$ and $\cos(4.5) = .99692 \implies (-.21, -.98)$



22. $\frac{1}{\sin(x)} = 3.45$
$\frac{1}{3.45} = \sin(x) \implies \sin^{-1} = .294$ radians or 16.85°

23. Amplitude= 4, Period= $\frac{2\pi}{3}$

24. 7 upwards

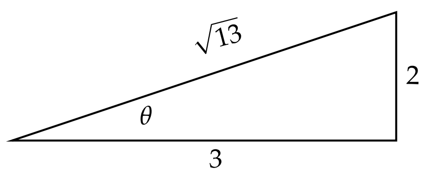
25. (Make sure your calculator is in radians!)
Radians = 3(12) = 36 radians
$r\sin(\theta) = 75\sin(36) = -74.38$ so 74.38 feet below the horizontal axis.

26. sin tells you the vertical distance above the horizontal axis.

27. Note $\tan(\theta) = \frac{1}{\cot(\theta)}$
Since $\tan(\frac{5\pi}{6}) = \frac{1}{-\sqrt{3}} \implies \frac{-\sqrt{3}}{1} = -\sqrt{3} = \cot(\frac{5\pi}{6})$

28. $s = \frac{2\pi}{3}, \frac{4\pi}{3}$

29. sin is positive in Quadrant 2
$\sin(\theta) = \frac{2}{\sqrt{13}} = \frac{2\sqrt{13}}{13}$



30. $\cot(\theta)\sin(\theta) - \cot(\theta)\tan(\theta)$
$\frac{\cos(\theta)}{\sin(\theta)}(\sin(\theta)) - \frac{\cos(\theta)}{\sin(\theta)}(\frac{\sin(\theta)}{\cos(\theta)}) = \cos(\theta) - 1$

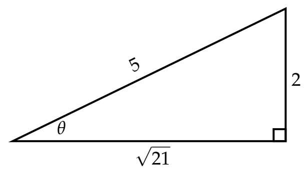
31. $\frac{1}{\cos(X)}\frac{\cos(x)}{\sin(x)}\frac{\sin(x)}{1} = \frac{\cos(x)}{\sin(x)}\frac{\sin(x)}{\cos(x)} = 1$

32. $\cot(x)\frac{\sin(x)}{1}\frac{\cos(x)}{1} = \frac{\cos(x)\sin(x)\cos(x)}{\sin(x)} = \cos^2(x)$

33. $\sin(45^\circ - 30^\circ) = \sin(45^\circ)\cos(30^\circ) - \sin(30)\cos(45)$
$\frac{\sqrt{2}}{2}(\frac{\sqrt{3}}{2}) - \frac{1}{2}(\frac{\sqrt{2}}{2}) = \frac{\sqrt{6}-\sqrt{2}}{4}$

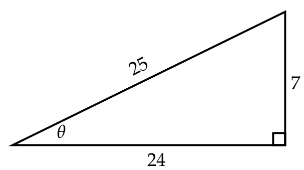
34. $\tan(45^\circ + 60^\circ) = \frac{\tan(45^\circ)+\tan(60^\circ)}{1-\tan(45^\circ)\tan(60^\circ)} = \frac{1+\sqrt{3}}{1-1(\sqrt{3})} = \frac{1+\sqrt{3}}{1-\sqrt{3}} = \frac{1+\sqrt{3}}{1-\sqrt{3}}(\frac{1+\sqrt{3}}{1+\sqrt{3}}) = \frac{1+2\sqrt{3}+3}{1-3} = \frac{4+2\sqrt{3}}{-2}$
$= -\sqrt{3} - 2$

35. Note sin $(\theta) = 2\sin(\theta)\cos(\theta)$. Since $\sin(\theta) = \frac{2}{5}$ we have the following diagram:



and since $\cos(\theta) < 0$ then $\cos(\theta) = \frac{-\sqrt{21}}{5}$. So we get $2(\frac{2}{5})(-\frac{\sqrt{21}}{5}) = -\frac{4\sqrt{21}}{25}$

36. Note $\cos(2\theta) = 2\cos^2(\theta) - 1$. Since $\tan(\theta) = \frac{7}{24}$ we have the following diagram:



and so $\cos(\theta) = \frac{24}{25}$. So we get $2(\frac{24}{25})^2 - 1 = .8432$

37. Since $\theta = \sec^{-1}(-\sqrt{2})$ and $\cos(\theta) = \frac{1}{\sec(\theta)}$, then we have $\cos^{-1}(\frac{1}{-\sqrt{2}}) = \cos^{-1}(\frac{-\sqrt{2}}{2}) = 135^\circ$ or $\frac{3\pi}{4}$.

38. $\cos^{-1}(\frac{-\sqrt{3}}{2}) = 150^\circ$ or $\frac{5\pi}{6}$

39. $\sin^{-1}(-.76) = -49.46^\circ$ but since $0 \le \theta \le 360^\circ$ so we get $360 - 49.46 = 310.54^\circ$ and $180 + 49.46 = 229.46^\circ$ as our answers.

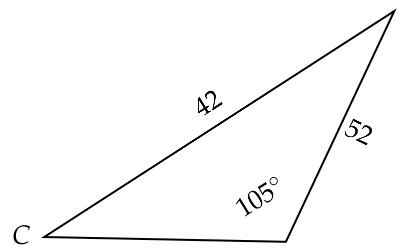
40. $\sin(\arctan(2)) = .8944$

41. $\tan(\arctan(4) = 4$

42.

$$\begin{aligned} 3\tan(\theta) + 12 &= 30 \\ 3\tan(\theta) &= 18 \\ \tan(\theta) &= 6 \\ \tan^{-1}(6) &= 80.54^\circ \text{ which is in quadrant } I. \\ 180 + 80.54 &= 260.54^\circ \text{ which is in quadrant } III. \end{aligned}$$

43. $\frac{\sin(105)}{42} = \frac{\sin(C)}{52}$
$1.196 = \sin(C)$
$\sin^{-1}(1.196) =$ so no solution

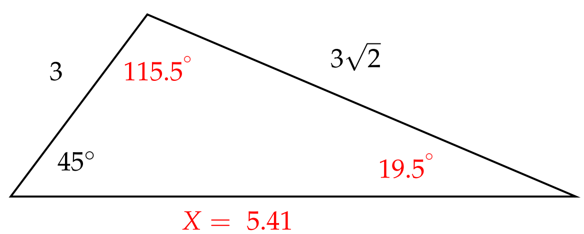


44. $\frac{\sin 45^\circ}{3\sqrt{2}} = \frac{\sin(\theta)}{2}$

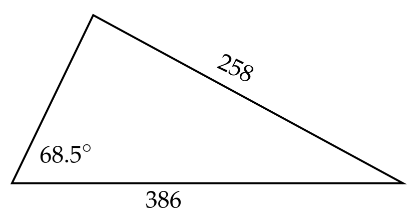
So $\frac{\frac{\sqrt{2}}{2}}{3\sqrt{2}} = \frac{\sqrt{2}}{2(3\sqrt{2}} = \frac{1}{6} = \frac{\sin(0)}{2} \implies \frac{1}{3} = \sin(\theta) \implies \sin^{-1}(\frac{1}{3}) = 19.5^\circ$

Since triangles are $180^\circ = 45^\circ + 19.5^\circ + x \implies x = 115.5^\circ$

$\frac{3\sqrt{(2)}}{\sin(45^\circ)} = \frac{X}{\sin(115.5^\circ)} \implies X = 5.41$



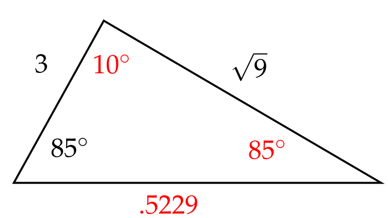
45. $\frac{\sin(68.5^\circ)}{285} = \frac{\sin(\theta)}{386} \implies \sin(\theta) = 1.26 \implies \sin^{-1}(1.26) =$ no solutions, so no triangles.



46. $\frac{\sin(85^\circ)}{\sqrt{9}} = \frac{\sin(\theta)}{3} \implies \sin(\theta) = .996 \implies \theta = 85^\circ$

$180^\circ - 85^\circ - 85^\circ = 10^\circ$

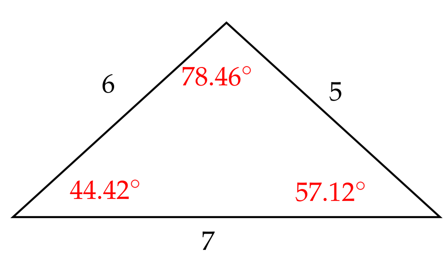
$\frac{X}{\sin(10)} = \frac{3}{\sin(85)} \implies X = .5229$



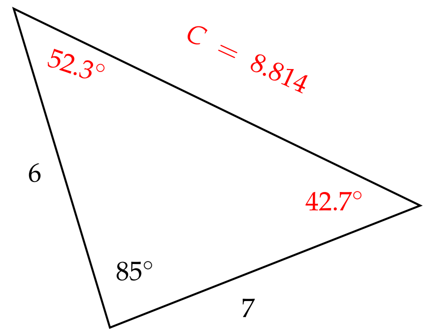
47. $7^2 = 5^2 + 6^2 - 2(5)(6)\cos(A) \implies .2 = \cos(A) \implies A = 78.46^\circ$

$6^2 = 5^2 + 7^2 - 2(5)(7)\cos(B) \implies .542857 = \cos(B) \implies B = 57.12$

$180 - 78.46 - 57.12 = 44.42$



48. $C^2 = 6^2 + 7^2 - 2(6)(7)\cos(85) \implies C = \sqrt{77.679}$
$6^2 = 7^2 + 8.814^2 - 2(7)(8.814)\cos(B) \implies \cos(B) = .7349 \implies B = 42.7°$
$180° - 85° - 42.7° = 52.3°$



49. (a) $s = \frac{3+1.3+\sqrt{11.25}}{2} = 3.927$
Area $= \sqrt{3.927(3.927-3)(3.927-1.5)(3.927-\sqrt{11.25})} = 2.25$
Or the easy way, $\frac{3(1.5)}{2} = 2.25$

(b) $s = \frac{12+16+25}{2} = 26.5$
Area $= \sqrt{26.5(26.5-12)(26.5-16)(26.5-25)} = \sqrt{6051.9375} = 77.79m^2$

(c) $A = \frac{1}{2}(b)(c)\sin(A)$
$A = \frac{1}{2}(13.6)(10.1)\sin(42.5°)$
$A = 46.4m^2$

50. (a) $\theta_c = -26.74°$
$\theta_1 = 180 - (-26.74°) = 206.74°$
$\theta_2 = 360 + (-26.74°) = 333.26°$
So our answer in radians should be:
$\theta_1 = 3.608$
$\theta_2 = 5.816$

(b) $\theta_c = 51.68°$
$\theta_1 = 51.68°$
$\theta_2 = 360 - 51.68° = 308.32°$
So our answer in radians should be:
$\theta_1 = .902$
$\theta_2 = 5.381$