Written work: Need a multi-plage PDF.

Printer/scanner, library, Learning commons, ...

Home-made pictures not good. (cell-phone pictures suck).

Need a clear white background.

Clear, dark writing.

RocketBook works well.

ANY decent printer/scanner will do it.

23. 0/4 points LarTrig10 1.8.052. [3882204]

For the simple harmonic motion described by the trigonometric function, find the maximum displacement, the frequency, the value of d when $t = 5$ and the least positive value of t for which $d = 0$. Use a graphing utility to verify your results.

$d = \frac{1}{4}\cos(16\pi t)$

(a) Find the maximum displacement. Amplitude

1/4

(b) Find the frequency.

8 cycles per unit of time

(c) Find the value of d when $t = 5$.

$d =$ 1/4

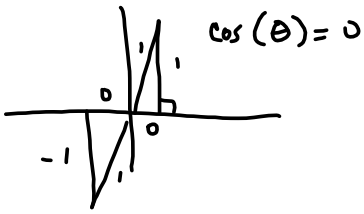
(d) Find the least positive value of t for which $d = 0$.

$t =$ 1/32

$d = \frac{1}{4}\cos(16\pi t) = 0$

$\Rightarrow \cos(16\pi t) = 0$

$\Rightarrow 16\pi t = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \ldots$



$\cos(\theta) = 0$

Frequency $= \frac{1}{\text{period}}$

$16\pi t = 2\pi$ when?

$t = \frac{2\pi}{16\pi} = \frac{1}{8} = T = \text{period} \Rightarrow$

freq $= 8$

$d(5) = \frac{1}{4}\cos(16\pi(5))$

$= \frac{1}{4}\cos(80\pi)$

$= \frac{1}{4}\cos(2\pi \cdot 40)$

$= \frac{1}{4}\cos(0) = \frac{1}{4}\cos(2\pi)$

$= \frac{1}{4}(1) = \frac{1}{4}$

Least positive value:

$16\pi t = \frac{\pi}{2}$

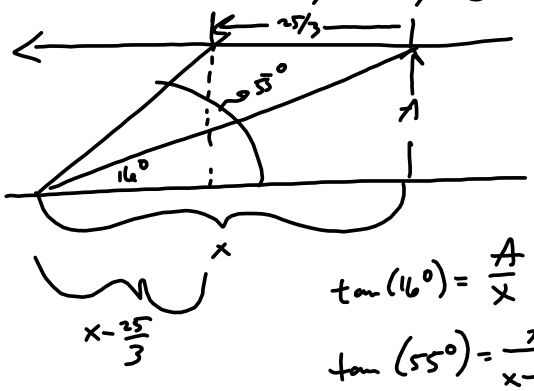
$t = \frac{\pi}{2} \cdot \frac{1}{16\pi} = \frac{1}{32}$

16. 0/1 points LarTrig10 1.8.029. [3882172]

You observe a plane approaching overhead and assume that its speed is 500 miles per hour. The angle of elevation of the plane is 16° at one time and 55° one minute later. Approximate the altitude of the plane. (Round your answer to two decimal places.)

2.99 mi

$\left(500\frac{mi}{hr}\right)\left(1\,min\right)\left(\frac{1\,hr}{60\,min}\right)=\frac{25}{3}\,mi$



$\tan(16^\circ)=\frac{A}{x}=a$

$\tan(55^\circ)=\frac{A}{x-\frac{25}{3}}=b$

$A=A$, etc.

$\Rightarrow ax=A$

$ax=b\left(x-\frac{25}{3}\right)=bx-\frac{25b}{3}$

$\Rightarrow ax-bx=-\frac{25b}{3}$

$\Rightarrow (a-b)x=-\frac{25b}{3}$

$x=\frac{-25b}{3(a-b)}\approx 10.42684954$

& $\frac{A}{x}=\tan(16^\circ)$

$A=(10.4\ldots)\tan(16^\circ)$

≈ 2.989850993

≈ 2.99

```
-25tan(55)/(3*(t
an(16)-tan(55))
      10.42684954
```

```
-25tan(55)/(3*(t
an(16)-tan(55))
      10.42684954
Ans*tan(16)
      2.989850993
```

21. 0/1 points LarTrig10 1.8.047.

Find a model for simple harmonic motion satisfying the specified conditions.

Displacement, d ($t = 0$)	Amplitude, a	Period
8 inches	8 inches	1.5 seconds

$d =$ $8\cos\left(\frac{4\pi t}{3}\right)$

sine/cosine

$f(t) = 8$

$T = 1.5\ s$ = Period

Want $bt = 2\pi$, when $t = 1.5$

$1.5b = 2\pi$

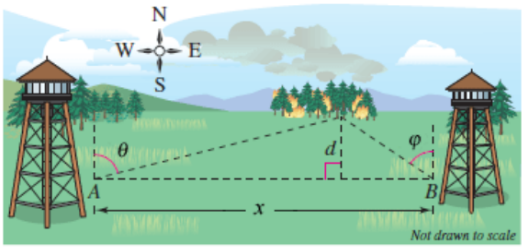
$b = \frac{2\pi}{1.5} = \frac{2\pi}{\frac{3}{2}} = \frac{4\pi}{3}$

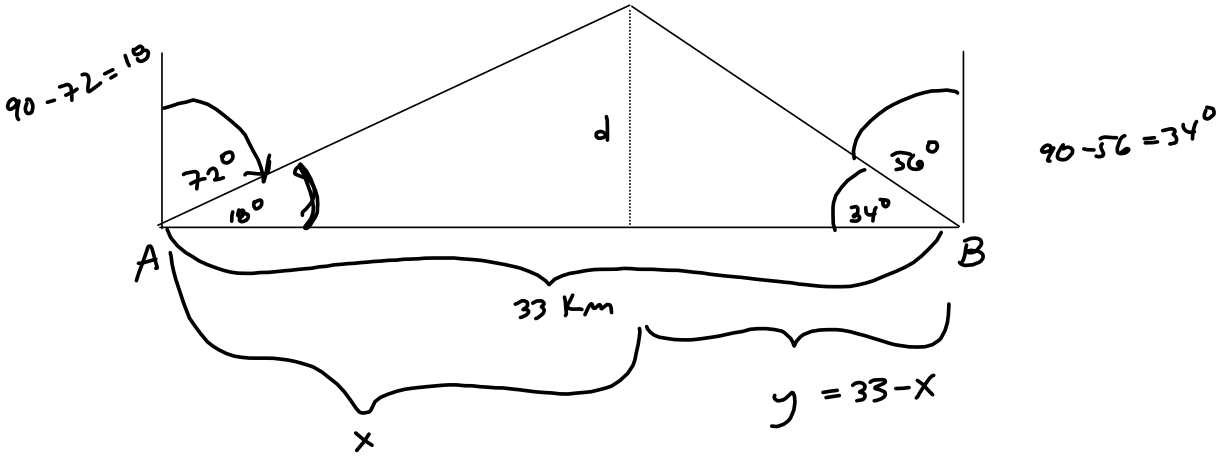
$f(t) = 8\cos\left(\frac{4\pi}{3}t\right)$

19. 0/1 points LarTrig10 1.8.040.MI. [3882407]

Fire tower A is $x = 33$ kilometers due west of fire tower B. A fire is spotted from the towers, and the bearings from A and B are θ = N 72° E and φ = N 56° W, respectively (see figure). Find the distance d of the fire from the line segment AB. (Round your answer to two decimal places.)

d = [ ] 7.24 km





$\frac{d}{x} = \tan 18^\circ$ $\qquad$ $\frac{d}{y} = \frac{d}{33-x} = \tan 34^\circ$

$d = x \tan 18^\circ$ $\qquad$ $d = (33-x)\tan 34^\circ$

$x \tan 18^\circ = (33-x)\tan(34^\circ)$

Solve for x

Then use

$d = x \tan(18^\circ)$

Evaluating Trigonometric Functions

In Exercises 23–32, find the exact values of the remaining trigonometric functions of θ satisfying the given conditions.

23. $\tan\theta = \frac{15}{8}$, $\sin\theta > 0$

24. $\cos\theta = \frac{8}{17}$, $\tan\theta < 0$

25. $\sin\theta = 0.6$, θ lies in Quadrant II.

26. $\cos\theta = -0.8$, θ lies in Quadrant III.

27. $\cot\theta = -3$, $\cos\theta > 0$

28. $\csc\theta = 4$, $\cot\theta < 0$

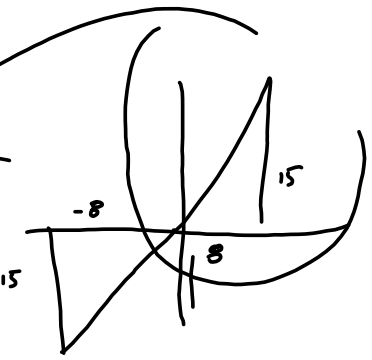
29. $\cos\theta = 0$, $\csc\theta = 1$

30. $\sin\theta = 0$, $\sec\theta = -1$

31. $\cot\theta$ is undefined, $\frac{\pi}{2} \le \theta \le \frac{3\pi}{2}$

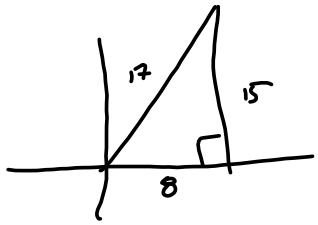
#23

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



$r^2 = 15^2 + 8^2 = 225 + 64 = 289$

$= 17^2 \Rightarrow r = 17$ (positive)



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

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

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

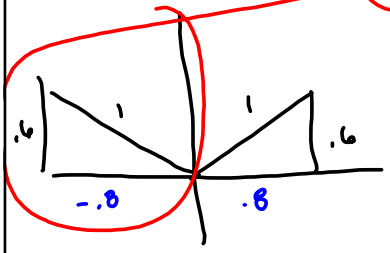
#25

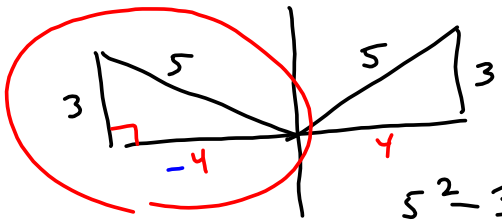
$\sin\theta = .6$, $\theta \in QII$

$.6 = \frac{6}{10} = \frac{3}{5} = \sin\theta$

$a^2 + b^2 = c^2$

$c^2 - 3^2 = b^2$





$5^2 - 3^2 = 25 - 9 = 16 = 4^2$

$\Rightarrow 4$

$1^2 - .6^2 = 1 - .36 = .64 = b^2$

$\Rightarrow b = -\sqrt{.64} = -.8$

QII!

$b = \pm\sqrt{.64} = \pm .8 \rightarrow$ Take $-.8$

$\sin\theta = .6 = \frac{3}{5}$

$\cos\theta = -.8 = -\frac{4}{5}$

$\tan\theta = \frac{.6}{-.8} = -.75 = -\frac{3}{4}$

The decimals, here, are exact.

They won't always be.

Finding a Reference Angle **In Exercises 47–54, find the reference angle θ'. Sketch θ in standard position and label θ'.**

47. $\theta = 160°$ **48.** $\theta = 309°$

49. $\theta = -125°$ **50.** $\theta = -215°$

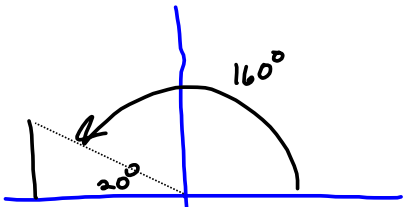
51. $\theta = \frac{2\pi}{3}$ **52.** $\theta = \frac{7\pi}{6}$

53. $\theta = 4.8$ **54.** $\theta = 12.9$

Using a Reference Angle **In Exercises 55–68, evaluate the sine, cosine, and tangent of the angle without using a calculator.**

55. 225° **56.** 300°

57. 750° **58.** 675°



ref angle is $20°$

$\theta = 12.9$

$2\pi \approx 6.28$

$\frac{12.9}{2\pi} \approx 2.05\ldots$ revs

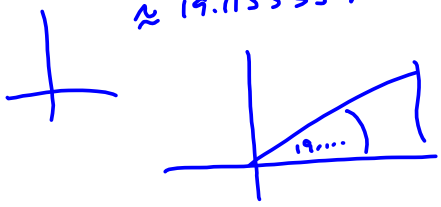
subtract of full revs

$.053\ldots$

convert to radians:

$.3336293856$

$\approx 19.11555572°$




```
          2.053098766
Ans-2
          .0530987659
Ans*2π
          .3336293856
Ans*180/π
          19.11555572
```

Solving for θ **In Exercises 91–96, find two solutions of each equation. Give your answers in degrees ($0° \le \theta < 360°$) and in radians ($0 \le \theta < 2\pi$). Do not use a calculator.**

91. (a) $\sin\theta = \frac{1}{2}$

(b) $\sin\theta = -\frac{1}{2}$

92. (a) $\cos\theta = \frac{\sqrt{2}}{2}$

(b) $\cos\theta = -\frac{\sqrt{2}}{2}$

93. (a) $\cos\theta = \frac{1}{2}$

(b) $\sec\theta = 2$

94. (a) $\sin\theta = \frac{\sqrt{3}}{2}$

(b) $\csc\theta = \frac{2\sqrt{3}}{3}$

95. (a) $\tan\theta = 1$

(b) $\cot\theta = -\sqrt{3}$

96. (a) $\cot\theta = 0$

(b) $\sec\theta = -\sqrt{2}$

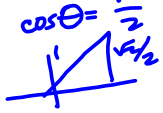
$\frac{\sqrt{2}}{2}\cdot\frac{\sqrt{2}}{\sqrt{2}} = \frac{2}{2\sqrt{2}} = \frac{1}{\sqrt{2}}$

$= \cos\theta$

hard to "see" the 30-60 triangle

Book

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



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