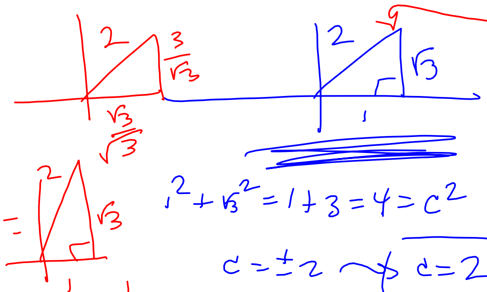
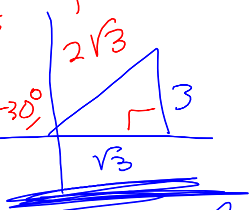
§1.3 # 62 GIVEN $0^\circ < \theta < 90^\circ$ $(0 < \theta < \frac{\pi}{2})$

(a) $\cot\theta = \frac{\sqrt{3}}{3} = \frac{1}{\sqrt{3}}$ Divide by $\sqrt{3}$ $\frac{\sqrt{3}}{3} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{3}{3\sqrt{3}} = \frac{1}{\sqrt{3}}$

2's & $\sqrt{3}$'s



Looks like 60°-30° maybe



$2 \mid 12$
$2 \mid 6$
3

$1^2 + \sqrt{3}^2 = 1 + 3 = 4 = c^2$

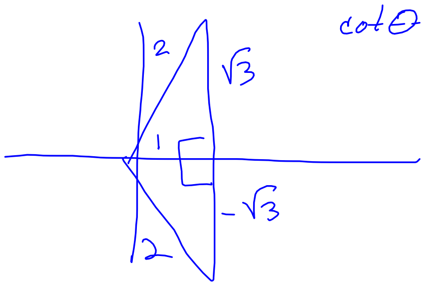
$c = \pm 2 \rightarrow \boxed{c = 2}$

$3^2 + \sqrt{3}^2 = 9 + 3 = 12 = c^2$

$\Rightarrow c = \pm\sqrt{12} = \pm 2\sqrt{3}$

Sweet! It is 60°-30° right triangle!

$\theta = 60^\circ = \frac{\pi}{3}$



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

2 triangles satisfy $\cot\theta = \frac{1}{\sqrt{3}}$, if we don't restrict the domain at the start, (and we did restrict it)

CHEAT THIS.

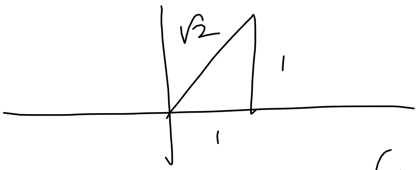
$\cot\theta = \frac{\sqrt{3}}{3} \Rightarrow \tan\theta = \frac{3}{\sqrt{3}}$

Calculator: TAN^{-1} Key. TAN^{-1}

$3/\sqrt{3}$, TAN^{-1} = Arctangent

TAN$^{-1}(3/\sqrt{3})$ = arctan

62b $\sec\theta = \sqrt{2} \Rightarrow \cos\theta = \frac{1}{\sqrt{2}}$



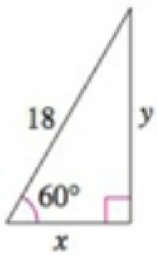
$\theta = 45^\circ = \frac{\pi}{4}$

$(45^\circ)\left(\frac{\pi}{180^\circ}\right) =$

$\sin(1.28) \approx .0223383$

$\sin\left(1.28 \cdot \frac{180^\circ}{\pi}\right) \approx .9580158603$

63. Find x and y.

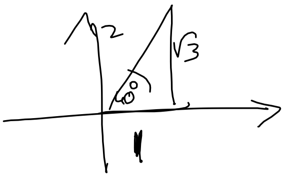


EXACT ANSWERS, ONLY.

Write Much Think Little

$\frac{y}{18} = \sin(60^\circ) \Rightarrow$

$\Rightarrow y = 18\sin(60^\circ) = \frac{18\sqrt{3}}{2} = \boxed{9\sqrt{3} = y}$



$\frac{x}{18} = \cos(60^\circ)$

$\Rightarrow x = 18\cos(60^\circ) = 18 \cdot \frac{1}{2} = \boxed{9 = x}$

Figure for 73

74. **Machine Shop Calculations** A tapered shaft has a diameter of 5 centimeters at the small end and is 15 centimeters long (see figure). The taper is 3°. Find the diameter d of the large end of the shaft.

75. **Geometry** Use a compass to sketch a quarter of a circle of radius 10 centimeters. Using a protractor, construct an angle of 20° in standard position (see figure). Drop a perpendicular line from the point of intersection of

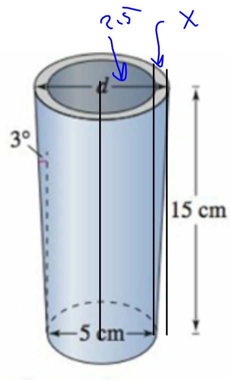
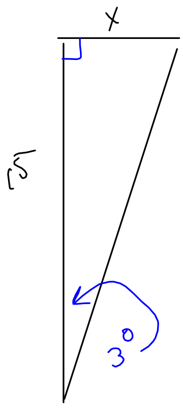
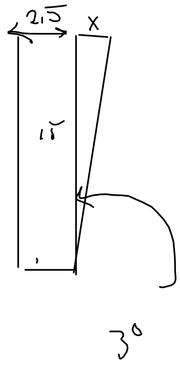


Figure for 74



So radius
$= 2.5 + x$
want diameter.



$$\frac{x}{15} = \tan 3^\circ$$

$x = 15 \tan 3^\circ \approx$ 0.7861166895

$2.5 + x = \text{radius} \approx 2.5 +$ 0.7861166895 cm

$= 3.2861166895 \approx r$

$\Rightarrow$ Diameter $= d = 2r \approx$ $\boxed{6.572233379 \text{ cm} \approx D}$

Let x = the amount by which top radius is greater than the bottom radius (cm)

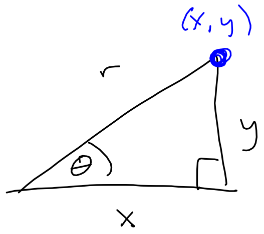
D = Diameter @ top (cm)

No specified precision, so be a smart-ass:

$$\boxed{D = 5 + (2)(15 \tan(3^\circ))}$$

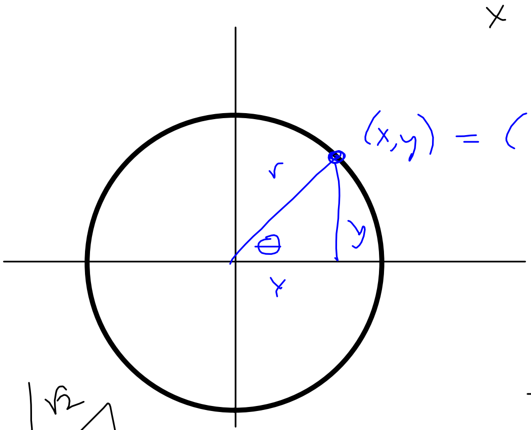
$= \boxed{5 + 30 \tan 3^\circ}$ is exact.

Don't kill yourself with repetitions if you have the concept. Feedback on homework is mainly formative (not as summative)



$$\boxed{\frac{y}{r} = \sin\theta \qquad \frac{x}{r} = \cos\theta} \Rightarrow \begin{array}{l} y = r\sin\theta \\ x = r\cos\theta \end{array}$$

$$\frac{y}{x} = \tan\theta$$

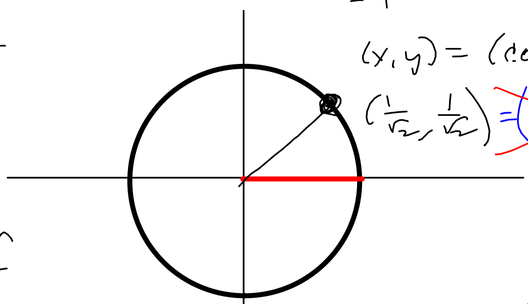


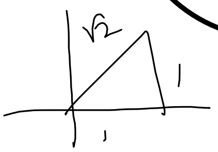
$(x,y) = (r\cos\theta, r\sin\theta)$

$r = 1$

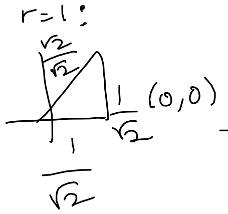
$(x,y) = (\cos\theta, \sin\theta)$

$\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right) = \cancel{\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)}$

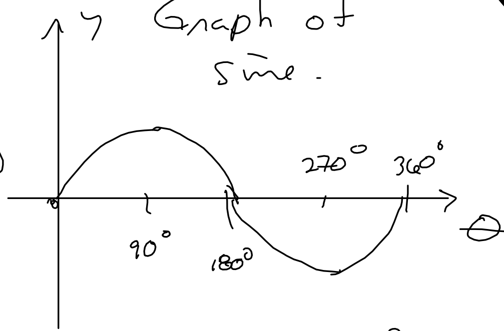




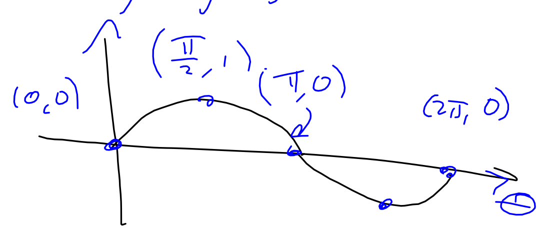
$r = 1$:



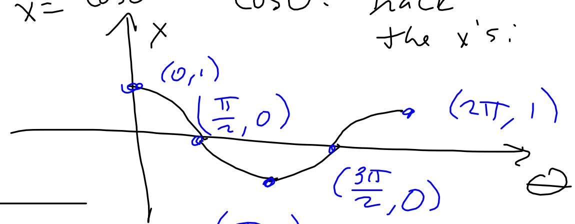
Graph of sine.

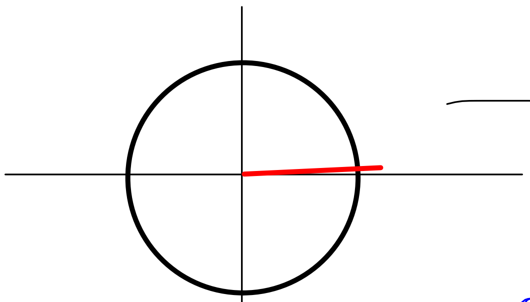


$y = \sin\theta$



$x = \cos\theta$ $\cos\theta$: Track the x's:





$y = \sin\theta$

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

$$\frac{2}{\sqrt{5}} = \frac{2}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$$

$$\boxed{\frac{1}{1+\sqrt{3}}} = \left(\frac{1}{1+\sqrt{3}}\right)\left(\frac{1-\sqrt{3}}{1-\sqrt{3}}\right) = \frac{1-\sqrt{3}}{1^2-\sqrt{3}^2}$$

$a+\sqrt{b}$ conjugate is $a-\sqrt{b}$

$(a+b)(a-b) = a^2-b^2$

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