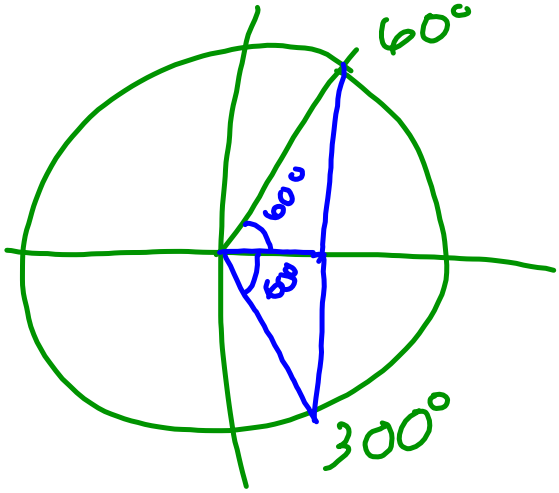
Warm-Up

March 22, 2017

Pull out your unit circle. What two angles between 0 and 2π satisfy cos(x) = 1/2?



$\frac{\pi}{3}, \frac{5\pi}{3}$

$\frac{2\pi}{1} \cdot \frac{3}{3} = \frac{6\pi}{3}$

(2) $\tan\theta = -2.9577$

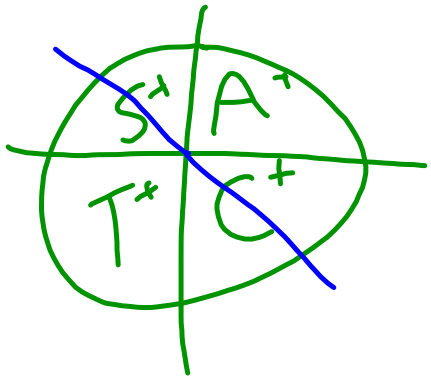
$\tan^{-1}$ $\tan^{-1}$

$\theta = \tan^{-1}(-2.9577)$

$= -71.32°$

$+360°$

IV $288.68°$



$71.32°$ ref $\measuredangle$

II $180 - 71.32°$

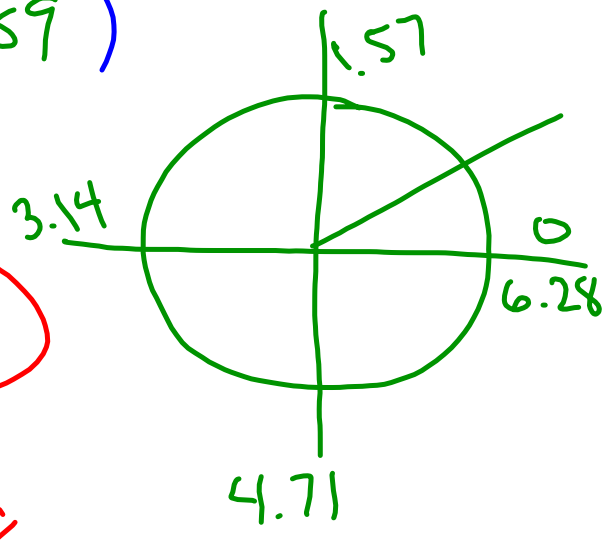
$108.68°$

6 $\cos\theta = .989$

$\cos^{-1}$ $\cos^{-1}$

S A
T C

I $\theta = 0.148$



IV $2\pi - 0.148$

$\theta = 6.135$

Find 2 angles, $0 \le \theta < 2\pi$, that satisfy $\csc\theta = -5.677$

$$\csc\theta = -5.677$$

$$\frac{1}{\sin\theta} = -\frac{5.677}{1}$$

$$\sin\theta = \frac{1}{-5.677}$$

$$\sin^{-1}$$

$$\theta = -0.177$$

$$+2\pi$$

IV $\theta = 6.106$

III $\pi + 0.177$

$\theta = 3.318$

$[0°, 360°)$

$\sec\theta = 2$

$[0, 2\pi)$

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

$[0°, 360°)$

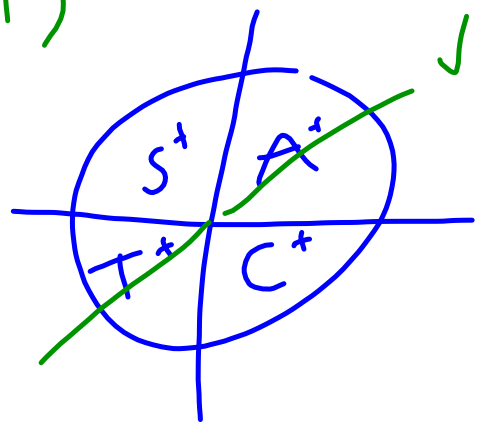
$\csc\theta = 9.1$

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

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

I $\theta = 45^\circ$

III $\theta = 225^\circ$



(6) $\cos\theta = .989$

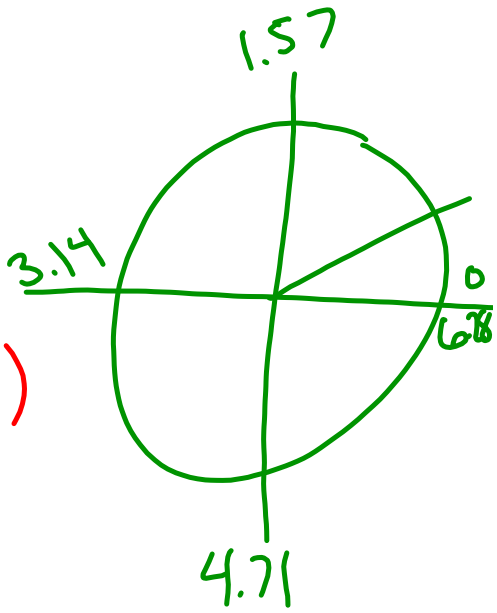
$\cos^{-1}$

$\theta = \cos^{-1}(.989)$

I $\theta = .148$

IV $\theta = 2\pi - .148$

$= 6.135$



3

$\cos\theta = 0.4537$

$\cos^{-1}$ $\cos^{-1}$

$\theta = \cos^{-1}(0.4537)$

I $= 63.02°$

IV $360° - 63.02°$

$= 296.98°$

2 $(\tan\theta) = -2.9577$

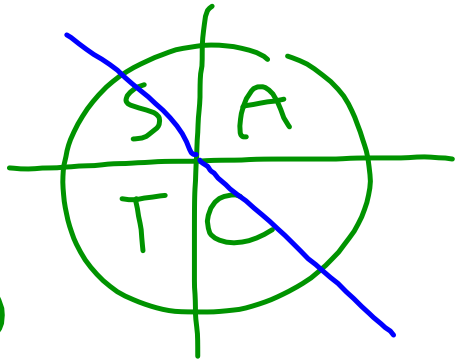
$\tan^{-1}$ $\tan^{-1}$

$\theta = \tan^{-1}(-2.9577)$

$\theta = -71.31^\circ$

$+360$

IV 288.69

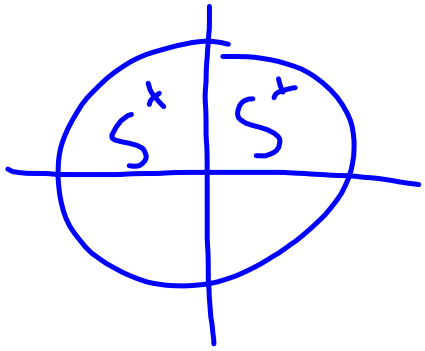


II $180^\circ - 71.31^\circ$

108.69°

(5) $\sin\theta = .6$

$\sin^{-1}(\sin\theta) = \sin^{-1}\left(\frac{2}{3}\right)$



$\theta = \sin^{-1}\left(\frac{2}{3}\right)$

I $\theta = 0.7297$

II $\pi - 0.7297$

$\theta = 2.411$

+ one of 2 angles
− add 360° or 2π
- make it positive if calculator gives a negative angle.
- use quadrant rules

S+	A+
T+	C+

(6) $\cos\theta = (.989)$

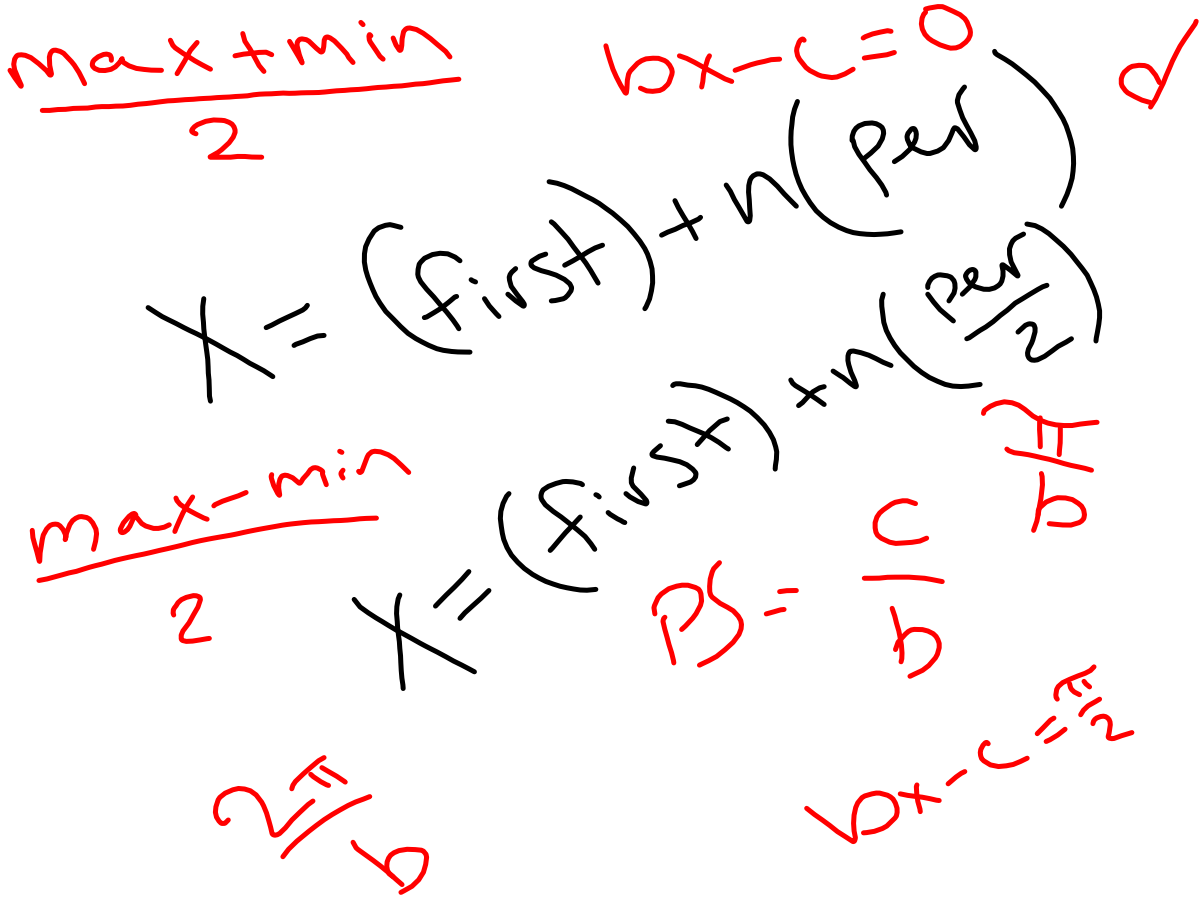
$\cos^{-1}$

$\theta = \cos^{-1}(.989)$

I $\theta = 0.1484$

IV $2\pi - 0.1484$

$\theta = 6.1516$


max + min
2
bx − c = 0
d
x = (first) + n(per)
x = (first) + n(per/2)
max − min
2
2π/b
PS = c/b
2π/b
bx − c = π/2

$0° \leq \theta < 360°$

$\tan\theta = -2.9577$

$\tan^{-1}$ $\tan^{-1}$

$\theta = -71...$

$\theta' = 71$

180 − 71 = 109

180

360 − 71 = 289°

S+ A+ T+ C+

71

II : 109°

IV : 289°

$\sin\theta = \frac{1}{\csc\theta} = \frac{1}{1.5}$

$\sin^{-1}(\sin\theta) = \sin^{-1}\left(\frac{1}{1.5}\right)$

$\theta' = 41.81°$

I: 41.81

II: 136.19°

$\cot = \frac{1}{\tan}$

$\tan = \frac{1}{\cot}$

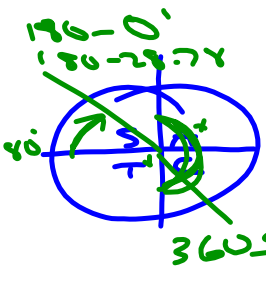
$0° \le \theta < 360°$

$\tan\theta =$ $\frac{1}{\cot\theta} = \frac{1}{-1.82}$

$(\tan\theta) = \left(\frac{1}{-1.82}\right)$

$\theta = -28.78°$

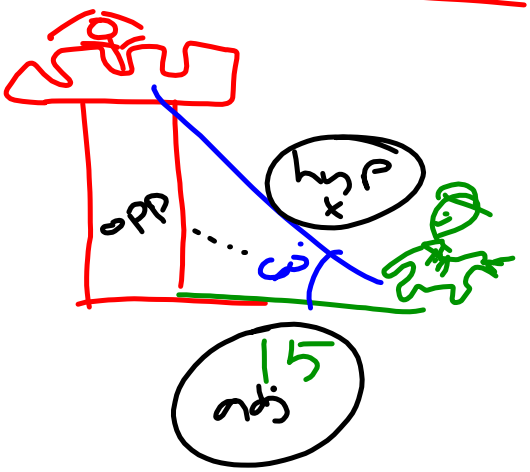
$\theta = 28.78°$



IV: 331.22°

II: 151.22°

1. A damsel is in distress and is being held captive in a tower. Her knight in shining armor is on the ground below with a ladder. When the knight stands 15 feet from the base of the tower and looks up at his precious damsel, the angle of elevation to her window is 60 degrees. How long does the ladder have to be?



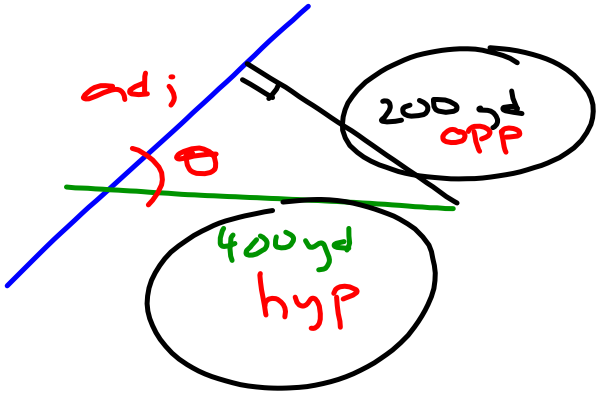
$$\cos(60^\circ) = \frac{15}{x}$$

$$x \cdot \cos(60^\circ) = 15$$

$$\frac{x \cdot \cos(60^\circ)}{\cos(60^\circ)} = \frac{15}{\cos(60^\circ)}$$

$$x = 30 \text{ feet}$$

2. You are 200 yards from a river. Rather than walking directly to the river, you walk 400 yards along a straight path to the river's edge. Find the acute angle between path and the river's edge.



Inverse trig!

$\sin\theta = \frac{200}{400}$

$\sin^{-1}(\sin\theta) = \sin^{-1}\left(\frac{200}{400}\right)$

$\theta = \sin^{-1}\left(\frac{200}{400}\right) = 30^\circ$

$\tan\theta = -2.9577$

$\theta = -71$

$\theta' = 71$

$180 - 71$

$109°$

$360 - \theta'$

$360 - 71$

289

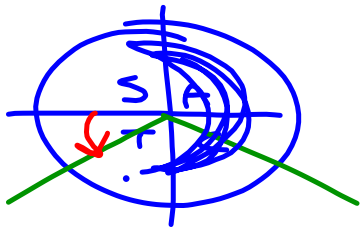
IV : 289

II : 109

$\sin\theta = \frac{1}{\csc\theta} = \frac{1}{-1.5}$

$(\sin\theta) = \left(\frac{1}{-1.5}\right)$

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



$\theta = -41.81°$

$\theta' = 41.81°$

III: $180 + 41.81$
$221.81°$

IV: $360 - \theta'$
$360 - 41.81$
$318.19°$

$0 \le \theta < 2\pi$

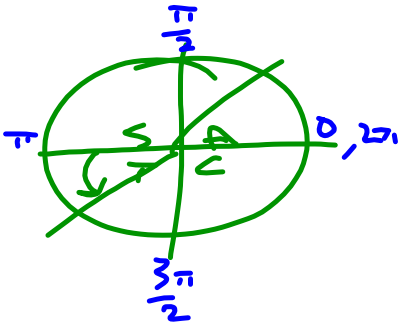
$\tan\theta = \frac{1}{\cot\theta} = \frac{1}{0.85}$

$\tan\theta = \left(\frac{1}{.85}\right)$ tan⁻¹

tan⁻¹

$\theta = 0.866$

$\theta' = 0.866$



I : 0.866

III : π + .866

4.01

1. A damsel is in distress and is being held captive in a tower. Her knight in shining armor is on the ground below with a ladder. When the knight stands 15 feet from the base of the tower and looks up at his precious damsel, the angle of elevation to her window is 60 degrees. How long does the ladder have to be?

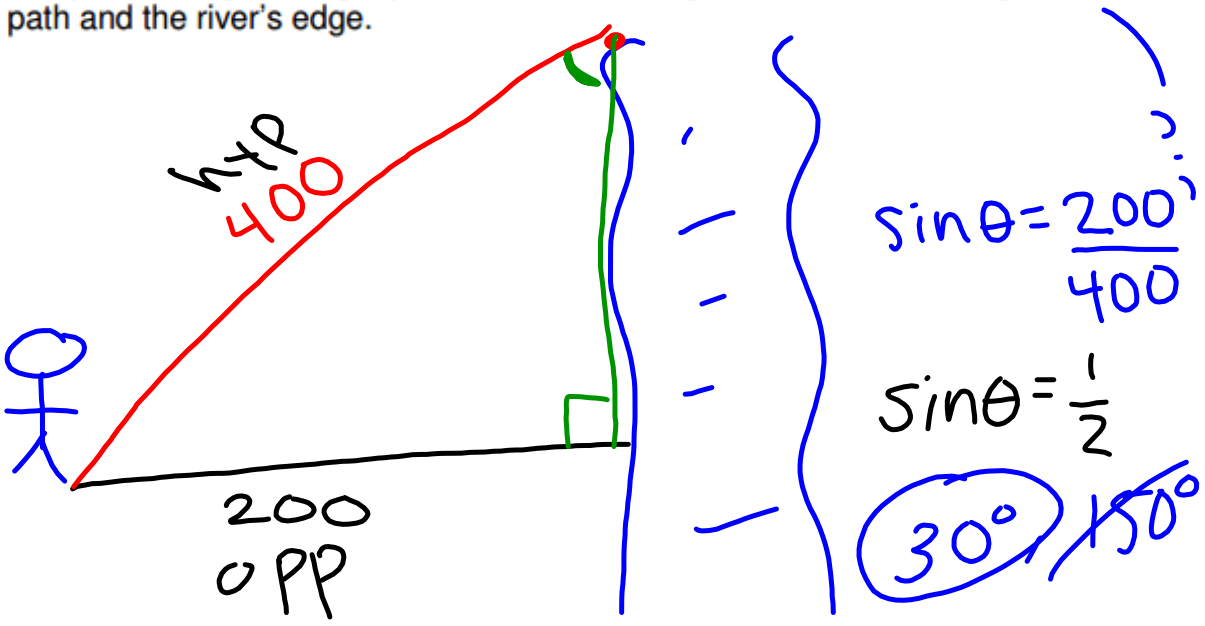
SOH CAH TOA

$H \cdot \cos(60) = \frac{15}{H} \cdot H$

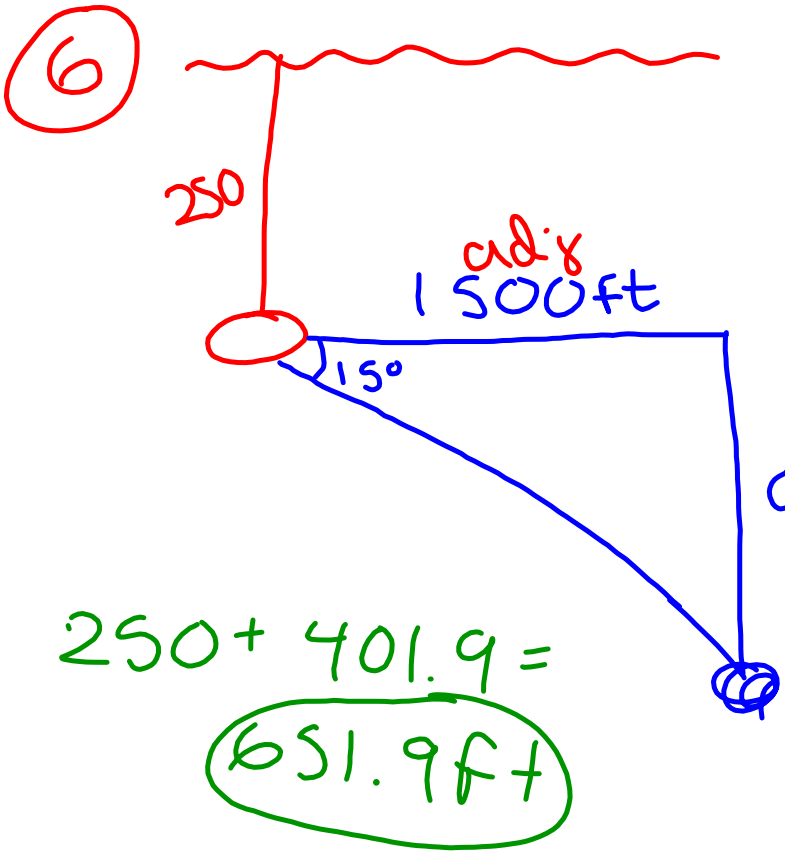
$\frac{H \cdot \cos(60)}{\cos(60)} = \frac{15}{\cos(60)}$

$H = 30$

2. You are 200 yards from a river. Rather than walking directly to the river, you walk 400 yards along a straight path to the river's edge. Find the acute angle between path and the river's edge.



6



$\tan(15°) = \frac{opp}{1500}$

opp = 401.9ft

250 + 401.9 =

651.9ft

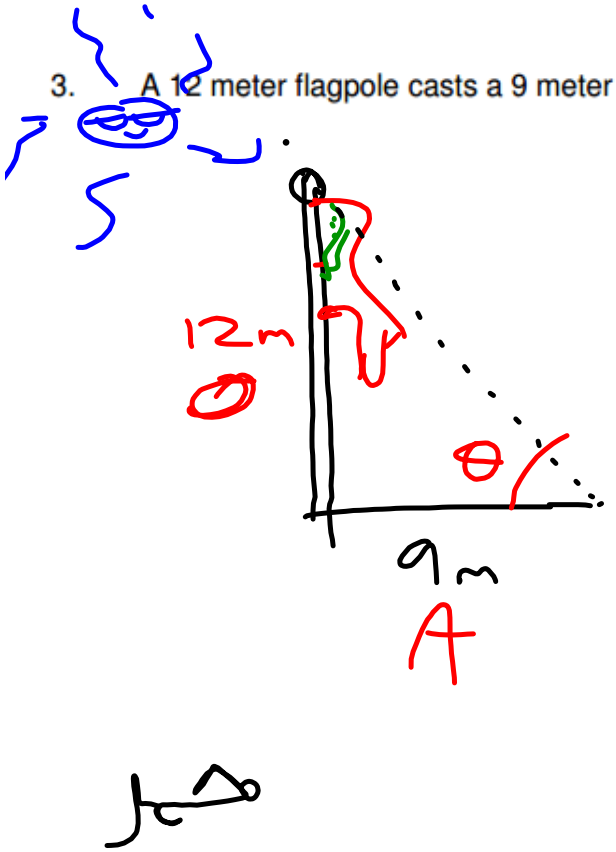
7

$\sin^{-1}(\sin(\theta)) = \frac{100}{110}$

$\theta = \sin^{-1}\left(\frac{100}{110}\right)$

$\theta = 65.38$

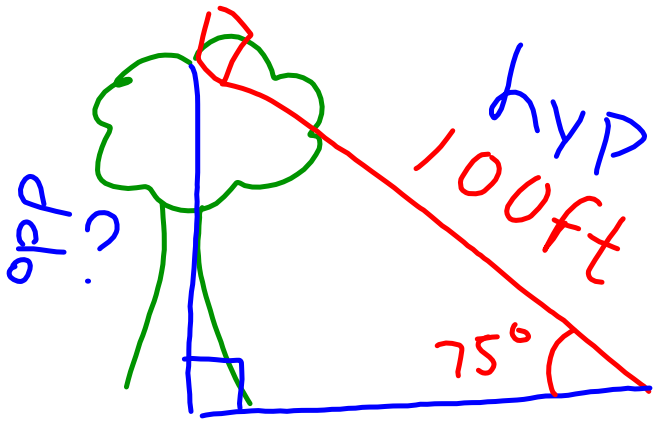
3. A 12 meter flagpole casts a 9 meter shadow. Find the angle of elevation of the sun.



$\tan\theta = \left(\frac{12}{9}\right)$

$\theta = 53.12^\circ$

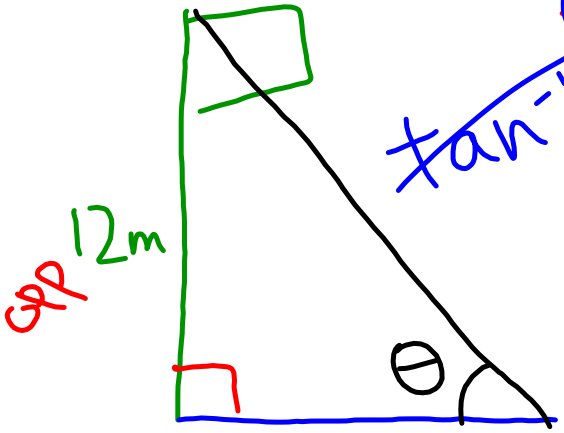
4. Suppose you're flying a kite, and it gets caught at the top of the tree. You've let out all 100 feet of string for the kite, and the angle that the string makes with the ground is 75 degrees. Instead of worrying about how to get your kite back, you wonder. "How tall is that tree?"



$100 \cdot \sin(75°) = \frac{opp}{100} \cdot 100$

$opp = 96.59 \text{ ft}$

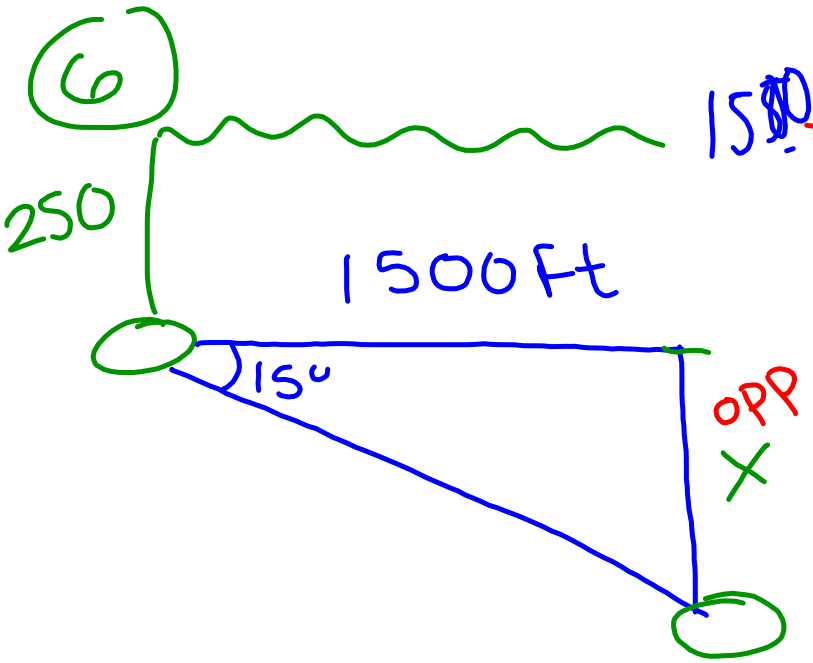
3



$\tan\theta = \left(\frac{12}{9}\right)$

$\tan^{-1}$ $\tan^{-1}$

$\theta = 53.130^\circ$



$\tan(15) = \frac{OPP}{1500}$ ·1500

$OPP = 401.9ft$

401.9
+ 250
651.9ft

5

SKIP #5