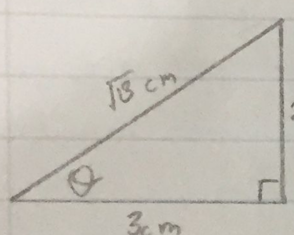
1) "co" is short for complementary

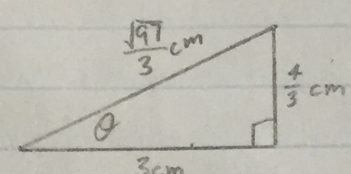
$\sin(30^\circ) = \frac{1}{2}$

complement of 30° is 60°

$\cos(60^\circ) = \frac{1}{2}$

2) As θ aproaches 0 radians, so does $\sin\theta$. This is because when the angle θ decreases, the point of intersection between the opposite side and the hypotenuse gets closer to the adjacent side

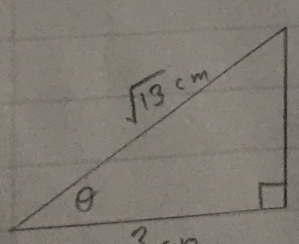


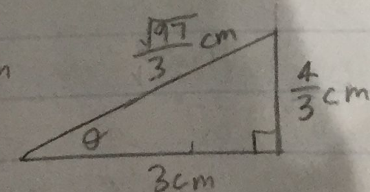


$\theta \approx 33.7^\circ$ $\quad$ $\theta \approx 24.0^\circ$

$\sin\theta \approx 0.6$ $\quad$ $\sin\theta \approx 0.4$

3) As θ aproaches 0 radians, $\cos\theta$ gets larger. This is because when the angle decreases, tha length of hypotenuse gets closer the the length of the adjacent side. This cause the ratio to get closer and closer to 1:1 ratio

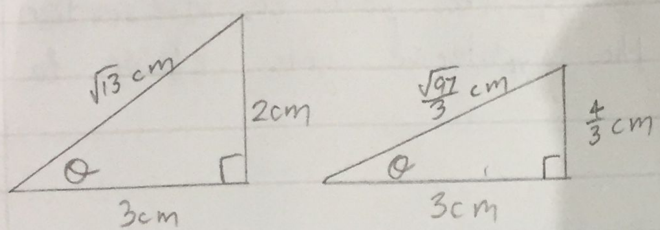




$\theta \approx 33.7^\circ$ $\quad$ $\theta \approx 24.0^\circ$

$\cos\theta \approx 0.8$ $\quad$ $\cos\theta \approx 0.9$

4) As θ aproaches 0, tan θ also does the same. In a tangent ratio, the numerator is the opposite side. As I have explained in previous questions, when θ aproaches 0, the length value of the opposite side decreases. this will result in the ratio getting closer to 0:hyp which means tan θ will decrease.



$\theta \approx 33.7^\circ$ $\quad$ $\theta \approx 24.0^\circ$

$\tan\theta \approx 0.7$ $\quad$ $\tan\theta \approx 0.4$

5) In question 2, I explained that as θ approaches 0, sin θ will decrease. When θ approaches 90°, sin θ will approach 1. When θ goes past 90, sinθ will start to go bach down to 0.

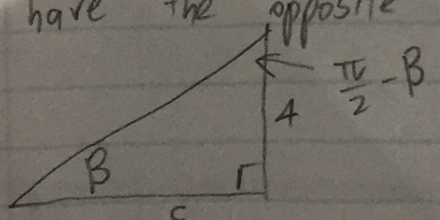
6) In question 3, I explained that as θ approaches 0, cos θ will increase. When θ approaches 90°, cos θ do the opposite and will decrease. This will make the ratio get closer to 0. Once θ goes past 90°, cos θ will continue to decrease into negative numbers. It will continue like this until it gets to 180° at which cos θ would equal -1. Past this point, the angle goes into a reflex angle causing the complement to decrease and thus results in cos θ to approach 0 once again.

7) In question 4, I explained that as θ approaches 0, $\tan\theta$ will decrease. As θ approaches 90°, $\tan\theta$ will do the opposite and will increase. Once θ passes 90°, the triangle will have 2 right angles causing the shape to open. Because of this, the opposite side will have an unknown length (∞) and $\tan\theta$ will be impossible to calculate.

8) Sin and cos do not have any restrictions other than θ has to be a $\mathbb{R}$. This is because sin always look at the smallest angle in the 2 axies and cos always uses the smallost angle in 1 axis. Therefor the sin will always subtract 90 until it can't without going into the negatves while cos will do the same but with 180 instead of 90.

9) For an answer to be undefined the denominator is often 0. To find a senario in which $\tan\theta = \frac{n}{0}$, we can let θ equal 90°. As I explained in question 7, as θ approaches 90°, $\tan\theta$ will increase until it reaches 90°. At this point, the opposite side and hypotenuse will be overlapping and the adjacent side will be 0 (non-existant). Since tan's ratio is $\frac{opp}{adj}$, there will be a 0 in the denominator making the answer undefined.

11) $\frac{\pi}{2}$ can be rewritten as 90°. Since a triangle has to have a sum of 180°, the sum of the 2 acute angles would be 90. $90-\beta$ would equal the third angle which will have the opposite ratio of $\tan\beta$.



$\therefore \tan(\frac{\pi}{2}-\beta) = \frac{5}{4}$