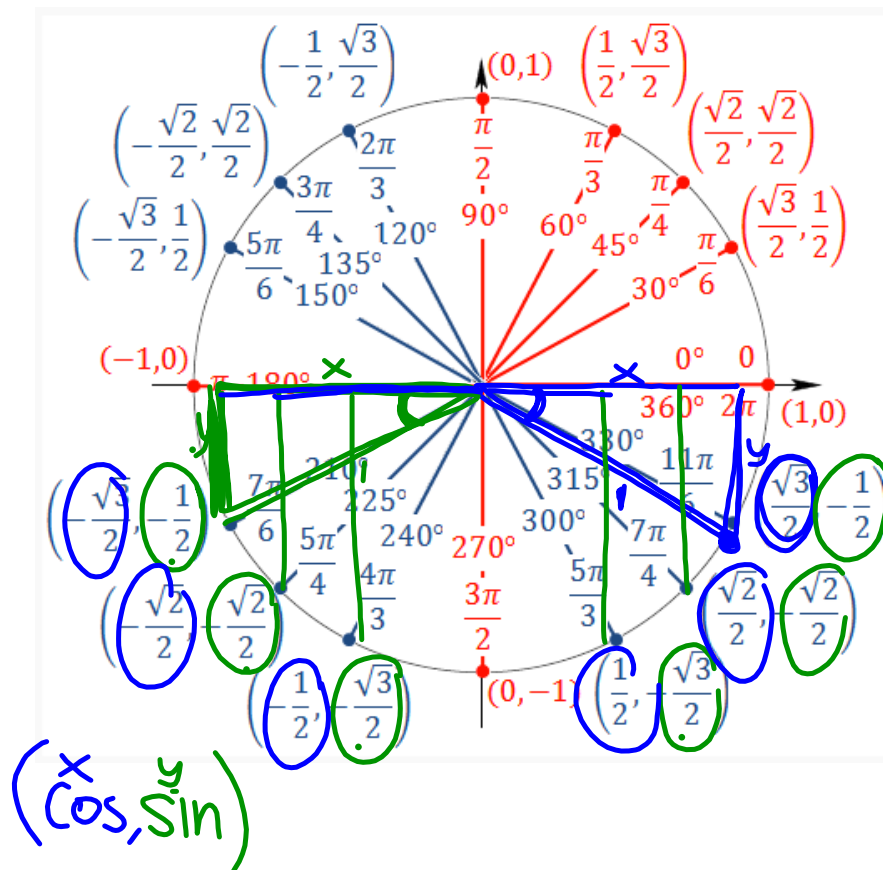


Unit Circle
Quiz
STUDY

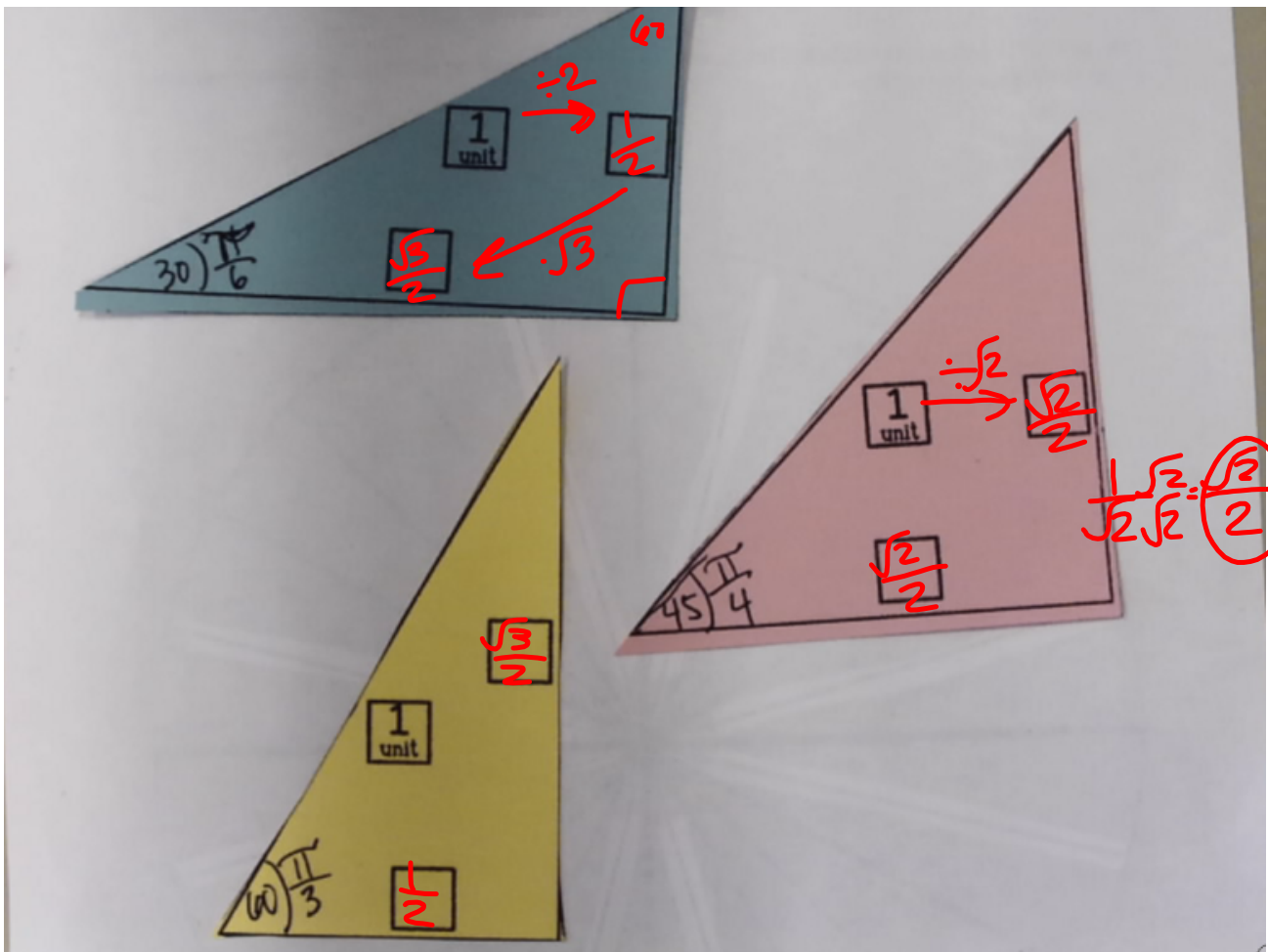


Unit Circle
Quiz

STUDY

$$\cos 330 = \frac{\sqrt{3}}{2}$$

$$\sin \frac{7\pi}{6} = -\frac{1}{2}$$



Unit Circle Quiz

1. complete the table

Degree	Radians (π)
30	$\frac{\pi}{6}$
45	$\frac{\pi}{4}$
60	$\frac{\pi}{3}$
225 $-180 = 45$	$\frac{5\pi}{4}$
360 - 330 = 30	$\frac{11\pi}{6}$



2. Write the ratio for:

a. $\cos(330^\circ) = \frac{\sqrt{3}}{2}$

b. $\sin\left(\frac{7\pi}{6}\right) = -\frac{1}{2}$

6.2 "Sine" Language

A Solidify Understanding Task

In the previous task, *George W. Ferris' Day Off*, you probably found Carlos' height at different positions on the Ferris wheel using right triangles, as illustrated in the following diagram.



12014 www.flickr.com/photos/nicholaslaughlin

SMART Ink

Recall the following facts from the previous task:

- The Ferris wheel has a radius of 25 feet
- The center of the Ferris wheel is 30 feet above the ground

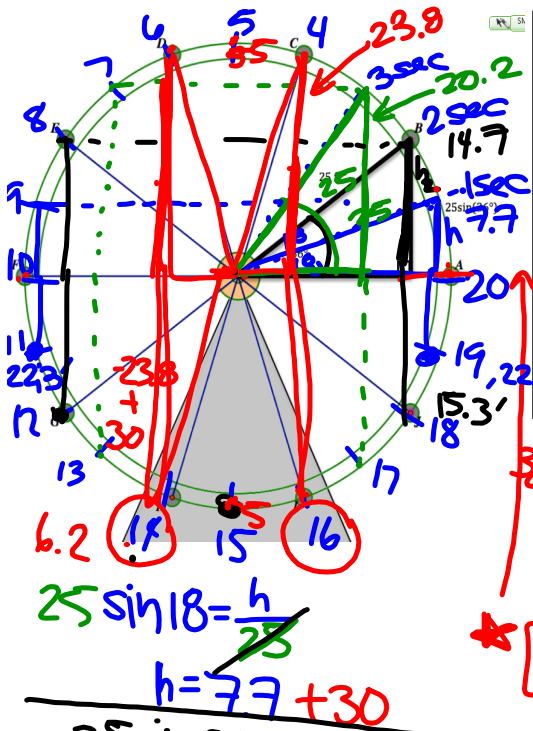
Carlos has also been carefully timing the rotation of the wheel and has observed the following additional fact.

- The Ferris wheel makes one complete rotation counterclockwise every 20 seconds

speed

$$\frac{360^\circ}{20\text{sec}} = \frac{18^\circ}{\text{Sec}}$$

1. How high will Carlos be 2 seconds after passing position A on the diagram?
2. Calculate the height of a rider at each of the following times t , where t represents the number of seconds since the rider passed position A on the diagram. Keep track of any regularities you notice in the ways you calculate the height. As you calculate each height, plot the position on the diagram.



Elapsed time since passing position A	Calculations	Height of the rider
1 sec	$25\sin 18 + 30$	37.7
1.5 sec		
2 sec	$25\sin(36) + 30$	44.7
2.5 sec		
3 sec	$25\sin(54) + 30$	50.2
5 sec		
6 sec	$25\sin(72) + 30$	53.8
8 sec	Same as 2 sec	44.7
9 sec	Same as 1 sec	37.7
10 sec		
12 sec	$30 - 14.7$	15.3
14 sec	$25\sin(144) + 30$	
15 sec		
18 sec	Same as 12 sec	15.3
19 sec	$30 - 7.7$	22.3
20 sec		
23 sec		
28 sec	$25\sin(18 \cdot 28) + 30$	44.7
35 sec	$25\sin(18 \cdot 35) + 30$	5
36 sec		
37 sec		
40 sec		

Summary: $25 \sin(18t) + 30$
 ↑ radius ↑ speed (degrees/sec) ↑ center height
 ↑ time

All the red lines are the same length.

So 4, 6, 14, 16 should all have the same answer...? Strange but amazing.

$25 \cdot \sin(4 \cdot 18)$	23.7764
$25 \cdot \sin(6 \cdot 18)$	23.7764
$25 \cdot \sin(14 \cdot 18)$	-23.7764
$25 \cdot \sin(16 \cdot 18)$	-23.7764

These are negative because they go down.

So just +30 and you'll get the height at every point!!

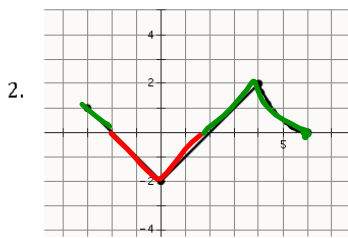
5. Examine your calculations for finding the height of the rider during the first 5 seconds after passing position A (the first few values in the above table). During this time, the angle of rotation of the rider is somewhere between 0° and 90° . Write a general formula for finding the height of the rider during this time interval.

* Summary: $25 \sin(18t) + 30$

↑ radius ↑ speed (degrees/sec) ↑ center height

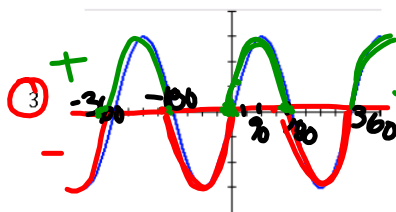
6. How might you find the height of the rider in other quadrants of the wheel, when the angle of rotation is greater than 90° ?

same equation



Positive: _____

Negative: _____



(The scale on the x-axis is in 45° increments.)

Positive: $(0, 180)$ $(-360, -180)$...

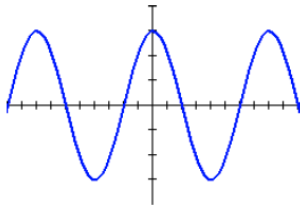
Negative: $(-180, 0)$ $(180, 360)$

repeats every 180°
" "

Name _____

Trigonometric Functions | **6.2**

4.



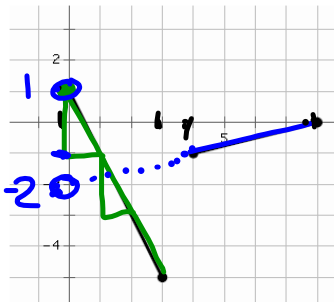
(The scale on the x-axis is in 45° increments.)

Positive: _____

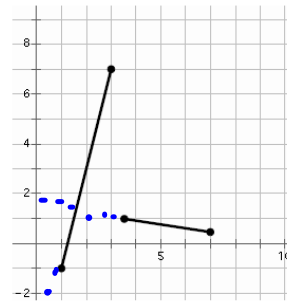
Negative: _____

Write the piece-wise equations for the given graphs.

5.



6.



Set

$$\begin{cases} y = -2x + 1, & \text{domain } 0 \leq x \leq 3 \text{ or } [0, 3] \\ y = \frac{1}{4}x - 2, & 4 \leq x \leq 8 \text{ or } [4, 8] \end{cases}$$

Set

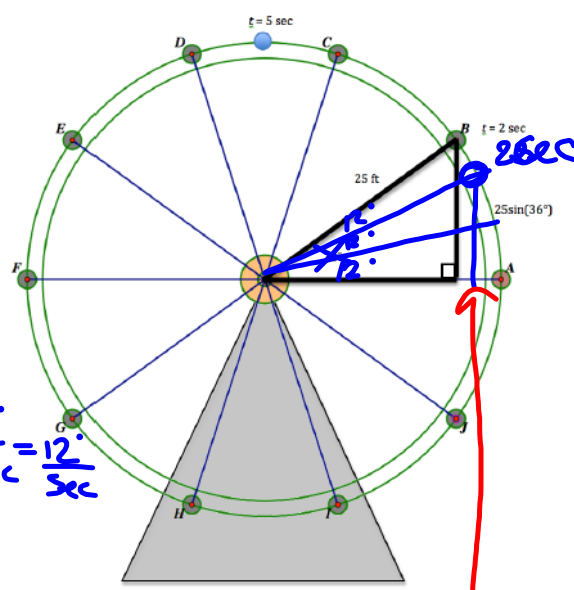
Topic: Sine as a function of time

Recall the following facts from the classroom task:

- The Ferris wheel has a radius of 25 feet
- The center of the Ferris wheel is 30 feet above the ground

Due to a safety concern, the management of the amusement park decides to slow the rotation of the Ferris wheel from 20 seconds for a full rotation to 30 seconds for a full rotation.

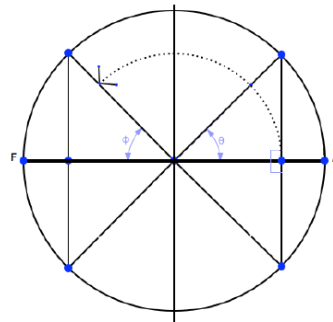
7. Calculate how high a rider will now be 2 seconds after passing position A on the diagram.



8. Calculate the height of a rider at each of the following times t , where t represents the number of seconds since the rider passed position A on the diagram. As you calculate each height, plot the position on the diagram. Connect the center of the circle to the point you plotted. Then draw a vertical line from the plotted point on the Ferris wheel to the line segment AF in the diagram. Each time you should get a right triangle similar to the one in the figure.

Elapsed time since passing position A	Calculations	Height of the rider
1 sec		
3 sec		
5 sec		
7 sec		
8 sec		
11 sec		
14 sec		
15 sec		
16 sec		
20 sec		
22 sec		
23 sec		
25 sec		
27 sec		
30 sec		

9. How did the position of the triangles you drew change between 5 seconds and 7 seconds?
10. How did the triangles you drew change between 14, 15, and 16 seconds?
11. How did the triangles you drew change between 22 seconds and 23 seconds?
12. Describe a relationship between the orientation of the right triangles around the circle and the angle of rotation. Use the diagram to help you think about the question.
(The dotted arc shows the angle of rotation.)



Go

Topic: Finding missing angles in triangles

Go

Topic: Finding missing angles in triangles



Find the measure of each acute angle of right triangle ABC , with $m\angle C = 90^\circ$. Round your answers to the nearest degree.

13. $a = 3$ in $b = 5$ in



14. $a = 5$ ft $c = 10$ ft

15. $a = 9.1$ cm $c = 12.3$ cm

16. $a = 14.1$ cm $c = 18$ cm

17. $a = 9.7$ in $b = 12.7$ in

18. $a = 14.6$ ft $c = 20.3$ ft