Questions on 6.9 HW? Quiz today...make sure you can switch between radians and degrees on your calculator...

Mar 28-9:51 AM

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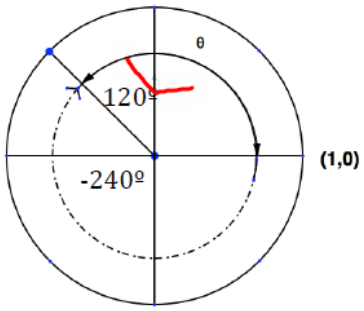
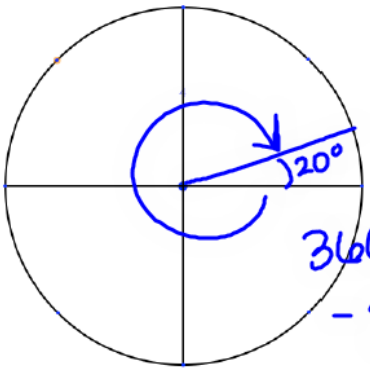
Example: $\theta = 120°$ is the given angle of rotation. The angle of rotation is indicated by the solid arc. The dotted angle of rotation is the coterminal angle with a rotation of $-240°$.



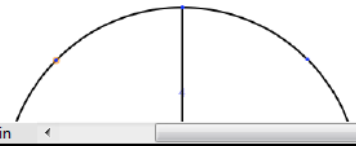
1. Given $\theta = 20°$
Coterminal angle _____



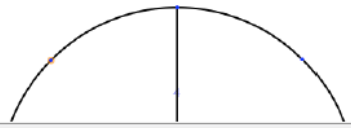
360 - 20 = 340

-340°

2. Given $\theta = 95°$
Coterminal angle _____



3. Given $\theta = 225°$
Coterminal angle _____



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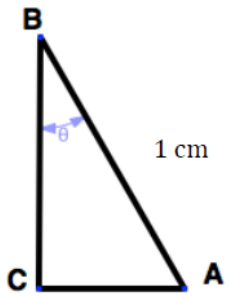
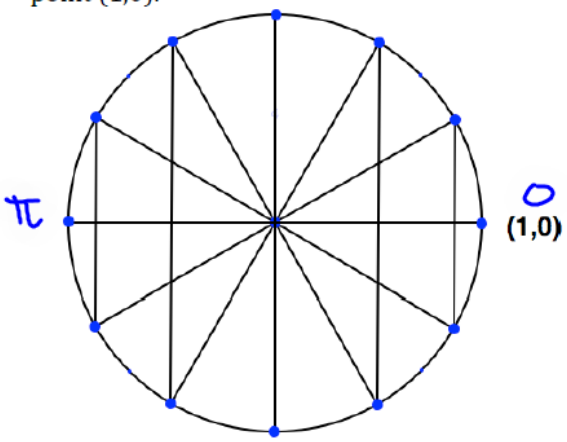
8. Triangle ABC is a 30°, 60°, 90° right triangle. The length of one side is given. Fill in the values for the missing sides. $m\angle B = 30°$.



9. Label each point around the circle with the angle of rotation in radians starting from the point (1,0).



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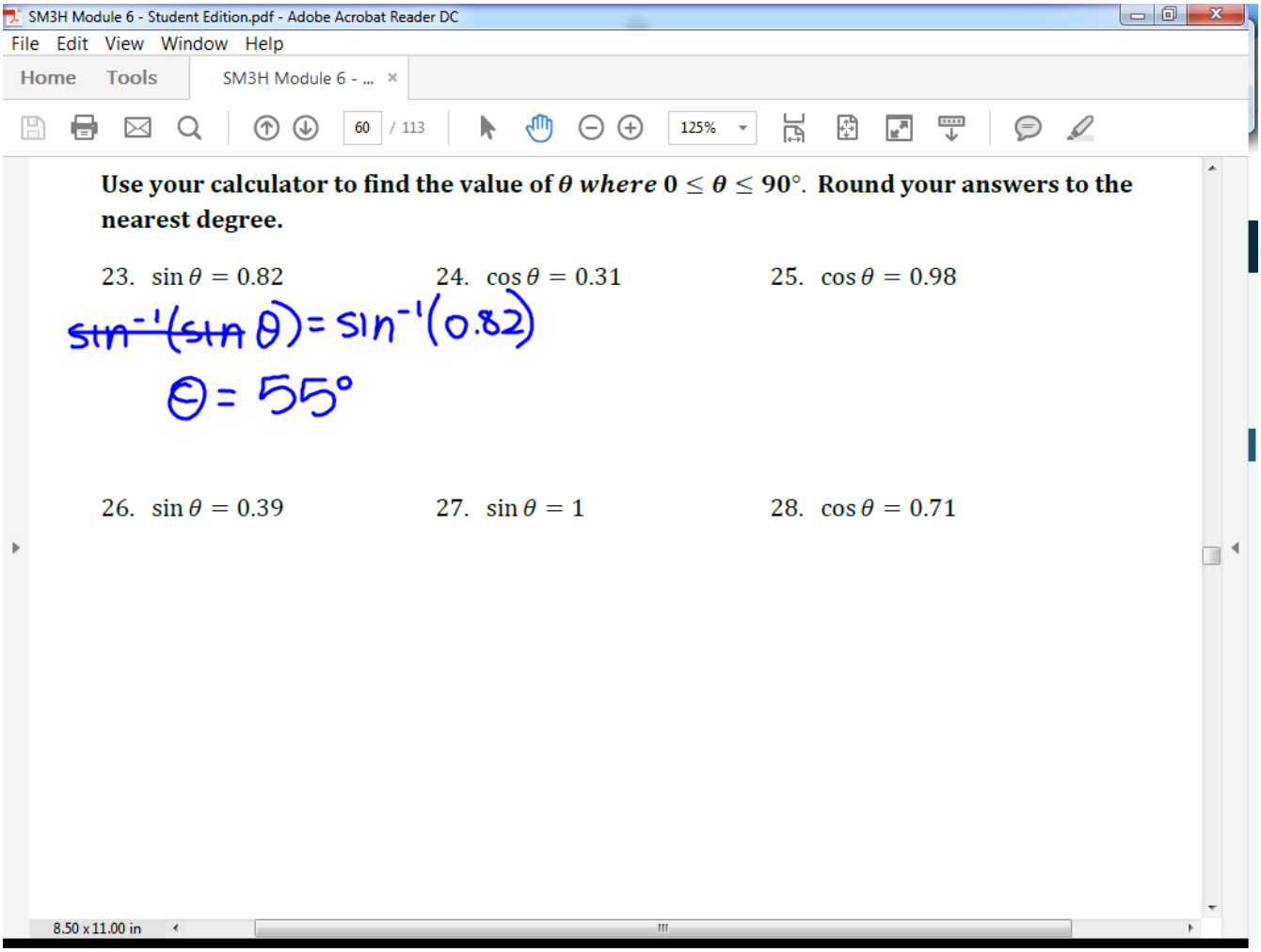
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Use your calculator to find the value of θ where 0 ≤ θ ≤ 90°. Round your answers to the nearest degree.
23. sin θ = 0.82
24. cos θ = 0.31
25. cos θ = 0.98
sin⁻¹(sin θ) = sin⁻¹(0.82)
θ = 55°
26. sin θ = 0.39
27. sin θ = 1
28. cos θ = 0.71
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3) tan(90°)

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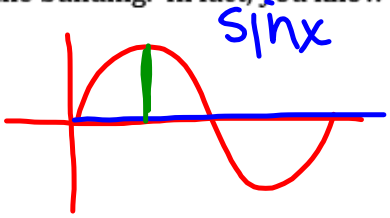
6.10 High Noon and Sunset Shadows

A Develop Understanding Task

In this task we revisit the amusement park Ferris wheel that caused Carlos so much anxiety. Recall the following facts from previous tasks:

- The Ferris wheel has a radius of 25 feet
- The center of the Ferris wheel is 30 feet above the ground
- The Ferris wheel makes one complete rotation counterclockwise every 20 seconds

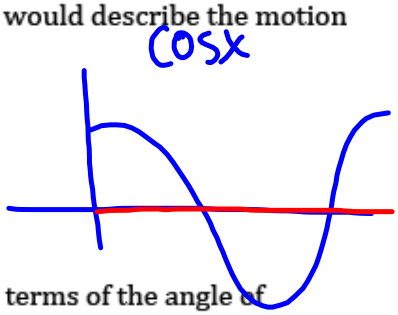
The amusement park Ferris wheel is located next to a high-rise office complex. At sunset, the diving platform casts a shadow on the exterior wall of the high-rise building. As the Ferris wheel turns, you can watch the shadow of a rider rise and fall along the surface of the building. In fact, you know an equation that would describe the motion of this "sunset shadow."



1. Write the equation of this "sunset shadow."

$\frac{360^\circ}{20\text{sec}} = 18$ $h(t) = 25\sin(18t) + 30$

At noon, when the sun is directly overhead, a rider casts a shadow that moves left and right along the ground as the Ferris wheel turns. In fact, you know an equation that would describe the motion of this "high noon shadow."



2. Write the equation of this "high noon shadow."

$s(t) = 25\cos(18t)$

3. Based on your previous work, you probably wrote these equations in terms of the angle of rotation being measured in degrees. Revise you equations so the angle of rotation is measured in radians.

   a. The "sunset shadow" equation in terms of radians:

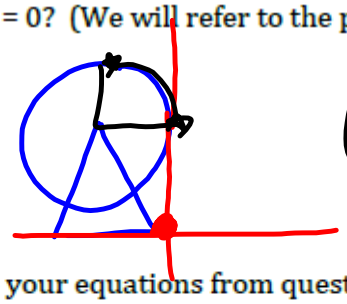
   $h(t) = 25\sin\left(\frac{\pi t}{10}\right) + 30$

   b. The "high noon shadow" equation in terms of radians:

   $s(t) = 25\cos\left(\frac{\pi t}{10}\right)$

$\frac{2\pi}{20} = \frac{\pi}{10}$

4. In the equations you wrote in question 3, where on the Ferris wheel was the rider located at time $t = 0$? (We will refer to the position as the rider's *initial position* on the wheel.)



(0,30)

5. Revise your equations from question 3 so that the rider's initial position at $t = 0$ is at the top of the wheel. shifting 90° $(\frac{\pi}{2})$

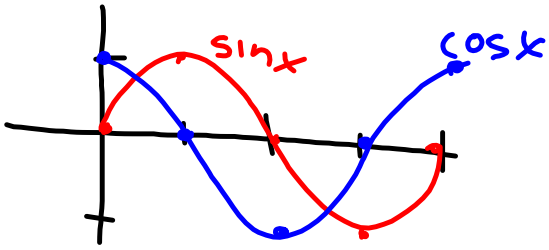
   a. The "sunset shadow" equation, initial position at the top of the wheel:

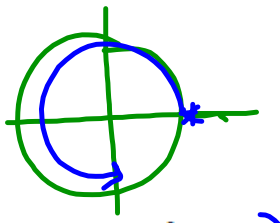
$$h(t) = 25\sin\left(\frac{\pi t}{10} + \frac{\pi}{2}\right) + 30$$

$h(t) = 25\sin\left(\frac{\pi}{10}(t+5)\right) + 30$

   b. The "high noon shadow" equation, initial position at the top of the wheel:

$$s(t) = 25\cos\left(\frac{\pi t}{10} + \frac{\pi}{2}\right)$$





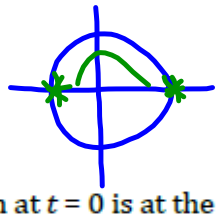
6. Revise your equations from question 3 so that the rider's initial position at $t = 0$ is at the bottom of the wheel. shifting 270° or $(\frac{3\pi}{2})$

   c. The "sunset shadow" equation, initial position at the bottom of the wheel:

$$h(t) = 25\sin\left(\frac{\pi t}{10} + \frac{3\pi}{2}\right) + 30$$

   d. The "high noon shadow" equation, initial position at the bottom of the wheel:

$$s(t) = 25\cos\left(\frac{\pi t}{10} + \frac{3\pi}{2}\right)$$



shifting π

7. Revise your equations from question 3 so that the rider's initial position at $t = 0$ is at the point farthest to the left of the wheel.

   e. The "sunset shadow" equation, initial position at the point farthest to the left of the wheel:

$$h(t) = 25\sin\left(\frac{\pi t}{10} + \pi\right) + 30$$

   f. The "high noon shadow" equation, initial position at the point farthest to the left of the wheel:

$$s(t) = 25\cos\left(\frac{\pi t}{10} + \pi\right)$$

8. Revise your equations from question 3 so that the rider's initial position at $t = 0$ is halfway between the farthest point to the right on the wheel and the top of the wheel.

   g. The "sunset shadow" equation, initial position halfway between the farthest point to the right on the wheel and the top of the wheel:

   h. The "high noon shadow" equation, initial position halfway between the farthest point to the right on the wheel and the top of the wheel:

9. Revise your equations from question 3 so that the wheel rotates twice as fast.

   i. The "sunset shadow" equation for the wheel rotating twice as fast:

   j. The "high noon shadow" equation for the wheel rotating twice as fast:

10. Revise your equations from question 3 so that the radius of the wheel is twice as large and the center of the wheel is twice as high.

    k. The "sunset shadow" equation for a radius twice as large and the center twice as high:

    l. The "high noon shadow" equation for a radius twice as large and the center twice as high:

Homework

Finish 6.10 "Ready, Set, Go"