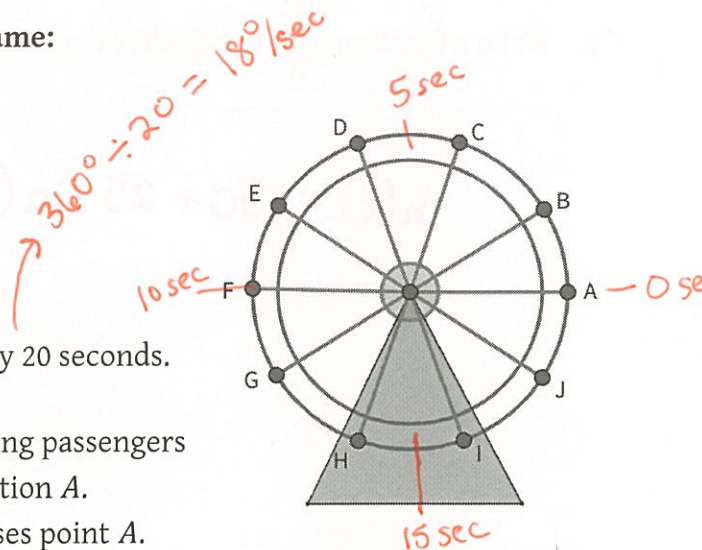


Lesson 2 "Sine" Language

Facts about this Ferris wheel:

- The Ferris wheel has a radius of 25 feet.
- The Ferris wheel's center is 30 feet off the ground.
- The Ferris wheel turns counterclockwise.
- The Ferris wheel makes one complete revolution every 20 seconds.



- Suppose that when the Ferris wheel has finished loading passengers and starts to turn at its regular speed, Carlos is at position A. Calculate Carlos's height at various times after he passes point A.

Elapsed time since passing position A	Calculations	Height of the rider
1 second	$30 + 25 \sin(18^\circ)$	37.73 ft
2 seconds	$30 + 25 \sin(18^\circ \cdot 2)$	44.69 ft
3 seconds	$30 + 25 \sin(18^\circ \cdot 3)$	50.23 ft
6 seconds	→ same height as 4 sec $30 + 25 \sin(18^\circ \cdot 4)$	53.78 ft
7.5 seconds	→ same as 2.5 sec $30 + 25 \sin(18^\circ \cdot 2.5)$	47.68 ft
8 seconds	→ same as 2 sec $30 + 25 \sin(18^\circ \cdot 2)$	44.69 ft
14.5 seconds	like 4.5 sec, but subtracted from 30 $30 - 25 \sin(18^\circ \cdot 4.5)$	5.31 ft
18 seconds	→ like 2 sec, but subtracted $30 - 25 \sin(18^\circ \cdot 2)$	15.31 ft
23 seconds	→ same as 3 sec $30 + 25 \sin(18^\circ \cdot 3)$	50.23 ft
28 seconds	→ same as 8 sec $30 + 25 \sin(18^\circ \cdot 8)$	44.69 ft
36 seconds	→ like 4 sec, but subtracted $30 - 25 \sin(18^\circ \cdot 4)$	6.22 ft
37 seconds	$30 - 25 \sin(18^\circ \cdot 3)$	9.77 ft
40 seconds	→ same as 0 sec	30 ft

2. Write a function  $h(t)$  to calculate Carlos's height at time  $t$ , if  $t$  is within the first 5 seconds.

$$h(t) = 30 + 25 \sin(18t)$$

3. How do you need to modify your function if  $t$  is after the first 5 seconds?

find an equivalent position within first 5 seconds, or find a height that is the same, but subtracted from 30 instead of added.

BUT it turns out that the calculator will do sine of angles not between  $0^\circ$  and  $90^\circ$  !!!

The calculator is using the same idea of going around a circle! This means we don't have to do anything special. We can use the formula

$$h(t) = 30 + 25 \sin(18t) \text{ for } \underline{\text{any time!}}$$