# Lesson 2

READY, SET, GO! Name Period Date

## READY

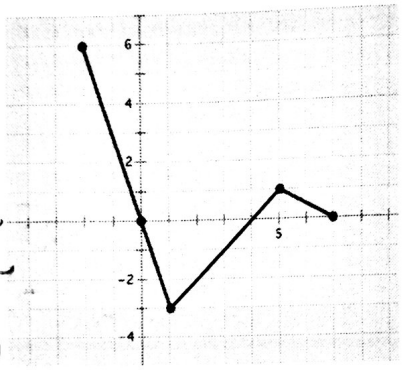
Topic: Describing intervals from graphs

**For each graph, write the interval(s) where $f(x)$ is positive and the interval(s) where it is negative.**

Positive interval: x-values where graph is above the x-axis (y's are positive)

Negative interval: ... below the x-axis (y's are negative)

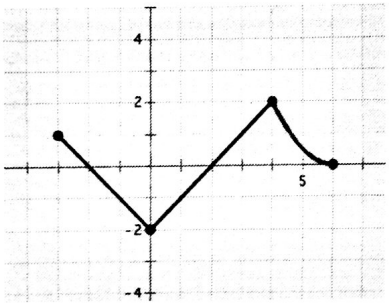
1.



Positive $[-2,0) \cup (4,7)$

Negative $(0,4)$

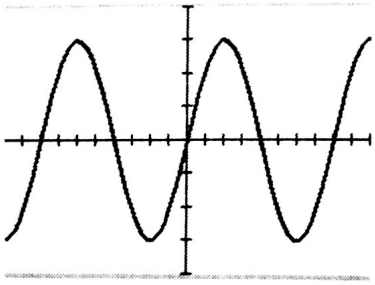
2.



Positive $[-3,-2) \cup (2,6)$

Negative $(-2,2)$

3.

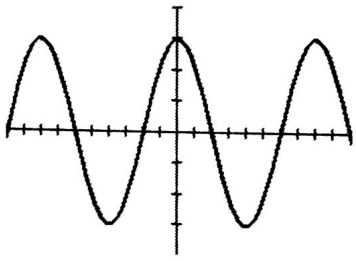


(The scale on the x-axis is in increments of 45°.)

Positive $(-360°,-180°) \cup (0°,180°) \cup (360°,450°]$

Negative $[-450°,-360°) \cup (-180°,0°) \cup (180°,360°)$

4.



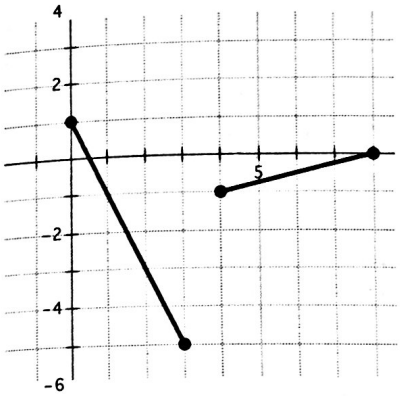
(The scale on the x-axis is in increments of 45°.)

Positive $(-450°,-270°) \cup (-90°,90°) \cup (270°,450°)$

Negative $(-270°,-90°) \cup (90°,270°)$

**Write the piece-wise functions for the given graphs.**

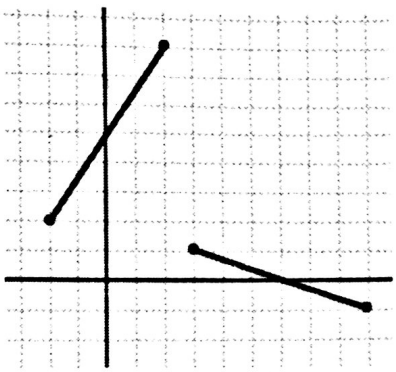
5.




Function: $f(x) = \begin{cases} -2x+1 & \text{if } 0 \le x \le 3 \\ f(x-4)-1 & \text{if } 4 \le x \le 8 \end{cases}$

* second part could also have equation $f(x-2)$

6.



Function: $f(x) = \begin{cases} \frac{3}{2}(x+2)+2 & \text{if } -2 \le x \le 2 \\ -\frac{1}{3}(x-3)+1 & \text{if } 3 \le x \le 9 \end{cases}$

* part to could be $\frac{3}{2}x+5$ and $-\frac{1}{3}x+2$

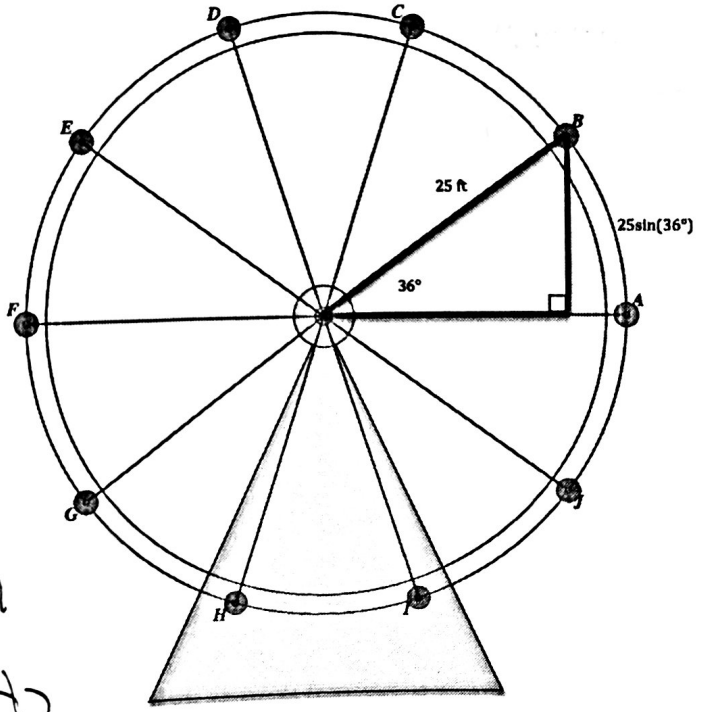
**SET**

Topic: Calculating 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.**




$\therefore \frac{30}{10} = 3$ seconds between each position

and $\frac{360°}{30} = 12°$ per second

$h(t) = 30 + 25\sin(12t)$

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

$30 + 25\sin(12° \cdot 2) = 40.17$ ft

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 (in feet) |
|---|---|---|
| 1 sec | $30 + 25\sin(12° \cdot 1)$ | 35.01 ft. |
| 3 sec | | 44.09 ft. |
| 5 sec | | 51.15 ft. |
| 7 sec | | 54.86 ft. |
| 8 sec | $30 + 25\sin(180° - 12° \cdot 8)$ | 54.86 ft. |
| 11 sec | | 48.58 ft. |
| 14 sec | | 35.01 ft. |
| 15 sec | | 30 ft. |
| 16 sec | $30 - 25\sin(12° \cdot 16 - 180°)$ | 24.80 ft. |
| 20 sec | | 8.35 ft. |
| 22 sec | | 5.14 ft. |
| 23 sec | $30 - 25\sin(360° - 12° \cdot 23)$ | 5.14 ft. |
| 25 sec | | 8.35 ft. |
| 27 sec | | 15.31 ft. |
| 30 sec | | 30 ft. |

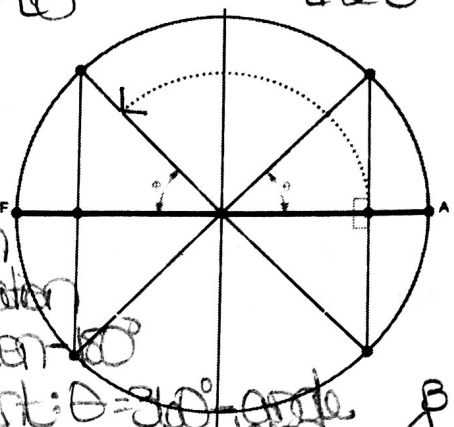
Quad 1

Quad 2

Quad 3

Quad 4

9. How did the position of the triangles you drew change between 7 seconds and 8 seconds?
The Δ switched from the 1st to the 2nd quadrant
10. How did the triangles you drew change between 14, 15, and 16 seconds?
At 14 seconds the Δ is in 2nd quadrant. At 15 seconds, you are on the x-axis (no Δ). At 16 seconds the Δ is in the 3rd quadrant
11. How did the triangles you drew change between 22 seconds and 23 seconds?
The Δ switched from the 3rd to the 4th quadrant.
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.)

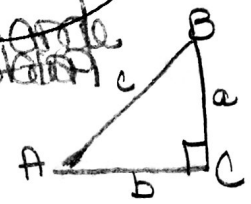



1st quadrant: θ = angle of rotation
2nd quadrant: θ = 180° − angle of rotation
3rd quadrant: θ = angle of rotation + 180°
4th quadrant: θ = 360° − angle of rotation

GO
Topic: Finding missing angles in triangles

**Find the measure of each acute angle of right triangle *ABC* with $m\angle C = 90°$.**

**Round your answers to the nearest degree.**




* Use sin⁻¹, cos⁻¹, or tan⁻¹ to find the ∠

13. $a = 3\ in$ $c = 5\ in$

$\sin A = \frac{3}{5}$ $\cos B = \frac{3}{5}$

$m\angle A = 37°$ $m\angle B = 53°$

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

$\sin A = \frac{5}{10}$ $\cos B = \frac{5}{10}$

$30°$ $60°$

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

$\sin A = \frac{9.1}{12.3}$ $\cos B = \frac{9.1}{12.3}$

$m\angle A = 48°$ $m\angle B = 42°$

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

$\sin A = \frac{14.1}{18}$ $\cos B = \frac{14.1}{18}$

$m\angle A = 52°$ $m\angle B = 38°$

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

$\tan A = \frac{9.7}{12.7}$ $\tan B = \frac{12.7}{9.7}$

$m\angle A = 37°$ $m\angle B = 53°$

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

$\sin A = \frac{14.6}{20.3}$ $\cos B = \frac{14.6}{20.3}$

$m\angle A = 46°$ $m\angle B = 44°$