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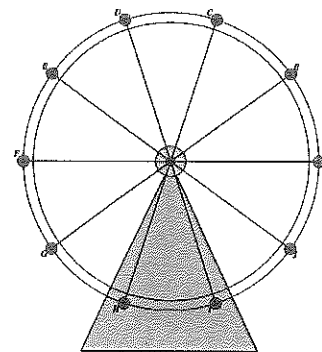
6.1 George W. Ferris' Day Off

A Develop Understanding Task

Perhaps you have enjoyed riding on a Ferris wheel at an amusement park. The Ferris wheel was invented by George Washington Ferris for the 1893 Chicago World's Fair.

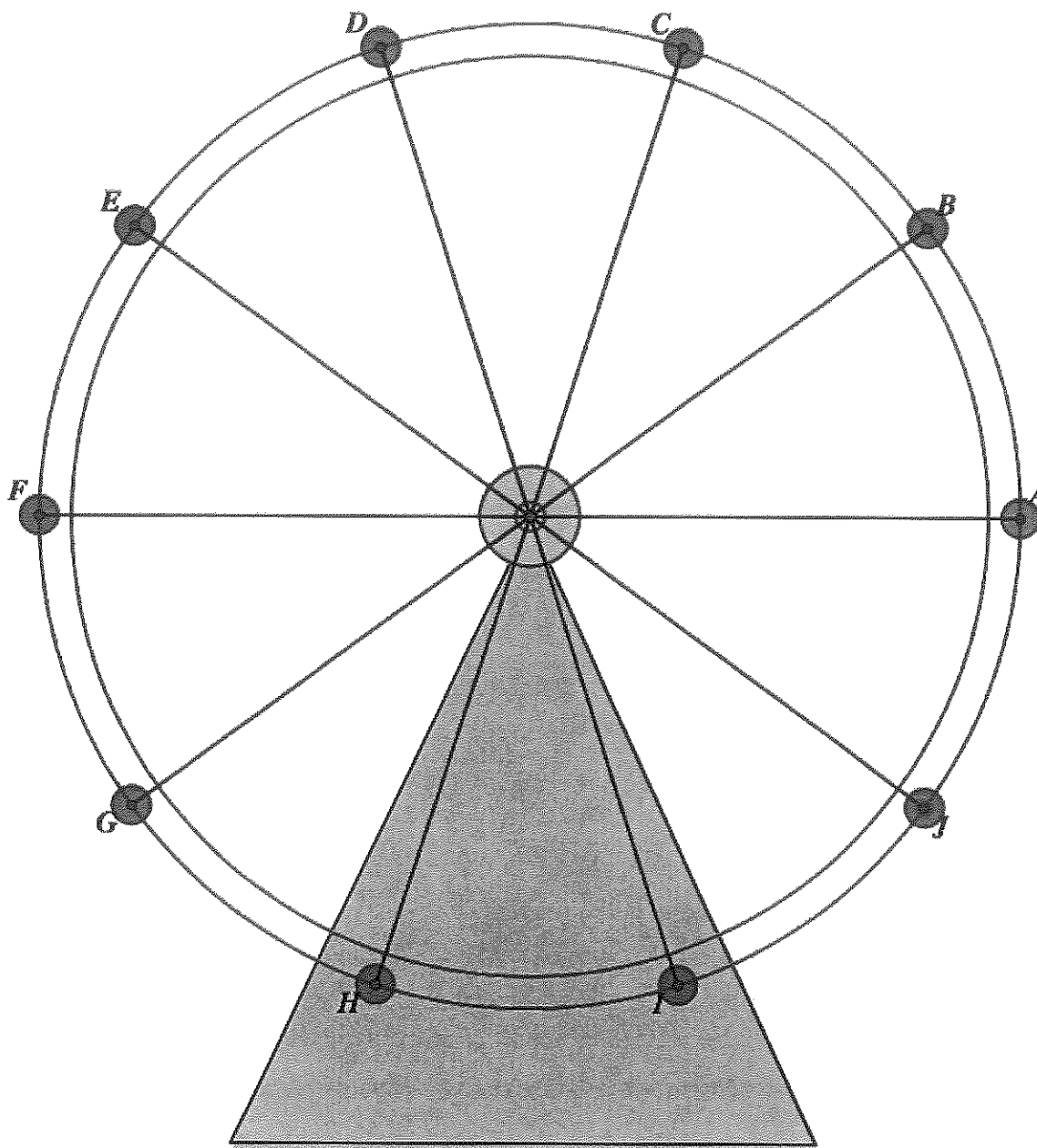
Carlos, Clarita and their friends are celebrating the end of the school year at a local amusement park. Carlos has always been afraid of heights, and now his friends have talked him into taking a ride on the amusement park Ferris wheel. As Carlos waits nervously in line he has been able to gather some information about the wheel. By asking the ride operator, he found out that this wheel has a radius of 25 feet, and its center is 30 feet above the ground. With this information, Carlos is trying to figure out how high he will be at different positions on the wheel.

1. How high above the ground will Carlos be when he is at the top of the wheel? (To make things easier, think of his location as simply a point on the circumference of the wheel's circular path.)
2. How high will he be when he is at the bottom of the wheel?
3. How high will he be when he is at the positions farthest to the left or the right on the wheel?



Because the wheel has ten spokes, Carlos wonders if he can determine the height of the positions at the ends of each of the spokes as shown in the diagram on the following page. Carlos has just finished studying right triangle trigonometry, and wonders if that knowledge can help him.

4. Find the height of each of the points labeled A-J on the Ferris wheel diagram below. Represent your work on the diagram so it is apparent to others how you have calculated the height at each point.



READY, SET, GO!

Name _____

Period _____

Date _____

READY

Topic: Making sense of speed when distance is circular

The number of degrees an object passes through during a given amount of time is called **angular speed**. For instance, the second hand on a clock has an angular speed of $\frac{360^\circ}{min}$ while the minute hand on a clock has an angular speed of $\frac{360^\circ}{hr}$. (Remember that a revolution is a full circle or 360° .)

1. What is the angular speed of the second hand on a clock in degrees per second?
2. What is the angular speed of the minute hand on a clock in degrees per second?
3. What is the angular speed of the hour hand in degrees per hour?

Your grandparents probably enjoyed music just as much as you do, but they didn't have iPods or MP₃ players. They had vinyl records and phonographs. Vinyl records came in 3 speeds. A record could be a 45, $33\frac{1}{3}$, or 78. These numbers referred to the rpms or **revolutions per minute**.

4. Calculate the **angular speed** of a 45 rpm, $33\frac{1}{3}$ rpm, and 78 rpm record in degrees per minute.
 - a) 45 rpm
 - b) $33\frac{1}{3}$ rpm
 - c) 78 rpm

Angular speed describes how fast something is turning. **Linear speed** describes how far it travels while it is turning. **Linear speed** depends on the circumference of a circle ($C = 2\pi r$) and the number of revolutions per minute.

Vinyl records were not the same size. A 45 rpm record had a diameter of 7 inches, a $33\frac{1}{3}$ a diameter of 12 inches and a 78 had a diameter of 10 inches.

5.
 - a) If a fly landed on the outer edge of a 45 rpm record, how far would it travel in 1 minute?
 - b) How far if it was perched on a $33\frac{1}{3}$ rpm record?
 - c) How far if it was perched on a 78 rpm record?

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SET

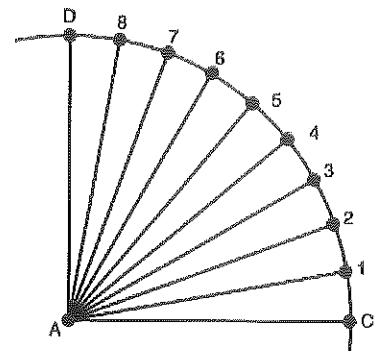
Topic: Using trigonometric ratios to solve problems

Perhaps you have seen *The London Eye* in the background of a recent James Bond movie or on a television show. When it opened in March of 2000, it was the tallest Ferris wheel in the world. The passenger capsule at the very top is 135 meters above the ground. The diameter is 120 meters.



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6. How high is the center of the Ferris wheel?
7. How far from the ground is the very bottom passenger capsule?
8. Assume there are 36 passenger capsules, evenly spaced around the circumference. Find the height from the ground of each of the *numbered* passenger capsules shown in the figure. (Use the figure at the right to help you think about the problem.)



GO

Topic: Connecting the trigonometric ratios

Find the other two trig ratios based on the one that is given.

9. $\sin \theta = \frac{4}{5}$	$\cos \theta =$	$\tan \theta =$
10. $\sin \theta =$	$\cos \theta = \frac{5}{13}$	$\tan \theta =$
11. $\sin \theta =$	$\cos \theta =$	$\tan \theta = 1$
12. $\sin \theta = \frac{1}{2}$	$\cos \theta =$	$\tan \theta =$
13. $\sin \theta =$	$\cos \theta = \frac{9}{41}$	$\tan \theta =$
14. $\sin \theta =$	$\cos \theta =$	$\tan \theta = \sqrt{3}$

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