

READY, SET, GO!

Name _____

Period _____

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 $\frac{360^\circ}{\text{min}}$ while the minute hand on a clock has an angular speed of $\frac{360^\circ}{\text{hr}}$. (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? $\frac{360^\circ}{60} = 6^\circ/\text{sec}$
2. What is the angular speed of the minute hand on a clock in degrees per second? $\frac{360^\circ}{60 \times 60} = 0.1^\circ/\text{sec}$
3. What is the angular speed of the hour hand in degrees per hour? $\frac{360^\circ}{12} = 30^\circ/\text{hr}$

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 $45(360^\circ) = 16,200^\circ$ per minute
 - b) $33\frac{1}{3}$ rpm $100/3(360^\circ) = 12,000^\circ$ per minute
 - c) 78 rpm $78(360^\circ) = 28,080^\circ$ per minute

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? $(7\pi)(45) = 989.6 \text{ in.}$
- b) How far if it was perched on a $33\frac{1}{3}$ rpm record? $(12\pi)(100/3) = 1256.6 \text{ in.}$
- c) How far if it was perched on a 78 rpm record? $(10\pi)(78) = 2450.4 \text{ in.}$

SECONDARY MATH III // UNIT 8
MODELING PERIODIC BEHAVIOR // LESSON 1

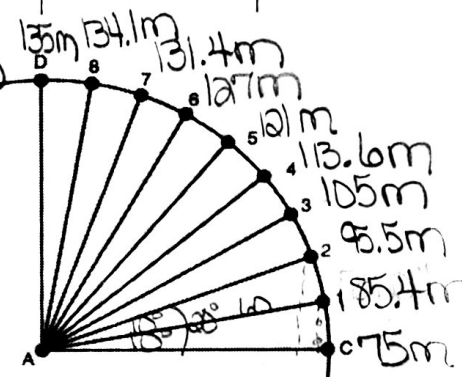
SET
Topic: Using trigonometric ratios to solve problems



©2016Sutorius

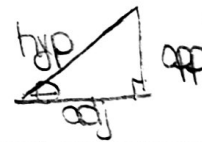
Perhaps you have seen *The London Eye* in the background of a recent James Bond movie or on a television show. When it opened in March of 2000, it was the tallest Ferris wheel in the world. The passenger capsule at the very top is 135 meters above the ground. The diameter is 120 meters. $\text{radius} = 60\text{m}$

6. How high is the center of the Ferris wheel? $135 - 60 = 75\text{m}$
7. How far from the ground is the very bottom passenger capsule? $= 15\text{m}$
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.) $\frac{360^\circ}{36} = 10^\circ$

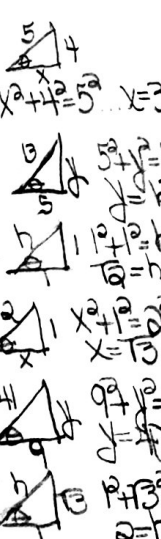


GO
Topic: Connecting the trigonometric ratios

Find the 3rd side using Pythagorean Theorem. Find the other two trig ratios based on the one that is given.



SOH-CAH-TOA



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

Need help? Visit www.rsgsupport.org

Mathematics Vision Project

Licensed under the Creative Commons Attribution CC BY 4.0

mathematicsvisionproject.org



- * 11. $\tan \theta = 1$ therefore $\frac{\text{opp}}{\text{adj}} = 1$. You get an answer of 1 when you divide a number by itself. Therefore opposite = adjacent sides are equal. Choose a value for both lengths (I chose 4). All values give same ratios.
- * 14. $\tan \theta = \frac{1}{\sqrt{3}}$. You know $\frac{1}{\sqrt{3}} = \frac{1}{\sqrt{3}}$. Therefore, let opp = 1 and adj = $\sqrt{3}$.