
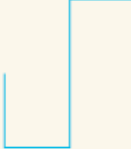



BIG PICTURE of this Unit

- How can we extend our geometry skills with triangles to go beyond right triangles to (i) obtuse triangles and (ii) circles and Cartesian Planes?
- What do triangles have to do with sinusoidal functions in the first place?
- How can we connect previously learned function concepts and skills to sinusoidal functions?
- How can use the equation of a sinusoidal function be used to analyze for key features of a graph of a sinusoidal curve?
- When and how can triangles and sinusoidal functions be used to model real world scenarios?

1. (CA) The height, h , of a basket on a water wheel at time t is given by $h(t) = \sin(6t)^\circ$, where t is in seconds and h is in meters. {15,19,21}
 - a. How high is the basket at 14 seconds?
 - b. When will the basket first be 0.5 m under water?
2. (CA) Solve the following: {8,9,10}
 - a. Solve $\triangle ABC$ if $\angle A = 63^\circ$, $b = 10$ cm and $c = 12$ cm.
 - b. Solve $\triangle ABC$ if $a = 15$ cm, $b = 12.5$ cm and $\angle B = 53^\circ$.
 - c. Solve $\triangle ABC$ if $\angle A = 47^\circ$, $b = 100$ cm and $\angle C = 71^\circ$.
 - d. Solve $\triangle ABC$ if $a = 7$ cm, $b = 10$ cm and $c = 12$ cm.
3. (CA) Mr. Smith and Mr. Santowski are trying to figure out the height of a new building recently constructed in Cairo. They call it the Super Building. Mr. Smith started from the base of the building and walked for a while... then took an angle measurement from the ground to the top of the building... the device read 80.8858° . Then Mr. Smith realized he didn't count how far he was away from the base of the building. Mr. Santowski, not wanting to walk back, said... I have an idea. Mr. Santowski walked 13 more meters away from their current location and took another angle measurement from the ground. The measuring device read 73.3° . It was now that Mr. Santowski could figure out how tall the building is. {2,4,8,9,10}
 - a. Draw a picture of this problem.
 - b. How tall is the building? Show your work.
 - c. How far was Mr. Smith from the base of the building when he took his first measurement?

4. (CA) The point $P(-5, -8)$ is on the terminal arm of an angle, θ , in standard position. Determine all values of θ , given the domain of $-540^\circ \leq \theta \leq 270^\circ$. {11,12}
5. (CA) Solve the following trig based equation: {16,21}
- From your **home screen on the TI-84**, use the TI-84 to solve the trig equation $0.6 = \cos(x)$. Explain how you did it and what your answer means.
 - Now, **use a graph** to evaluate $y = \cos(x)$ for $0^\circ \leq x \leq 720^\circ$ when $y = 0.6$. Answer to the nearest degree.
 - Explain how the two answers (Q(a) and Q(b)) are the **same** and yet are **different**. Why are they different?
6. (CI) Sketch periodic graphs to satisfy the given properties: {15}

Shape	Period	Amplitude	Equation of Axis	Number of Cycles
	4	6	$y = 2$	2
	3	4	$y = 1$	3
	$\frac{1}{2}$	5	$y = -3$	2

7. (CA, but eventually CI) Graph the sinusoidal function $f(x) = 3\sin(x) + 1$ on your TI-84. Use the graph (or your knowledge of the equation to answer the following questions: {16,17}
- NEATLY and CAREFULLY, sketch the function into your notebooks. Label the five “critical points” on your sketch.
 - Determine the amplitude of this function. Show/explain how you determined your answer.
 - Determine the period of this function. Show/explain how you determined your answer.
 - Determine the equation of the axis of the curve. Show/explain how you determined your answer.
 - Find the x-intercepts of the function if the domain is $0^\circ \leq x \leq 720^\circ$.
 - Find the extrema (max & min points) of the function, on the same domain of $0^\circ \leq x \leq 720^\circ$.
 - In which domain interval(s) are the values of $f(x)$ **increasing**?
 - EXPLAIN how you would do this question WITHOUT THE AID OF A GRAPHING CALCULATOR.



Higher Level Questions for More Complex Concepts OR an EXTENSION of basic concepts involved with triangle trigonometry and sinusoidal functions.

- We have another unit that we can use to measure angles, called radians. Go on line to find out what a radian is. Record your definition and an example to illustrate what 1 radian is.
- Convert the following angle measures from degrees to radians:
(i) 45° (ii) -225° (iii) 780° (iv) 1° (v) -390° (vi) 75°
- Convert the following angle measures from radians to degrees.
(i) $\frac{7\pi}{4}$ (ii) $\frac{-11\pi}{6}$ (iii) $\frac{17\pi}{3}$ (iv) 1 radian (v) 2.35 radians (vi) $\frac{7\pi}{2}$