Questions?

Did you take the test? How'd it go?

> So the test is due Midnight Friday night?! But on the schedule it says we're doing 3.1, today...

Flipped Class: Resources (videos and notes) online or in handouts. Students get the theory from them, and then do their work IN CLASS.

I was already doing this in my face-to-face.

We're not *quite* "flipped" in this remote section of Trig. I'm still giving lectures. But I'm not as worried about attendance and participation, if I see you making good progress on the WORK.

22. **0/1 points** LarTrig10 2.3.040. [3882605]

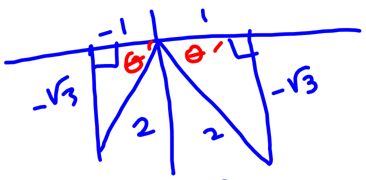
Solve the multiple-angle equation. (Enter your answers as a comma-separated list. Use n as an integer constant. Enter your response in radians.)

$$2\sin(5x) + \sqrt{3} = 0$$

$x =$ ✗ $\frac{2\pi n}{5} + \frac{4\pi}{15}, \frac{2\pi n}{5} + \frac{\pi}{3}$

$2\sin(5x) = -\sqrt{3}$

$\sin(5x) = -\frac{\sqrt{3}}{2}$

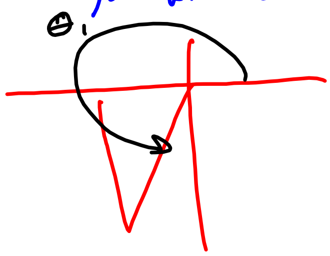


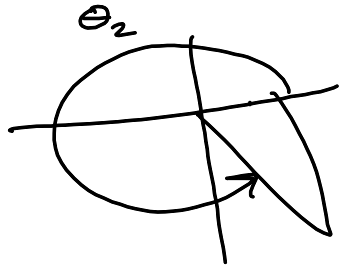
$\theta' = 60° = \frac{\pi}{3}$

Calculator-Dependent?

$\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right) = -60°$

Then, to put solns in $[0, 360°) = [0, 2\pi)$, interpret your picture





Solve for $5x$:

$\sin(5x) = -\frac{\sqrt{3}}{2} \Rightarrow$

$\cancel{5x = \frac{4\pi}{3}, \frac{5\pi}{3}} \Rightarrow$

$\cancel{x = \frac{4\pi}{15}, \frac{\pi}{3}}$

No. Let's Find ALL SOLUTIONS:

$5x = \frac{4\pi}{3} + 2\pi n \implies \boxed{x = \frac{4\pi}{15} + \frac{2\pi n}{5}}$

$\theta_1 = 180^\circ + 60^\circ = 240^\circ = \frac{4\pi}{3}$ s

$360^\circ - 60^\circ = 300^\circ = \frac{5\pi}{3}$

$5x = \frac{5\pi}{3} + 2\pi n \implies x = \boxed{\frac{\pi}{3} + \frac{2\pi n}{5}}$

This is WebAssign style.

To Find ALL SOLUTIONS $x \in [0, 2\pi)$ to this equation,

$0 \le x < 2\pi \implies$ GREAT WP #3 Question.

$0 \le 5x < 10\pi$, so you have to find all $5x \in [0, 10\pi)$ that solve the eq'n.

$5x = \frac{4\pi}{3}, \frac{5\pi}{3}, \frac{10\pi}{3}, \frac{11\pi}{3}, \frac{16\pi}{3}, \frac{17\pi}{3}, \frac{22\pi}{3}, \frac{23\pi}{3}, \frac{28\pi}{3}, \frac{29\pi}{3}$

$2\pi + \frac{4\pi}{3} = \frac{6\pi + 4\pi}{3}$

$\frac{5\pi}{3} + \frac{6\pi}{3}$

So $x = \frac{4\pi}{15}, \frac{\pi}{3}, \frac{2\pi}{3}, \frac{11\pi}{15}, \frac{16\pi}{15}, \frac{17\pi}{15}, \frac{22\pi}{15}, \frac{23\pi}{15}, \frac{28\pi}{15}, \frac{29\pi}{15}$

Practice Test 2 #15, Junior asks...

$$\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \frac{1+\cos\theta}{|\sin\theta|}$$. why absolute value?

$x^2 = 16$

$\sqrt{x^2} = \sqrt{16} = 4$

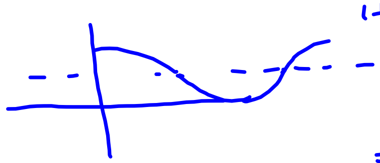
$|x| = 4$

$x = \pm 4$

$(a-b)(a+b) = a^2 - b^2$

$$\sqrt{\left(\frac{1+\cos\theta}{1-\cos\theta}\right)\left(\frac{1+\cos\theta}{1+\cos\theta}\right)} = \sqrt{\frac{(1+\cos\theta)^2}{1-\cos^2\theta}} = \frac{|1+\cos\theta|}{\sqrt{\sin^2\theta}}$$

$$= \frac{1+\cos\theta}{|\sin\theta|}$$



$1+\cos\theta \ge 0$

so

$|1+\cos\theta| = 1+\cos\theta$

Meh.

$$\sqrt{\left(\frac{1+\cos\theta}{1-\cos\theta}\right)\left(\frac{1-\cos\theta}{1-\cos\theta}\right)} = \frac{\sqrt{1-\cos^2\theta}}{\sqrt{(1-\cos\theta)^2}}$$

$$= \frac{|\sin\theta|}{|1-\cos\theta|} = \frac{|\sin\theta|}{1-\cos\theta}$$

$$\left(\frac{3+\sqrt{2}}{7+\sqrt{5}}\right)\left(\frac{7-\sqrt{5}}{7-\sqrt{5}}\right) = \frac{21-3\sqrt{5}+7\sqrt{2}-\sqrt{10}}{49-5}$$

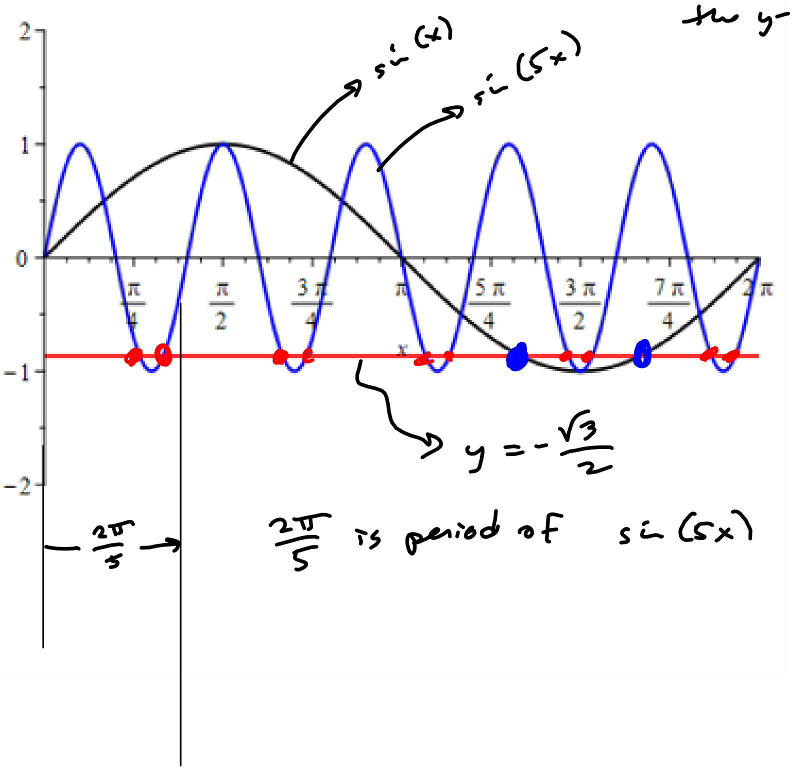
$$= \frac{\text{Mess}}{44}$$

$$\left(\frac{3+2i}{7+5i}\right)\left(\frac{7-5i}{7-5i}\right) =$$

$$= \frac{21-15i+14i-10i^2}{49-25i^2} = \frac{21-i+10}{49+25} = \frac{31-i}{74}$$

$$= \frac{31}{74} - \frac{1}{74}i$$ $= a+bi$ = standard form of a complex #.

sin(5x) is squished towards the y-axis.



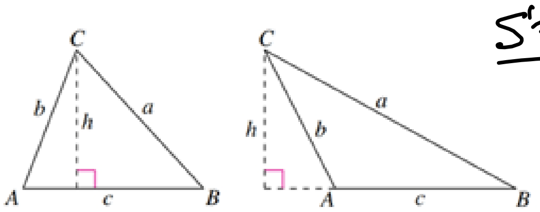
$\frac{2\pi}{5}$ is period of sin(5x)

Law of Sines *(p. 262)*

§3.1 Preview

If ABC is a triangle with sides a, b, and c, then

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}.$$



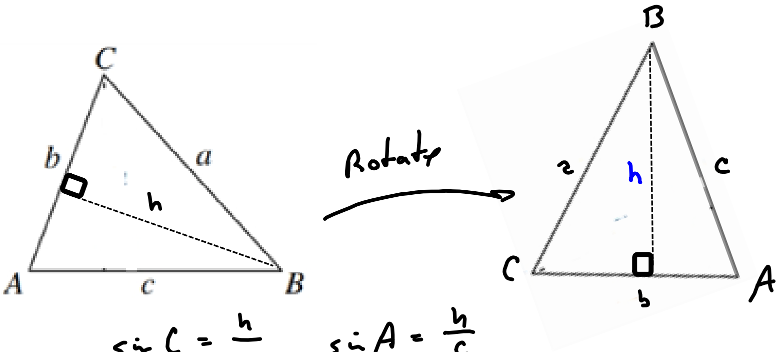
A is acute. A is obtuse.

Proof

$\sin A = \frac{h}{b}$, $\sin B = \frac{h}{a} \Rightarrow$

$h = b \sin A = a \sin B \Rightarrow$

$\frac{\sin A}{a} = \frac{\sin B}{b}$. OR $\frac{a}{\sin A} = \frac{b}{\sin B}$ (Good for finding lengths)



$\sin C = \frac{h}{a}$, $\sin A = \frac{h}{c}$

$\Rightarrow \dots \Rightarrow \frac{\sin A}{a} = \frac{\sin C}{c}$ ($= \frac{\sin B}{b}$, by previous work & transitivity of the relational operator "=".)

ArithMETic Operators

$+, -, *, \div$

$<, >$

7. 0/3 points LarTrig10 3.1.026. [388274

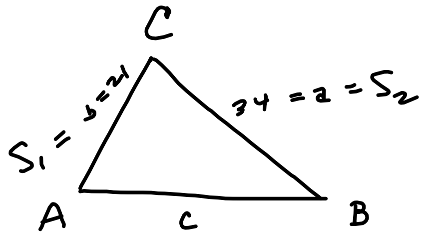
Use the Law of Sines to solve (if possible) the triangle. If two solutions exist, find both. Round your answers to two decimal places. (If not possible, enter IMPOSSIBLE.)

$A = 78°$, $a = 34$, $b = 21$

$B =$ 37.17 °

$C =$ 64.83 °

$c =$ 31.46



This has only ONE sol'n because $S_2 > S_1$

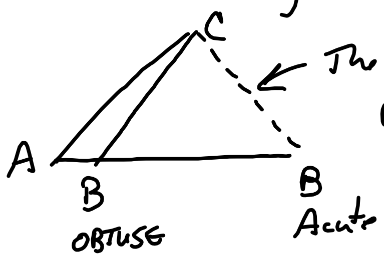
34 > 21, so S_2 (a=) is long enough to reach c & Too long to fit there;

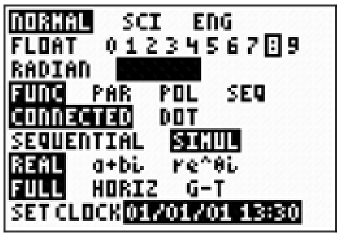
Need:
side c, C, B

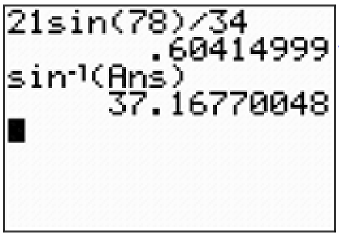
$\frac{\sin B}{b} = \frac{\sin A}{a}$ →

$\sin B = \frac{b \sin A}{a}$

$= \frac{21 \sin(78°)}{34} \approx \sin(B)$







≈ sin(B)

≈ B, if B is acute

Calculator (B Acute)

The other one. (B obtuse)

Note: If $B = 37.\ldots^\circ$, then $C = 180^\circ - 78^\circ - 37.\ldots^\circ$

≈ 64.83229952

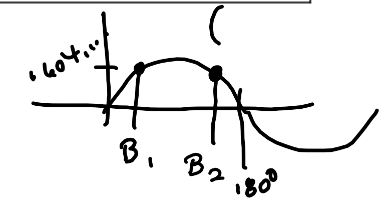
```
21sin(78)/34
          .60414999
sin⁻¹(Ans)
         37.16770048
180-78-Ans
         64.83229952
```

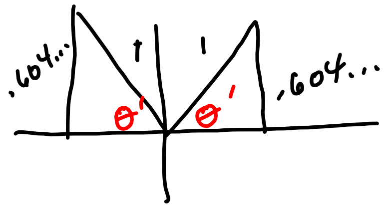
I didn't round to do my calculations.

Here's why there's only one sol'n

If there WERE a 2nd B, then

$B =$





$\theta' = 37.\ldots^\circ$, then

$B_1 = 37.\ldots^\circ$

$B_2 = 180^\circ - 37.\ldots^\circ \approx 142.8322995^\circ$

& so $C = 180^\circ - 78^\circ - 142.\ldots^\circ$

$\approx$

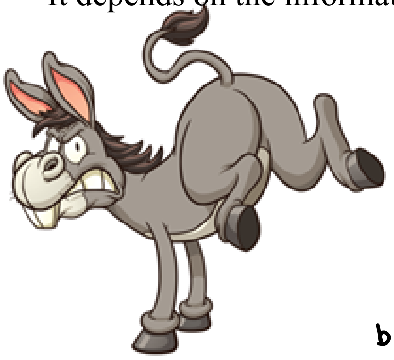
```
         37.16770048
180-78-Ans
         64.83229952
180-37.16770048
         142.8322995
180-78-Ans
        -40.83229952
```

$\rightarrow C < 0$?! Un-Possible!

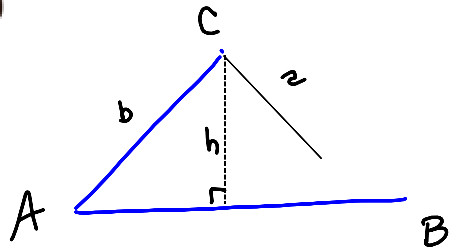
So if you mistakenly think $\exists$ 2 sol'ns, you'll get a negative angle for C.

Law of Sines is great for AAS, ASA, which uniquely determine the triangle.

In the case of ASS, it *might* work, but it might give you *two* solutions or have *no solutions*. It depends on the information given.



AS_1S_2 case is the only one that requires any hard-core analysis. Basically it comes down to whether S_2 is long enough (one or possibly 2 solutions), super-long (a unique solution), or not long enough (no solution).



$\frac{h}{b} = \sin A$

$h = b \sin A$

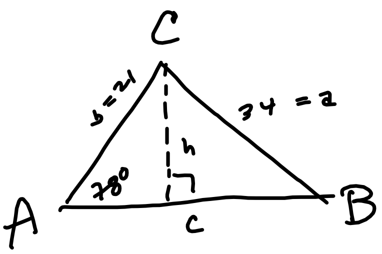
a has to reach:

Need $a \geq h = b \sin A$. Then $\exists$ 2 possibilities

(1) $a < b \Rightarrow$ 2 Sol'ns.

(2) $a > b \Rightarrow$ 1 Sol'n.

The one we did was case (1)

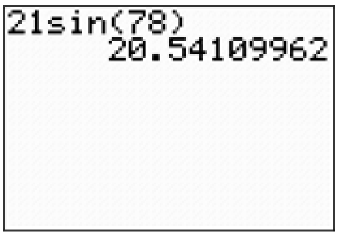


$\frac{h}{21} = \sin(78°)$

$h = 21 \sin(78°) \approx 20.54109962$

Now $a = 34 > 20....$, so long enough to reach, but too long to give us a 2nd sol'n, because

$34 > 21$



Area of an oblique triangle

$$\text{Area} = \frac{1}{2}bc\sin A$$