"SINE, COSINE, AND TANGENT: THE UNIT CIRCLE"
problems

Answers to these problems are available in the Answers document, and in the video.
You can find links to these resources at my website:
www.freelance-teacher.com
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This video is intended for students who find this material to be difficult, so in the video I
proceed slowly and repeat myself a lot. If you find the video to move too slowly, you can simply
try the problems in this Problems document, check the answers in the Answers document, and
skip to any particular parts of the video that cover problems that you find confusing.

Answer all the following questions without using a calculator.

Label cos 170° and sine 170° on the unit circle.
Predict whether cos 170° and sin 170° are positive or negative.

Find cos 90° and sin 90°.
Find cos 0 and sin 0.
Find cos 180° and sin 180°.
Find cos 360° and sin 360°.
Find cos (2π rad) and sin (2π rad).

What is tan 0? What is tan 90°? What is tan 180°?

Suppose θ is an acute angle.
When θ increases, does cos θ increase or decrease?
When θ increases, does sin θ increase or decrease?
When θ increases, does tan θ increase or decrease?

What is the range of outputs of cos θ?
What is the range of outputs of sin θ?
What is the range of outputs of tan θ?

Your friend Bob tells you that he knows that

$\cos(30°)$ = ½ or $\dfrac{\sqrt{3}}{2}$, and that

$\sin(30°)$ = ½ or $\dfrac{\sqrt{3}}{2}$

but he can't remember which one equals ½ and which one equals $\dfrac{\sqrt{3}}{2}$.

Which is which?

What are $\cos(60°)$ and $\sin(60°)$?

What do you predict about $\cos(45°)$ and $\sin(45°)$?

Consider an acute angle θ.
(a) Prove that SOH CAH TOA implies that $\cos\theta$ represents an x-coordinate on the unit circle, and that $\sin\theta$ represents a y-coordinate on the unit circle.
(b) Prove that SOH CAH TOA implies that $\tan\theta = \dfrac{\sin\theta}{\cos\theta}$.

SUMMARY
fill in the blanks

Define "unit circle":

unit circle interpretations:

cos θ =

sin θ =

tan θ =

cos 0 =	sin 0 =	tan 0 =
cos 90° =	sin 90° =	tan 90° =
cos 180° =	sin 180° =	tan 180° =
cos (2π rad) =	sin (2π rad) =	tan (2π rad) =

Suppose θ is an acute angle.
When you increase θ, cos θ
When you increase θ, sin θ
When you increase θ, tan θ

The range of outputs of cos θ is:
The range of outputs of sin θ is:
The range of outputs of tan θ is:

cos 30° =	sin 30° =	
cos 45° =	sin 45° =	tan 45° =
cos 60° =	sin 60° =	