Trig Functions and the Unit Circle (3.3+3.11) HW

1. Select all of the following that are equal to $\sin\left(\frac{\pi}{6}\right)$

   A) $\sin\left(\frac{5\pi}{6}\right)$ C) $\sin\left(-\frac{\pi}{6}\right)$ E) $\sin\left(\frac{13\pi}{6}\right)$

   B) $\sin\left(\frac{7\pi}{6}\right)$ D) $\sin\left(-\frac{11\pi}{6}\right)$ F) $\sin\left(\frac{25\pi}{6}\right)$

2. Select all of the following that are undefined.

   A) $\cot\left(\frac{\pi}{2}\right)$ B) $\csc\left(-\frac{\pi}{2}\right)$ C) $\csc\left(\frac{\pi}{2}\right)$ D) $\cot(\pi)$

   E) $\sec(0)$ F) $\tan\left(\frac{3\pi}{2}\right)$ G) $\sec(-\pi)$ H) $\tan(2\pi)$

3. Two of the following are equal. Which two are equal?

   $\sin\left(\frac{4\pi}{5}\right)$ $\sin\left(-\frac{\pi}{5}\right)$ $\sin\left(\frac{3\pi}{5}\right)$ $\sin\left(\frac{\pi}{5}\right)$

In questions #2-6, two trigonometric values are presented. You are meant to answer these questions without actually evaluating either function.

4. Which is greater: $\sin\left(\frac{3\pi}{5}\right)$ or $\cos\left(\frac{3\pi}{5}\right)$?
5. Which is greater: $\sec\left(\frac{8\pi}{7}\right)$ or $\tan\left(\frac{8\pi}{7}\right)$?
6. Which is greater: $\sin\left(\frac{\pi}{8}\right)$ or $\cos\left(\frac{\pi}{8}\right)$?
7. Which is greater: $\csc\left(\frac{\pi}{8}\right)$ or $\sec\left(\frac{\pi}{8}\right)$?
8. Which is greater: $\sin\left(\frac{9\pi}{8}\right)$ or $\cos\left(\frac{9\pi}{8}\right)$?
9. Which is greater: $\sin\left(\frac{2\pi}{5}\right)$ or $\csc\left(\frac{2\pi}{5}\right)$?

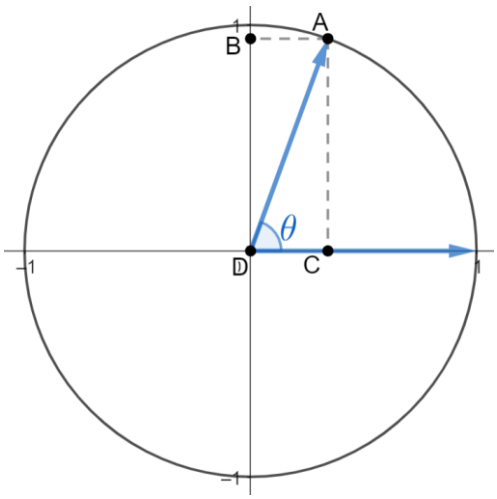
10. Fun fact: $\cos\left(\frac{\pi}{5}\right) = \frac{1+\sqrt{5}}{4}$. You do not memorize this. But you do need to know this for the following questions:
    a. Find $\cos\left(\frac{4\pi}{5}\right)$
    b. Find $\cos\left(\frac{6\pi}{5}\right)$
    c. Find $\cos\left(\frac{9\pi}{5}\right)$
    d. Find $\cos\left(\frac{26\pi}{5}\right)$

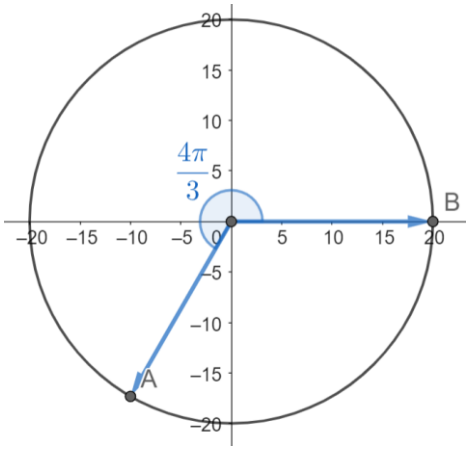
11. If $\sin(\theta) < 0$ and $\tan(\theta) < 0$, in which quadrant does the terminal ray of θ lie when the angle is graphed in standard form?

Evaluate each of the following.

12. $\sin\left(\frac{5\pi}{6}\right)$
13. $\cos(-\pi)$
14. $\tan\left(\frac{7\pi}{6}\right)$
15. $\sec\left(\frac{\pi}{2}\right)$
16. $\csc\left(\frac{3\pi}{2}\right)$
17. $\cot\left(\frac{4\pi}{3}\right)$
18. $\sin\left(\frac{9\pi}{2}\right)$
19. $\cos\left(\frac{7\pi}{4}\right)$
20. $\tan\left(-\frac{7\pi}{4}\right)$

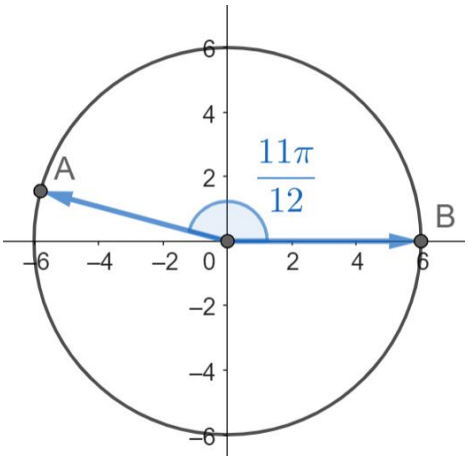
21. When graphed in standard form, the terminal side of the angle θ intersects the unit circle at the point A. Point C is on the x-axis directly below A. Point B is on the y-axis directly to the left of B. Point D is at the origin. $\sin(\theta)$ is equal to the length of which of the following line segments:
    A) $\overline{AB}$
    B) $\overline{AC}$
    C) $\overline{AD}$
    D) $\overline{BC}$





22. At what point does the angle $\frac{4\pi}{3}$ graphed in standard form intersect a circle centered at the origin with radius 20? Give exact coordinates (i.e. not a calculator question).

23. Use a calculator/Desmos to determine at what point the terminal ray of the angle $\frac{11\pi}{12}$ graphed in standard form intersects a circle centered at the origin with radius 6? Round the coordinates to 3 decimal places (assume AP Precalculus is always 3 decimal places).



Think you are done with the homework? Not yet. Your homework is to also make sure you are ready for next class's speed quiz. The new information on that speed quiz is $\sin\theta$, $\cos\theta$, $\tan\theta$, $\csc\theta$, $\sec\theta$, and $\cot\theta$ for basic quadrantal angles ($0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}$, and 2π). In addition, you still need to know all of the questions that could have been on the first speed quiz.

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1. A, D, E, F
2. D and F
3. $\sin\left(\frac{4\pi}{5}\right)$ and $\sin\left(\frac{\pi}{5}\right)$
4. $\sin\left(\frac{3\pi}{5}\right)$ ($\sin\left(\frac{3\pi}{5}\right)$ is positive and $\cos\left(\frac{3\pi}{5}\right)$ is negative)
5. $\tan\left(\frac{8\pi}{7}\right)$ ($\tan\left(\frac{8\pi}{7}\right)$ is positive and $\sec\left(\frac{8\pi}{7}\right)$ is negative)
6. $\cos\left(\frac{\pi}{8}\right)$ (At that point on the unit circle, the x value is close to 1 and the y value is close to 0)
7. $\csc\left(\frac{\pi}{8}\right)$ (From the previous problem, we know $\cos\left(\frac{\pi}{8}\right)$ is greater than $\sin\left(\frac{\pi}{8}\right)$. This question is about the reciprocal of those. The bigger denominator will lead to the smaller fraction)
8. $\sin\left(\frac{9\pi}{8}\right)$ (At that point on the unit circle, the x value is close to -1 and the y value is close to 0)
9. $\csc\left(\frac{2\pi}{5}\right)$ ($\sin\left(\frac{2\pi}{5}\right)$ is a positive number less than 1. It's reciprocal will be greater than 1)
10.
    a. $-\frac{1+\sqrt{5}}{4}$
    b. $-\frac{1+\sqrt{5}}{4}$
    c. $\frac{1+\sqrt{5}}{4}$
    d. $-\frac{1+\sqrt{5}}{4}$
11. Quadrant 4
12. $\frac{1}{2}$
13. -1
14. $\frac{\sqrt{3}}{3}$
15. Undefined
16. -1
17. $\frac{\sqrt{3}}{3}$
18. 1
19. $\frac{\sqrt{2}}{2}$
20. 1
21. B
22. $\left(-10, -10\sqrt{3}\right)$
23. $(-5.796, 1.553)$