Directions: Please **show all your work** for these exercises. You are allowed (and in fact encouraged!) to work with your classmates on this assignment, but please make sure that you turn in your own work. This worksheet is due on Wednesday, Feb 22 at midnight. Please submit your completed worksheet as a pdf on Canvas. For Worksheet 6, only the last two pages will be graded for worksheet credit.

1. Pick one of the circles on the page of circles provided. Once you have picked a circle, you must stick with that circle for the entirety of the exercise, so please record what circle you have picked. **Circle:** _____

2. Lay a Twizzler on the straight line from the center of the circle to the other point marked, and tear it off so that the length of the Twizzler piece is equal to the radius of the circle.

3. Tear 9 more Twizzler pieces to match the length of the first Twizzler piece. All of the Twizzler pieces whose length equals the length of the radius will be called _____.

4. Start laying your radians around the circumference of the circle. Record how many radians it takes to go (give a decimal approximation):

   (a) 1/4 of the way around the circle (90°).   _____

   (b) 1/2 of the way around the circle (180°).   _____

   (c) 3/4 of the way around the circle (270°).   _____

   (d) all of the way around the circle (360°).   _____

5. Write your approximations on the board. The class averages for each category are:

   (a) 1/4 of the way around the circle (90°):   _____

   (b) 1/2 of the way around the circle (180°):   _____

   (c) 3/4 of the way around the circle (270°):   _____

   (d) all of the way around the circle (360°):   _____

6. Take a guess, how many radians will it take to cover:

   (a) 30°?   _____

   (b) 120°?   _____

   (c) 317°?   _____

   (d) 560°?   _____

7. Eat your Twizzlers.

8. One _____ is the measure of a central angle θ that intercepts an arc s equal in length to the radius r of the circle.

9. **Follow the logic:** This exercise will guide you through showing exactly why we convert between degrees and radians the way we do.

   (a) What is the formula for circumference in terms of radius r?

   (b) If you laid the circumference of a circle in a straight line, how many "radiuses"' would it measure?

   (c) So how many radians are in 360°?

   (d) Write that as a proportion.

   (e) How many degrees are there in one radian?

10. Convert the following measurements from degrees to radians.

    (a) 135°

    (b) 540°

    (c) −270°

11. Convert the following measurements from radians to degrees.

    (a) $-\pi/2$ radians

    (b) 2 radians

    (c) $9\pi/2$ radians

12. Recall the arc length formula is given by $\boxed{s = r\theta}$, where θ is measured in radians. Find the length of the chord of the circle (the straight line segment), assuming the radius of the circle is 10.
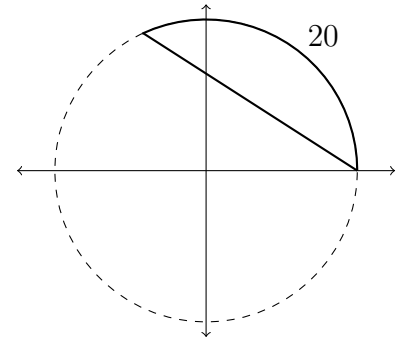
13. To keep an unstable flagpole from swaying, two support cables are attached to the top of the pole, with their other ends attached to the ground. Suppose the cable on the left side of the pole and makes an angle of $\frac{2\pi}{7}$ with the ground, the cable on the right side of the pole makes an angle of $\frac{3\pi}{7}$ with the ground, and the two attaching points on the ground are 80 feet apart. How tall is the flagpole? You must include a picture and round to two decimal places. (Hint: You'll need the third angle of the triangle, and your calculator will need to be in radians mode. How many radians do the angles in a triangle add up to?)