# Angle and Trig Ratio Problems
## Math 130 *Kovitz*

1. (a) Convert to radian measure: $18°$ (both in terms of π and as a decimal).
   (b) Convert to degree measure:
      i. $\frac{\pi}{5}$
      ii. 8

      Both of these numbers are in radian measure.
   (c) Convert to radian measure in terms of π: 5 radians.

2. (a) How long is an arc associated with an angle of $42°$ in a circle with radius 206 feet?
   (b) In a circle with 260-inch radius, how long is an arc associated with a central angle of 1.4 radians?

3. (a) In a unit circle, an arc 2.1 units long subtends a central angle of how many radians? Of how many degrees, to the nearest degree?
   (b) In a circle with 15-cm. radius, an arc 36 cm. long subtends a central angle of how many radians? Of how many degrees, to the nearest degree?

4. Given arc length $s = 10$ and $\theta = 60°$, find the radius r. (You may leave r in the form $\frac{N}{\pi}$, N an integer.)

5. On a turntable, an 8-in. diameter record is rotating at a rate of $33\frac{1}{3}$ revolutions per minute (rpm). Find
   (a) the angular speed of the record and the angle swept in 3 seconds;
   (b) the linear speed of a point on its rim and the distance traveled by the point in 3 seconds.

6. Find the six trigonometric ratios for angle θ.
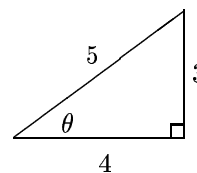
7. Solve this triangle. (Find all sides and angles.)
   It is given that $\angle A = 41°$ and $c = 100$.
   Use a calculator when indicated.
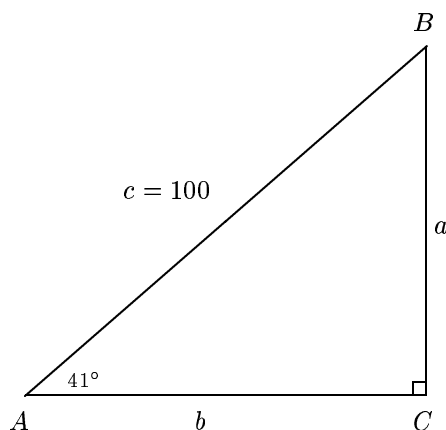
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with Unit Circle and Standard Position Problems

8. Find and label any two points in the second quadrant which are on the unit circle, the graph of $u^2 + v^2 = 1$. (Note that $(0,1)$ and $(-1,0)$ are not in the second quadrant; they are on the axes.)

   The answers may be expressed in either radical or decimal form. If possible, find two points with exact decimal values—such points are a bit more difficult to find.

9. The point $P = (.96, -.28)$ is on the unit circle.

   (a) Roughly mark it.

   (b) Find the coordinates of its reflection
      i. across the u-axis.
      ii. across the v-axis.
      iii. across the line $v = u$.
      iv. through the origin.

   (c) For each part of (b), roughly mark the reflected point on the circle, labeling it with its coordinates and with the name of the reflection from the point P.

10. (a) On the unit circle mark the points determined by
      i. $\frac{2\pi}{3}$
      ii. $\frac{\pi}{6}$
      iii. $-\frac{4\pi}{3}$
      iv. $-\frac{\pi}{2}$
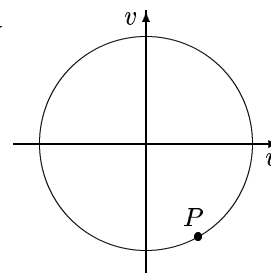
   (b) i. Find a real number between 0 and 2π that determines point P.
       ii. Find a real number between -2π and 0 that determines point P.

   (c) Is it a contradiction that P is determined by two different numbers?