MA-115 (F,99)
Radian Measures &
Trigonometric Values of Standard Angles
Worksheet

1. First, be able to start at 0 and count by 30's, count by 45's, count by 60's and count by 90's around the circle.

2. Start at 0 and give the size of the standard angles in succession around the circle.

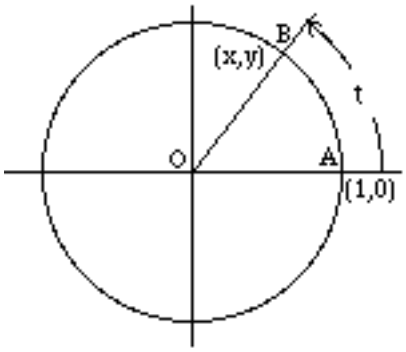
3. Start at 0 and be able to count by $\pi/6$'s, $\pi/4$'s, $\pi/3$'s and $\pi/2$'s around the circle, reducing as you go.

4. Start at 0 and give the size of the standard angles in succession measured in radians around the circle.

5. The real goal: If you're given a standard angle in degrees, picture it in the appropriate place on the circle in your mind's eye give its radian measure. Conversely, if you're given a radian measure, picture it appropriately in your mind's eye and be able to give its degree measure.

This is the text's definition of the sine of any real number t:

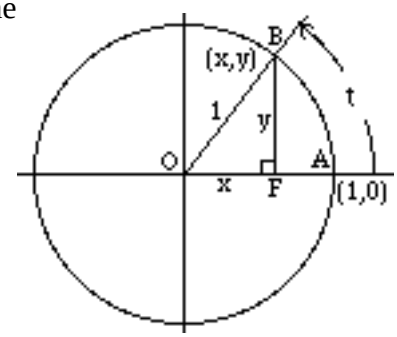
> Let t be any real number. Starting at the point (1, 0), move around the unit circle in standard position a directed distance t. Let the point (x, y) be the terminal point. Then, by definition, sin t = y.



The text then tells you how to find the coordinates of terminal points for particular values of t by using the fact that the equation for the circle is $x^2 + y^2 = 1$.

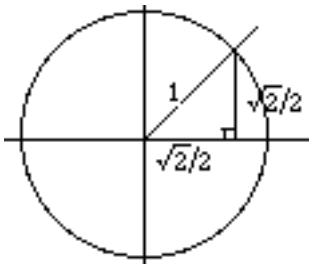
We can relate the book's definition with what we've been doing as follows:

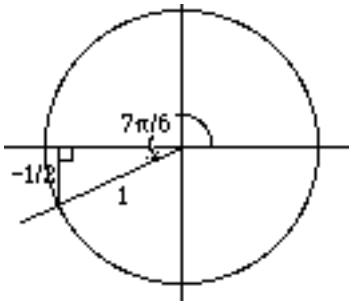
First note that t is just the radian measure of AOB. Second, note that, if F is the foot of the perpendicular from B to the x-axis, the directed lengths OF and FB are the numbers x and y respectively. We can then use right ΔAOB to determine x and y. For example,



$\sin \frac{\pi}{4} = \frac{\sqrt{2}}{2}$ and

$\sin \frac{7\pi}{6} = -\frac{1}{2}$.



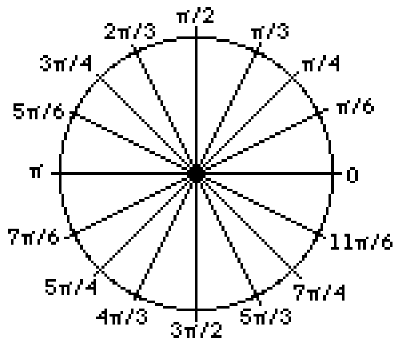


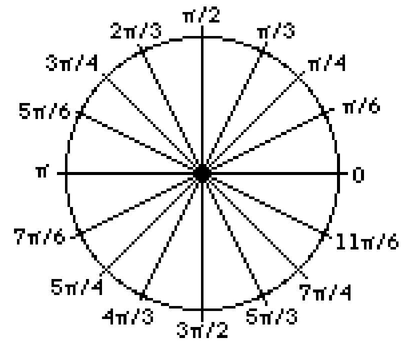
6. Picture the radius vector (hypotenuse) going around the unit circle making right triangle at the standard angles (measured in radians -- everything is measured in radians from now on.) Picture how the y-values are changing as directed lengths of standard triangles. Be able to give values for the sine of the standard angles around the unit circle.

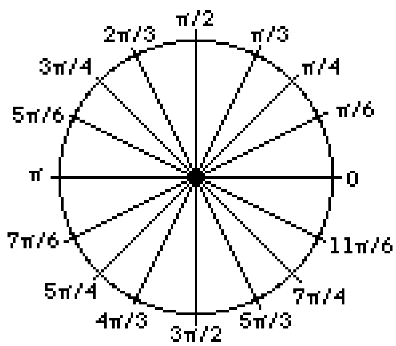
7. Be able to do the same as in 6 with the cosines and tangents of the standard angles.

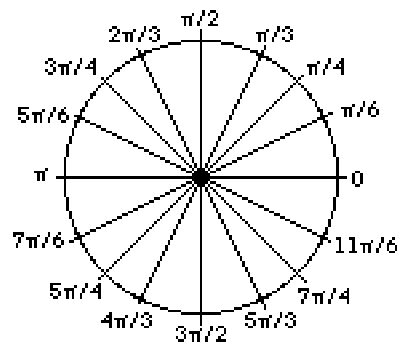
8. The ultimate goal is for you to give the sine, cosine and tangent of any of the standard angles.

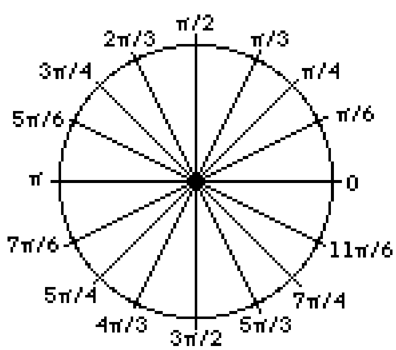
9. You also must be able to answer questions like this: If $0 \le t \le 2\pi$, and $\sin t = -\sqrt{3}/2$, what is t? Or Give all the values between 0 and 2π, inclusive, whose cosine is $\sqrt{2}/2$. Or if $\tan x = -1$ and $-\pi/2 < x < \pi/2$, what's x?

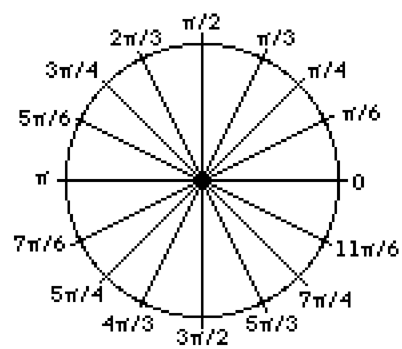

π/2
2π/3
π/3
3π/4
π/4
5π/6
π/6
π
0
7π/6
11π/6
5π/4
7π/4
4π/3
5π/3
3π/2


π/2
2π/3
π/3
3π/4
π/4
5π/6
π/6
π
0
7π/6
11π/6
5π/4
7π/4
4π/3
5π/3
3π/2


π/2
2π/3
π/3
3π/4
π/4
5π/6
π/6
π
0
7π/6
11π/6
5π/4
7π/4
4π/3
5π/3
3π/2


π/2
2π/3
π/3
3π/4
π/4
5π/6
π/6
π
0
7π/6
11π/6
5π/4
7π/4
4π/3
5π/3
3π/2


π/2
2π/3
π/3
3π/4
π/4
5π/6
π/6
π
0
7π/6
11π/6
5π/4
7π/4
4π/3
5π/3
3π/2


π/2
2π/3
π/3
3π/4
π/4
5π/6
π/6
π
0
7π/6
11π/6
5π/4
7π/4
4π/3
5π/3
3π/2