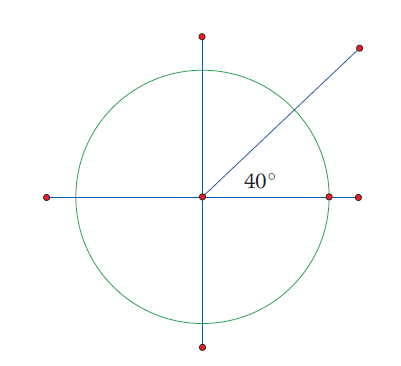
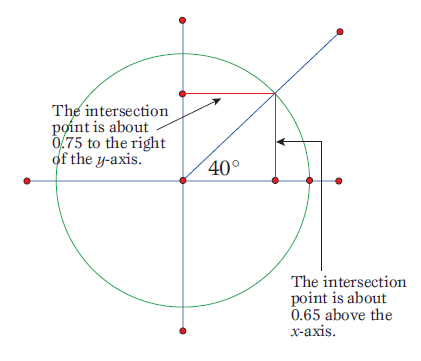
Computing Sines and Cosines by Using the Unit Circle

1. Start with a unit circle drawn on a Cartesian grid.

A unit circle is a circle with a radius of 1 whose center is the origin.

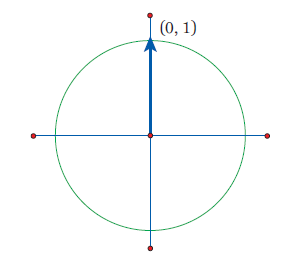
1. Use your protractor to make an angle with respect to the positive part of the x-axis.

A angle is shown here.

1. Locate the point of intersection between the terminal arm of the angle that you have drawn and the unit circle. Using the scale provided on the unit circle, determine the x-value and y-value of this point on the Cartesian plane. **The x-value is the cosine of the angle you have constructed, and the y-value is the sine of the angle. Why?**

In this case, the cosineis about 0.75 and the sineis about 0.65. Label this point on the diagram.

**EXERCISES**

1. Compute the following sines and cosines by using a protractor and the unit circle provided. For each angle given, label the point of intersection between the terminal arm of the angle and the unit circle.  
   1.  d. 
   2.  e. 
   3.  f. 
2. Using the unit circle, determine the following sines and cosines.

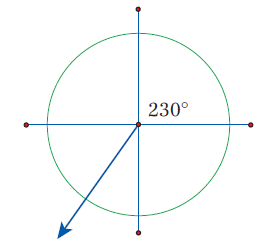
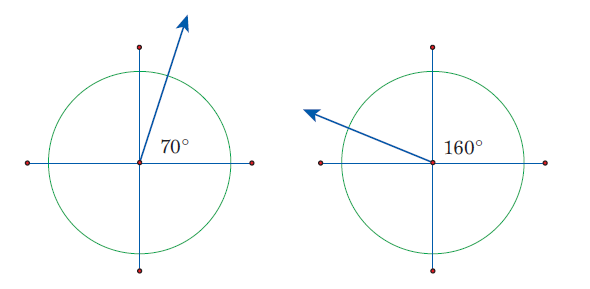
The first is done for you.

* 1.   
       
     *Explanation:* The terminal arm of a angle drawn in standard position inside the unit circle will intersect the top of the circle. The coordinates of this point are (0, 1).

Therefore,  and .

* 1.  d. 
  2.  e. 

1. Without explicitly computing these values (that is, without using a protractor or a calculator), *approximate*, to the nearest tenth, the sine and cosine of each angle shown in the diagrams below.  
     
     
     



1. Without doing the computations, answer the following questions. Justify your answer.  
   1. Is a positive or a negative number? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Is  a positive number or a negative number? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Which is bigger: ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. Which is bigger: ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. In which quadrants will  be positive? In which quadrants will  be positive? Explain.

*  will be positive in quadrant(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
*  will be positive in quadrant(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Can you find an angle  such that ? If so, what angle is it? If you cannot find such an angle,

why not?

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