EXAMPLE 1 Working with DMS Measure

(a) Convert 37.425° to DMS.

(a) We need to convert the fractional part to minutes and seconds. First we convert 0.425° to minutes:

$$0.425^\circ\left(\frac{60'}{1^\circ}\right) = 25.5'.$$

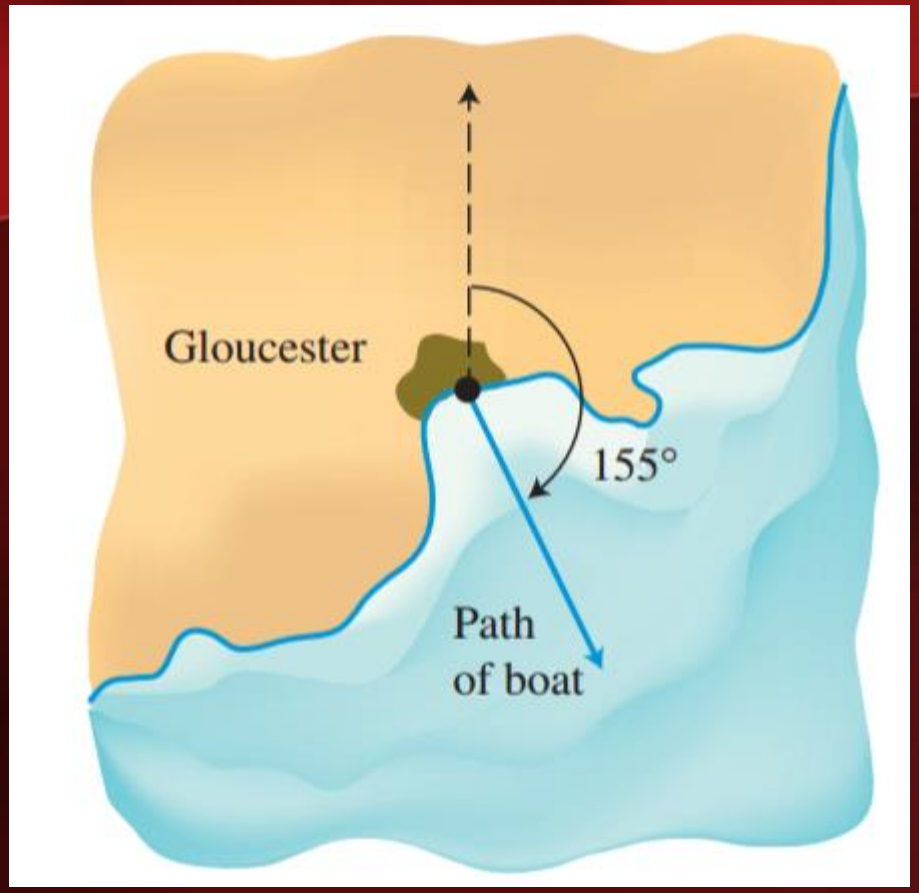
Then we convert 0.5 minutes to seconds:

$$0.5'\left(\frac{60''}{1'}\right) = 30''.$$

Putting it all together, we find that $37.425^\circ = 37^\circ 25' 30''$.

(b) Convert $42°24'36''$ to degrees.

$$42°24'36'' = 42° + \left(\frac{24}{60}\right)° + \left(\frac{36}{3600}\right)° = 42.41°.$$



In navigation, the **course** or **bearing** of an object is sometimes given as the angle of the **line of travel** measured clockwise from due north. For example, the line of travel in Figure 4.2 has the bearing of 155°.

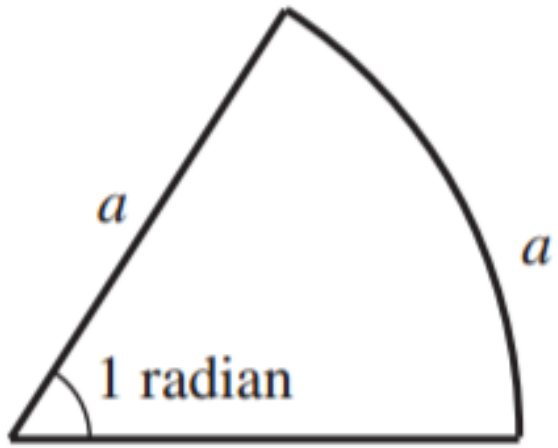


FIGURE 4.3 In a circle, a central angle of 1 radian intercepts an arc of length one radius.

DEFINITION Radian

A central angle of a circle has measure 1 **radian** if it intercepts an arc with the same length as the radius. (See Figure 4.3.)

Degree-Radian Conversion

To convert radians to degrees, multiply by $\frac{180^\circ}{\pi \text{ radians}}$.

To convert degrees to radians, multiply by $\frac{\pi \text{ radians}}{180^\circ}$.

EXAMPLE 2 Working with Radian Measure

(a) How many radians are in 90 degrees?

(b) How many degrees are in $\pi/3$ radians?

(c) Find the length of an arc intercepted by a central angle of 1/2 radian in a circle of radius 5 inches.

(d) Find the radian measure of a central angle that intercepts an arc of length s in a circle of radius r.

Circular Arc Length

Arc Length Formula (Radian Measure)

If θ is a central angle in a circle of radius r, and if θ is measured in radians, then the length s of the intercepted arc is given by

$$s = r\theta.$$

EXAMPLE 3 Perimeter of a Pizza Slice

Find the perimeter of a 60° slice of a large (7 in. radius) pizza.

EXAMPLE 4 Designing a Running Track

The running lanes at the Emery Sears track at Bluffton College are 1 meter wide. The inside radius of lane 1 is 33 meters and the inside radius of lane 2 is 34 meters. How much longer is lane 2 than lane 1 around one turn? (See Figure 4.5.)