Topic B

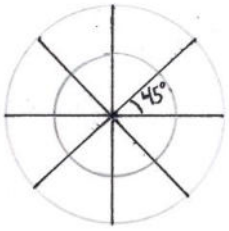
Angle Measurement

4.MD.5, 4.MD.6

Focus Standard:	4.MD.5	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.
	4.MD.6	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
Instructional Days:	4	
Coherence -Links from:	G2–M8	Time, Shapes, and Fractions as Equal Parts of Shapes

In Topic B, students explore the definition of degree measure. Beginning in Lesson 5 with a circular protractor, students divide the circumference of a circle into 360 equal parts, with each part representing 1 degree (**4.MD.5**). Students apply this understanding as they discover that a right angle measures 90° and, in turn, that the angles they know as acute measure less than 90°, and obtuse angles measure more than 90°. The idea that an angle measures the amount of *turning* in a particular direction is explored, providing students with the opportunity to recognize familiar angles in varied positions (**4.G.1**, **4.MD.5**).

Through experimentation with circles of various sizes and angles constructed to varying specifications in Lesson 6, students discover that, although the size of a circle may change, an angle spans an arc, which represents a constant fraction of the circumference. This reasoning forms the basis for the understanding that degree measure is not a measure of length. For example, as shown to the right, the 45° angle spans $\frac{1}{8}$ of the circumference of the circle, whether choosing the small or large circle.



Armed with this understanding of the degree as a unit of measure, students use various protractors in Lesson 7, including standard 180° protractors, to measure angles to the nearest degree and construct angles of a given measure (**4.MD.6**).

The topic concludes in Lesson 8 with students further exploring angle measure as an amount of turning. This provides a link to Grade 3 work with fractions as students reason that a $\frac{1}{4}$ turn is a right angle and measures 90°, a $\frac{1}{2}$ turn measures 180°, and a $\frac{3}{4}$ turn measures 270°. Students move forward to identify these angles in their environment.

A Teaching Sequence Toward Mastery of Angle Measurement	
Objective 1:	**Use a circular protractor to understand a 1-degree angle as $\frac{1}{360}$ of a turn. Explore benchmark angles using the protractor. (Lesson 5)**
Objective 2:	**Use varied protractors to distinguish angle measure from length measurement. (Lesson 6)**
Objective 3:	**Measure and draw angles. Sketch given angle measures, and verify with a protractor. (Lesson 7)**
Objective 4:	**Identify and measure angles as turns and recognize them in various contexts. (Lesson 8)**