## Lesson 9: Use a Protractor to Measure Angles

- Let's use some tools to measure angles.


## Warm-up: True or False: There's Something about 45

Decide if each statement is true or false. Be prepared to explain your reasoning.

- $2 \times 45=6 \times 15$
- $4 \times 45=2 \times 90$
- $3 \times 45=180-90$
- $6 \times 45=45+90+135$


## 9.1: How Large is a $1^{\circ}$ Angle?

1. A ray that turns all the way around its endpoint and back to its starting place has made a full turn or has turned $360^{\circ}$.


What fraction of a full turn is each of the following angle measurements?
a. $120^{\circ}$
b. $60^{\circ}$
c. $45^{\circ}$
d. $30^{\circ}$
e. $10^{\circ}$
f. $1^{\circ}$
2. Your teacher will give you a protractor, a tool for measuring the number of degrees in an angle.
a. How is $1^{\circ}$ shown on the protractor?
b. How many $1^{\circ}$ measurements do you see?
3. A protractor with no numbers has been placed over an angle.

- The center of the protractor is lined up with the vertex of the angle.
- The straight edge of the protractor is lined up with a ray of the angle.

How many degrees is this angle? Explain how you know.

4. An angle contains thirty $1^{\circ}$ angles, as shown. How many degrees is this angle?


## 9.2: Use a Protractor

1. Here are four angles whose sizes you may have estimated earlier. A protractor has been placed over each angle. Measure the size of each angle in degrees.
a.

b.

c.

d.

2. Elena and Kiran are measuring an angle with a protractor. Elena says the angle is $80^{\circ}$. Kiran says it shows $100^{\circ}$. Why might they end up with different measurements? Which one is correct? Explain your reasoning.

