Name _____

Degrees

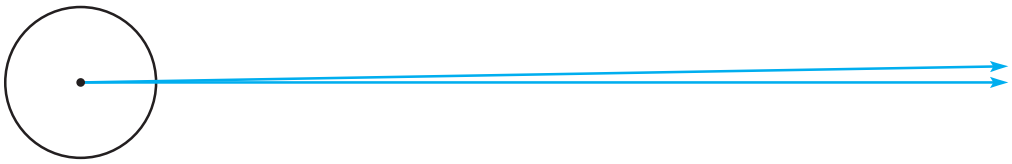
Essential Question How are degrees related to fractional parts of a circle?

Common Core **Measurement and Data—4.MD.C.5a, 4.MD.C.5b**

MATHEMATICAL PRACTICES
MP1, MP2, MP5

CONNECT You can use what you know about angles and fractional parts of a circle to understand angle measurement. Angles are measured in units called **degrees**. Think of a circle divided into 360 equal parts. An angle that turns through $\frac{1}{360}$ of the circle measures 1 degree.

Math Idea
The symbol for degrees is °.



Unlock the Problem

Real World

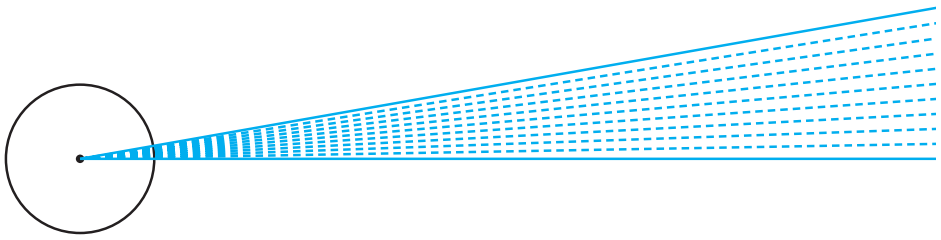
The angle between two spokes on the bicycle wheel turns through $\frac{10}{360}$ of a circle. What is the measure of the angle formed between the spokes?

- What part of an angle does a spoke represent?

_____

_____

Example 1 Use fractional parts to find the angle measure.



Each $\frac{1}{360}$ turn measures _____ degree.

Ten $\frac{1}{360}$ turns measure _____ degrees.

So, the measure of the angle between the spokes is _____.

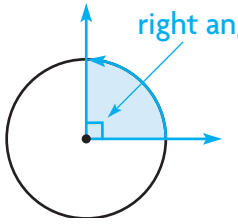
Math Talk

MATHEMATICAL PRACTICES 2

Reason Abstractly How many degrees is the measure of an angle that turns through 1 whole circle? Explain.

▲ The Penny Farthing bicycle was built in the 1800s.

Example 2 Find the measure of a right angle.



Think: Through what fraction of a circle does a right angle turn? _____

STEP 1 Write $\frac{1}{4}$ as an equivalent fraction with 360 in the denominator.

$\frac{1}{4} = \frac{\square}{360}$ **Think:** $4 \times 9 = 36$, so $4 \times$ _____ $= 360$.

Remember
To write an equivalent fraction, multiply the numerator and denominator by the same factor.

STEP 2 Write $\frac{90}{360}$ in degrees.

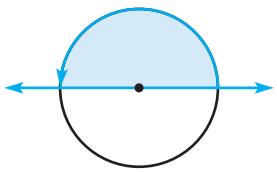
An angle that turns through $\frac{1}{360}$ of a circle measures _____.

An angle that turns through $\frac{90}{360}$ of a circle measures _____.

So, a right angle measures _____.

Try This! Find the measure of a straight angle.

Through what fraction of a circle does a straight angle turn? _____



Write $\frac{1}{2}$ as an equivalent fraction with 360 in the denominator.

$\frac{1}{2} = \frac{\square}{360}$ **Think:** $2 \times 18 = 36$, so $2 \times$ _____ $= 360$.

So, a straight angle measures _____.

1. How can you describe the measure of an acute angle in degrees?

_____

_____

2. How can you describe the measure of an obtuse angle in degrees?

_____

Name _____

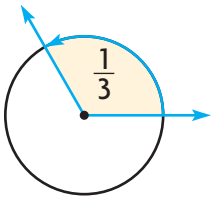
Share and Show

MATH BOARD

1. Find the measure of the angle.

Through what fraction of a circle does the angle turn? _____

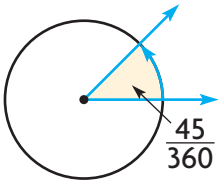
$\frac{1}{3} = \frac{\square}{360}$ Think: 3 × 12 = 36, so 3 × _____ = 360.



So, the measure of the angle is _____.

Tell the measure of the angle in degrees.

2.



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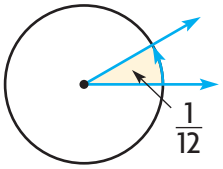

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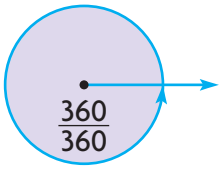
Math Talk MATHEMATICAL PRACTICES 6

If an angle measures 60°, through what fraction of a circle does it turn? **Explain.**

On Your Own

Tell the measure of the angle in degrees.

4.



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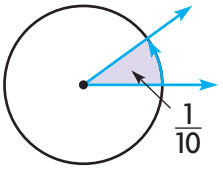

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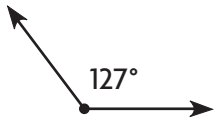
Classify the angle. Write *acute, obtuse, right,* or *straight.*

6.



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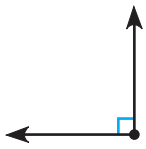

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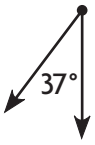

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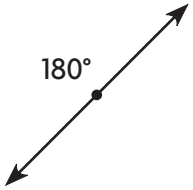

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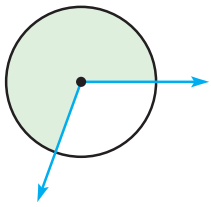
10. MATHEMATICAL PRACTICE 6 Is this an obtuse angle? **Explain.**

_____

_____

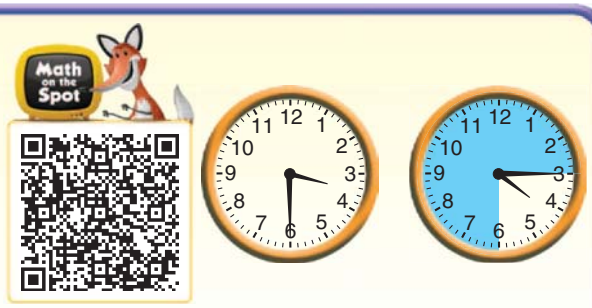
_____



11. GO DEEPER Alex cut a circular pizza into 8 equal slices. He removed 2 of the slices of pizza. What is the measure of the angle made by the missing slices of pizza?

_____

Unlock the Problem Real World



12. THINK SMARTER Ava started reading at 3:30 P.M. She stopped for a snack at 4:15 P.M. During this time, through what fraction of a circle did the minute hand turn? How many degrees did the minute hand turn?

a. What are you asked to find?

_____

_____

b. What information can you use to find the fraction of a circle through which the minute hand turned?

_____

_____

c. How can you use the fraction of a circle through which the minute hand turned to find how many degrees it turned?

_____

_____

d. Show the steps to solve the problem.

STEP 1 $\frac{3 \times \square}{4 \times \square} = \frac{?}{360}$

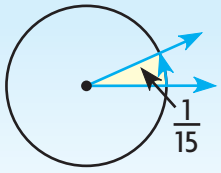
STEP 2 $\frac{3 \times 90}{4 \times 90} = \frac{\square}{360}$

e. Complete the sentences.

From 3:30 P.M. to 4:15 P.M., the minute hand made a _____ turn clockwise.

The minute hand turned _____ degrees.

13. THINK SMARTER An angle represents $\frac{1}{15}$ of a circle. Select the number to show how to find the measure of the angle in degrees.



$\frac{1}{15} = \frac{1 \times \square}{15 \times \square} = \frac{\square}{360}$

The angle measures _____.

20

24

30

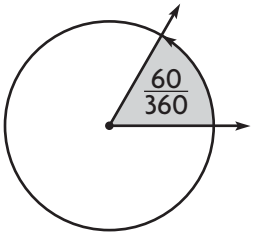
Name _____

Degrees

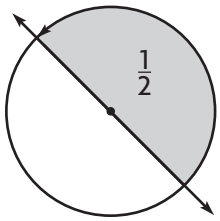
Common Core

COMMON CORE STANDARDS—4.MD.C.5a, 4.MD.C.5b *Geometric measurement: understand concepts of angle and measure angles.*

Tell the measure of the angle in degrees.

1. 

60° _____

2. 

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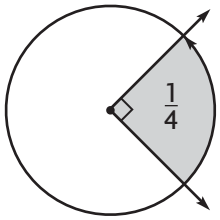
3. 

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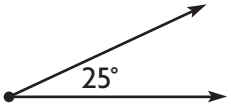
Classify the angle. Write *acute*, *obtuse*, *right*, or *straight*.

4. 

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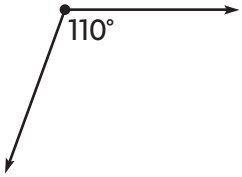
5. 

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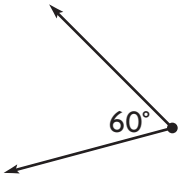
6. 

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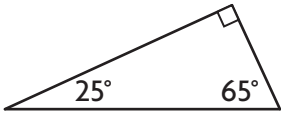
Classify the triangle. Write *acute*, *obtuse*, or *right*.

7. 

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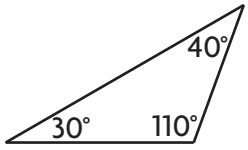
8. 

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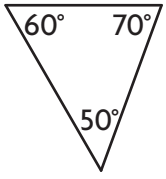
9. 

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Problem Solving Real World

Ann started reading at 4:00 P.M. and finished at 4:20 P.M.

10. Through what fraction of a circle did the minute hand turn?

_____

Start

End

11. WRITE Math Give an example from everyday life of an angle that measures 90 degrees.

_____

_____

Lesson Check (4.MD.C.5a, 4.MD.C.5b)

1. What kind of angle is shown?

2. How many degrees are in an angle that turns through $\frac{1}{4}$ of a circle?

Spiral Review (4.OA.A.3, 4.NF.B.3b, 4.NF.B.4a, 4.NF.C.5)

3. Mae bought 15 football cards and 18 baseball cards. She separated them into 3 equal groups. How many sports cards are in each group?

4. Each part of a race is $\frac{1}{10}$ mile long. Marsha finished 5 parts of the race. How far did Marsha race?

5. Jeff said his city got $\frac{11}{3}$ inches of snow. Write this fraction as a mixed number.

6. Amy ran $\frac{3}{4}$ mile. Write the distance Amy ran as a decimal.

FOR MORE PRACTICE GO TO THE Personal Math Trainer