

## Topic 15 / Overview

# TOPIC 15


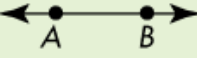


## Geometric Measurement: Understand Concepts of Angles and Angle Measurement

### OVERVIEW

Topic 15 focuses on developing understanding of angle concepts including angle measurement.

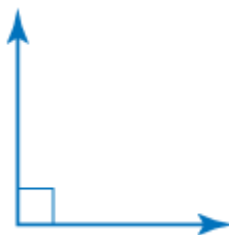
### GEOMETRIC CONCEPTS

**Understand Basic Geometric Concepts** Your child will learn to identify, name, and draw points, lines, line segments, rays, and angles. The definitions and notations for each of these terms are in the following table.

Geometric Term	Example	Label	What You Say
A <b>point</b> is an exact location in space.		Point Z	Point Z
A <b>line</b> is a straight path of points that goes on and on in opposite directions.		$\overleftrightarrow{AB}$	Line AB
A <b>line segment</b> is a part of a line with two endpoints.		$\overline{GR}$	Line Segment GR
A <b>ray</b> is a part of a line that has one endpoint and continues on forever in one direction.		$\overrightarrow{NP}$	Ray NP

Your child will also learn to identify and right, straight, acute, and obtuse angles.

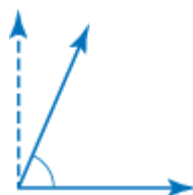
A right angle forms a square corner.



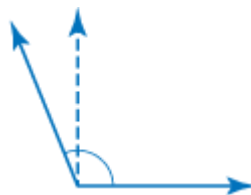
A straight angle forms a straight line.



An acute angle has a measure less than a right angle.



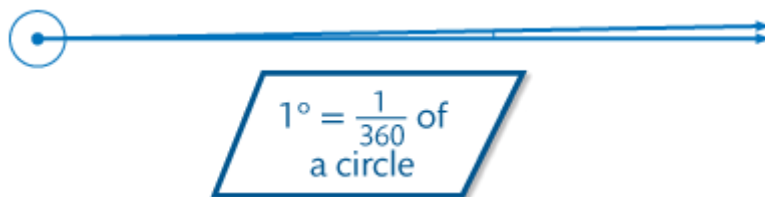
An obtuse angle has a measure greater than a right angle, but less than a straight angle.



## MEASURE ANGLES

**Unit Angles** Your child will be introduced to the concept that an angle that turns through  $\frac{1}{360}$  of a circle is a unit angle, with a measure of one degree ( $1^\circ$ ). The measure of an angle can be found using fractions of a circle.

A full circle has an angle measure of  $360^\circ$ .



Here is how your child might find the measure of an angle that turns through  $\frac{1}{6}$  of a circle.



$$360^\circ \div 6 = 60^\circ$$

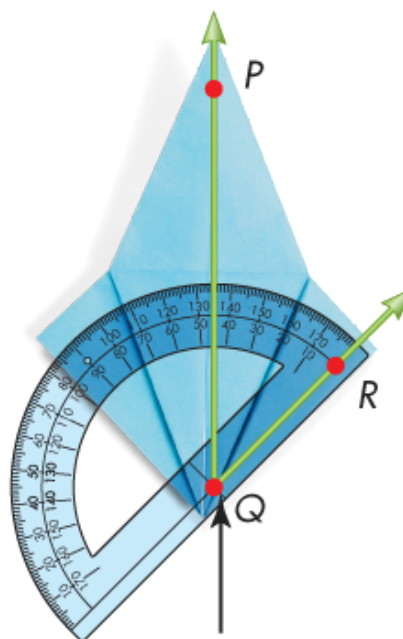
The angle measure is  $60^\circ$ .

**Measure Angles** Your child will learn how to use a protractor to measure and draw angles.

Here is how to measure an angle using a protractor.

### Measure $\angle PQR$ .

Place the protractor's center on the angle's vertex,  $Q$ . Place one of the  $0^\circ$  marks on  $\overrightarrow{QR}$ . Read the measure where  $\overrightarrow{QP}$  crosses the protractor. If the angle is acute, use the lesser number. If the angle is obtuse, use the greater number.



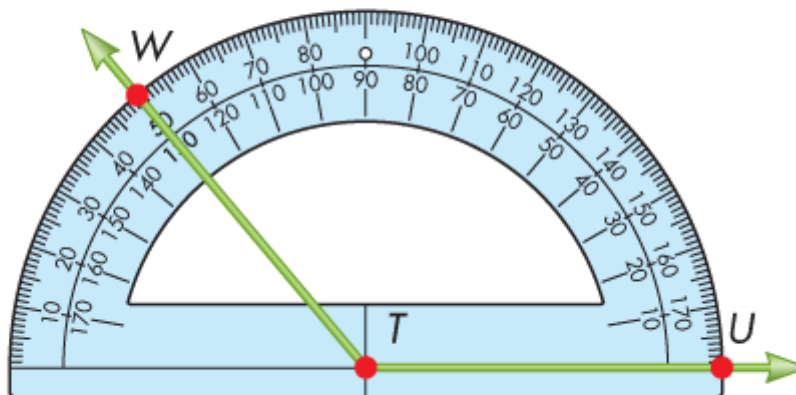
The vertex is the common endpoint of the rays that form the angle.

The measure of  $\angle PQR$  is  $45^\circ$ .

Here is how to draw an angle using a protractor.

### Draw an angle that measures $130^\circ$ .

Draw  $\overrightarrow{TU}$ . Place the protractor so the center is over point  $T$ , and one of the  $0^\circ$  marks is on  $\overrightarrow{TU}$ . Place a point at  $130^\circ$ . Label it  $W$ . Draw  $\overrightarrow{TW}$ .

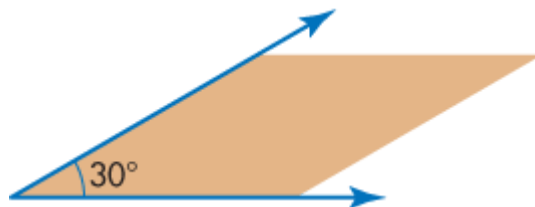


The measure of  $\angle WTU$  is  $130^\circ$ .

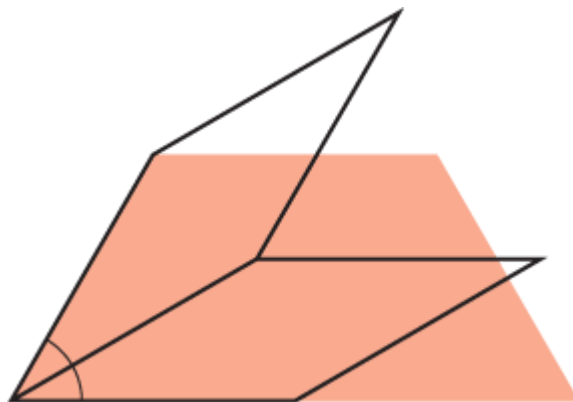
## SOLVE PROBLEMS INVOLVING ANGLE MEASURES

**Use the Additive Nature of Angle Measures** Your child will use angles with known measures to find the measures of unknown angles. This process builds the understanding that angle measure is additive—in other words, angle measures can be added together to find the total measure of an angle.

The smaller angle of the tan pattern block measures  $30^\circ$ .



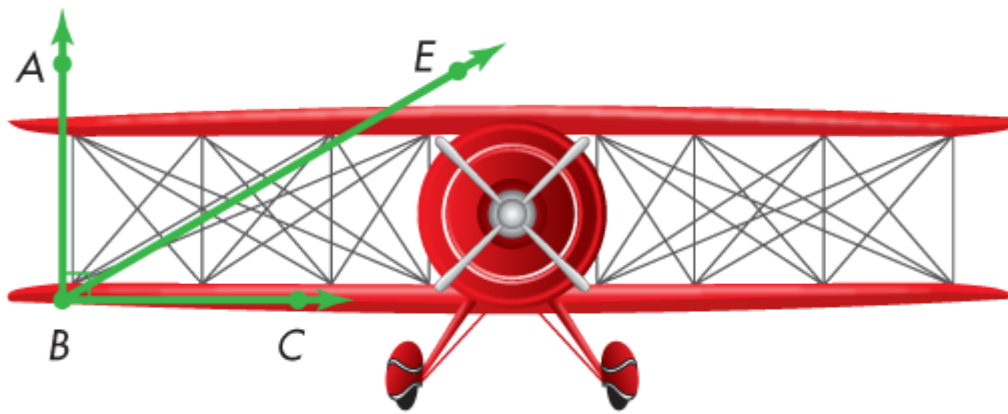
By adding two of this known measure, your child can find the unknown measure of the angle of the trapezoid pattern block.



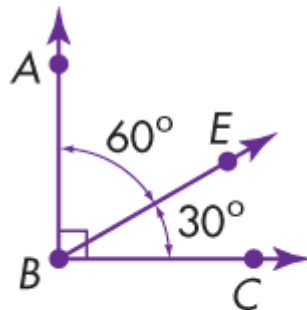
$$30^\circ + 30^\circ = 60^\circ$$

**Add and Subtract Angle Measures** Your child will learn that when an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Using what they know about right angles and straight angles, your child will add and subtract to solve problems with unknown angle measures. Here is how your child might solve a problem that involves finding an unknown angle measure.

$\angle ABC$  is a right angle.  $\angle EBC$  measures  $30^\circ$ . Find the measure of  $\angle ABE$ .



Write and solve an equation to determine the unknown angle measure.



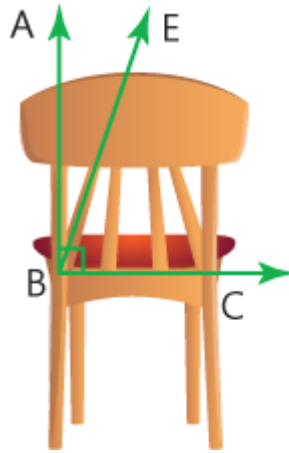
$$n + 30^\circ = 90^\circ$$

$$n = 90^\circ - 30^\circ$$

$$n = 60^\circ$$

The measure of  $\angle ABE$  is  $60^\circ$ .

Here is how your child can represent and solve the problem "If  $\angle ABE$  measures  $20^\circ$ , what is the measure of  $\angle EBC$ ?"



$$90^\circ - 20^\circ = n$$

$$70^\circ = n$$

The measure of  $\angle EBC$  is  $70^\circ$ .

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## CONNECT THE MATH

You can connect the math in this topic to everyday experiences. Notice angles at home or when you are out, such as angles in furniture, building structures, or designs in fabric or tiling. Ask your child to name the type of angle and estimate the angle measure.

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## TOPIC 15 LESSONS

- Lesson 15-1**      [Lines, Rays, and Angles](#)
- Lesson 15-2**      [Understand Angles and Unit Angles](#)
- Lesson 15-3**      [Measure with Unit Angles](#)
- Lesson 15-4**      [Measure and Draw Angles](#)
- Lesson 15-5**      [Add and Subtract Angle Measures](#)
- Lesson 15-6**      **PROBLEM SOLVING**  
Use Appropriate Tools

