

# Instructional Supports and Resources

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K-PREP Sampler Support  
Grade 4  
Mathematics  
8/20/2012

This document provides teachers with instructional supports for effectively teaching the standards that are measured by the sample released K-PREP mathematics items.

<b>Domain:</b>	<b>Geometry</b>
<b>Cluster</b>	<i>Draw and identify lines and angles, and classify shapes by properties of their lines and angles.</i>
<b>Standards:</b>	<b>4.G.1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.</b>
<b>Standards for Mathematical Practice:</b>	<b>MP.1. Make sense of problems and persevere in solving them. MP.4. Model with mathematics. MP.6. Attend to precision.</b>

### Instructional Strategies

#### Angles

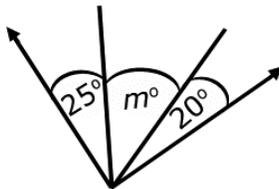
Students can and should make geometric distinctions about angles without measuring or mentioning degrees. Angles should be classified in comparison to right angles, such as larger than, smaller than or the same size as a right angle.

Students can use the corner of a sheet of paper as a benchmark for a right angle. They can use a right angle to determine relationships of other angles.

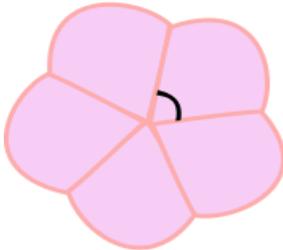
#### Two-dimensional shapes

Two-dimensional shapes are classified based on relationships by the angles and sides. Students can determine if the sides are parallel or perpendicular, and classify accordingly. Characteristics of rectangles (including squares) are used to develop the concept of parallel and perpendicular lines. The characteristics and understanding of parallel and perpendicular lines are used to draw rectangles. Repeated experiences in comparing and contrasting shapes enable students to gain a deeper understanding about shapes and their properties.

If the two rays are perpendicular, what is the value of  $m$ ?



- Joey knows that when a clock's hands are exactly on 12 and 1, the angle formed by the clock's hands measures  $30^\circ$ . What is the measure of the angle formed when a clock's hands are exactly on the 12 and 4?
- The five shapes in the diagram are the exact same size. Write an equation that will help you find the measure of the indicated angle. Find the angle measurement.



Draw two different types of quadrilaterals that have two pairs of parallel sides.  
Is it possible to have an acute right triangle? Justify your reasoning using pictures and words.

How many acute, obtuse and right angles are in this shape?



Draw and list the properties of a parallelogram. Draw and list the properties of a rectangle. How are your drawings and lists alike? How are they different?

**Instructional Resources/Tools**

[http://nlvm.usu.edu/en/nav/frames\\_asid\\_172\\_g\\_2\\_t\\_3.html?open=activities&from=category\\_g\\_2\\_t\\_3.html](http://nlvm.usu.edu/en/nav/frames_asid_172_g_2_t_3.html?open=activities&from=category_g_2_t_3.html)

<http://www.geogebra.org/cms/>

<http://www.k-5mathteachingresources.com/4th-grade-geometry.html>

<http://insidemathematics.org/common-core-math-tasks/4th-grade/4-2008%20Quilt%20Making.pdf>

geoboards  
angle explorers  
straws

**Resources:**

Ohio Department of Education. Model Curriculum. March, 2011.

<http://www.education.ohio.gov>

Arizona Department of Education. Mathematics Resources and Common Core Standards. June, 2011.

<http://www.azed.gov/standards-practices/mathematics-standards/>

North Carolina State Board of Education. Elementary and Middle Grades Resources.

<http://www.ncpublicschools.org/curriculum/mathematics/scos/>

Tools for the Common Core Standards. CCSSM Progressions. April, 2011.

<http://commoncoretools.me/category/progressions/>

<b>Domain:</b>	<b>Number and Operations Base Ten</b>
<b>Cluster</b>	<b><i>Generalize place value understanding for multi-digit whole numbers.</i></b>
<b>Standards:</b>	<b>4.NBT.3. Use place value understanding to round multi-digit whole numbers to any place.</b>
<b>Standards for Mathematical Practice:</b>	<b>MP.2. Reason abstractly and quantitatively. MP.6. Attend to precision.</b>

### **Instructional Strategies**

This standard refers to place value understanding, which extends beyond an algorithm or procedure for rounding. The expectation is that students have a deep understanding of place value and number sense and can explain and reason about the answers they get when they round. Students should have numerous experiences using a number line and a hundreds chart as tools to support their work with rounding. When students are asked to round large numbers, they first need to identify which digit is in the appropriate place.

Example: Round 76,398 to the nearest 1000.

- Step 1: Since I need to round to the nearest 1000, then the answer is either 76,000 or 77,000.
- Step 2: I know that the halfway point between these two numbers is 76,500.
- Step 3: I see that 76,398 is between 76,000 and 76,500.

Step 4: Therefore, the rounded number would be 76,000.

In Grade 4, rounding is not new, and students need to build on the Grade 3 skill of rounding to the nearest 10 or 100 to include larger numbers and place value. What is new for Grade 4 is rounding to digits other than the leading digit, e.g., round 23,960 to the nearest hundred. This requires greater sophistication than rounding to the nearest ten thousand because the digit in the hundreds place represents 900 and when rounded it becomes 1000, not just zero.

Students should also begin to develop some rules for rounding, building off the basic strategy of; “Is 48 closer to 40 or 50?” Since 48 is only 2 away from 50 and 8 away from 40, 48 would round to 50. Now students need to generalize the rule for much larger numbers and rounding to values that are not the leading digit.

Students can use visual models to illustrate place value in rounding e.g., number line, place value drawings, base ten blocks.

Locate a target number on the number line. Determine the place value to which you are rounding. Identify which two benchmark numbers are on either side of the target number. Choose the benchmark number that is closer to the target number.

Show populations of different cities. Ask students to estimate how many people are in each city.

On Saturday, 45,672 people visited Hogle Zoo. Sam and Dee both estimated how many people were there. Sam said that about 45,000 people visited the zoo on Saturday, and Dee said that about 46,000 people visited the zoo on Saturday. Who rounded the number of visitors correctly? Explain your choice.

### **Instructional Resources/Tools**

[https://www.georgiastandards.org/Common-Core/Common%20Core%20Frameworks/CCGPS\\_Math\\_4\\_Unit1FrameworkSE.pdf](https://www.georgiastandards.org/Common-Core/Common%20Core%20Frameworks/CCGPS_Math_4_Unit1FrameworkSE.pdf)

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<b>Domain:</b>	<b>Measurement and Data</b>
<b>Cluster</b>	<b>Geometric measurement: understand concepts of angle and measure angles.</b>
<b>Standards:</b>	<b>4.MD.7 Recognize angle measure as additive. 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. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.</b>
<b>Standards for Mathematical Practice:</b>	<b>MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.4. Model with mathematics. MP.6. Attend to precision.</b>

### Instructional Strategies

Angles are geometric shapes composed of two rays that are infinite in length. Students can understand this concept by using two rulers held together near the ends. The rulers can represent the rays of an angle. As one ruler is rotated, the size of the angle is seen to get larger. Ask questions about the types of angles created. Responses may be in terms of the relationship to right angles. Introduce angles as acute (less than the measure of a right angle) and obtuse (greater than the measure of a right angle). Have students draw representations of each type of angle. They also need to be able to identify angles in two-dimensional figures. Students can also create an angle explorer (two strips of cardboard attached with a brass fastener) to learn about angles.

They can use the angle explorer to get a feel of the relative size of angles as they rotate the cardboard strips around.

Students can compare angles to determine whether an angle is acute or obtuse. This will allow them to have a benchmark reference for what an angle measure should be when using a tool such as a protractor or an angle ruler.

Provide students with four pieces of straw, two pieces of the same length to make one angle and another two pieces of the same length to make an angle with longer rays.

Another way to compare angles is to place one angle over the other angle. Provide students with a transparency to compare two angles to help them conceptualize the spread of the rays of an angle. Students can make this comparison by tracing one angle and placing it over another angle. The side lengths of the angles to be compared need to be different.

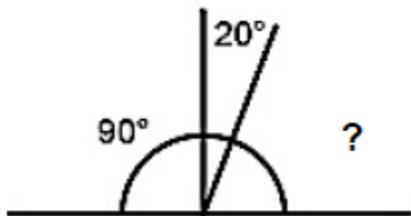
Using protractors, students will draw angles with missing measure and trade drawings with a partner. The partner will then solve for the missing angle.

Students are confused as to which number to use when determining the measure of an angle using a protractor because most protractors have a double set of numbers. Students should decide first if the angle appears to be an angle that is less than the measure of a right angle ( $90^\circ$ ) or greater than the measure of a right angle ( $90^\circ$ ). If the angle appears to be less than  $90^\circ$ , it is an acute angle and its measure ranges from  $0^\circ$  to  $89^\circ$ . If the angle appears to be an angle that is greater than  $90^\circ$ , it is an obtuse angle and its measures range from  $91^\circ$  to  $179^\circ$ . Ask questions about the appearance of the angle to help students in deciding which number to use. Draw two different types of quadrilaterals that have two pairs of parallel sides. Is it possible to have an acute right triangle? Justify your reasoning using pictures and words.

Example:

How many acute, obtuse and right angles are in this shape?

Draw and list the properties of a parallelogram. Draw and list the properties of a rectangle. How are your drawings and lists alike? How are they different? Be ready to share your thinking with the class.



$$180 - (90 + 20) = ?$$

$$180 - 110 = 70^\circ$$

### Instructional Resources/Tools

Cardboard cut in strips to make an angle explorer

Brass fasteners

Protractor

Angle ruler

Straws

Transparencies

Angle explorers

<http://www.figurethis.org/challenges/c10/challenge.htm>

<http://pbskids.org/cyberchase/math-games/star-gazing/>

<http://www.k-5mathteachingresources.com/support-files/anglewordproblems.pdf>

<http://www.k-5mathteachingresources.com/support-files/anglesinarighttriangle.pdf>

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