

MA.4.GR.1.2

Overarching Standard: MA.4.GR.1 *Draw, classify and measure angles.*

Benchmark of Focus

MA.4.GR.1.2: Estimate angle measures. Using a protractor, measure angles in whole-number degrees and draw angles of specified measure in whole-number degrees. Demonstrate that angle measure is additive.

Benchmark Clarifications

Clarification 1: Instruction includes measuring given angles and drawing angles using protractors.

Clarification 2: Instruction includes estimating angle measures using benchmark angles (30° , 45° , 60° , 90° and 180°).

Clarification 3: Instruction focuses on the understanding that angles can be decomposed into non-overlapping angles whose measures sum to the measure of the original angle.

Related Benchmark/Horizontal Alignment

- MA.4.GR.1.1

Vertical Alignment

Previous Benchmarks Next Benchmarks

MA.3.GR.1.2

MA.5.GR.1.1

Terms from the K-12 Glossary

- Acute Angle
- Angle
- Obtuse Angle
- Right Angle

Purpose and Instructional Strategies

The purpose of this benchmark is to build understanding that angles can be measured. Students have experience identifying acute, obtuse, and right angles (MA.4.GR.1.1). Through instruction in this benchmark, students will attach precise measurements to their informal understanding of the angles they have explored.

- Students will also estimate angle measures based on their growing familiarity of the size of angles according to the benchmark angles 30° , 45° , 60° , 90° and 180° .

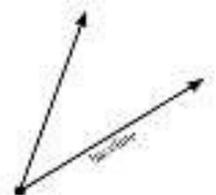
- Instruction should allow students to draw angles of all sizes, including situations where they must make angles that are larger than their protractor or their piece of paper. This will ensure that students have an understanding that the angle measure does not change even if the length of the rays do.
- Instruction should use explicit and direct instruction to show students how to use a protractor (standard or circle) to measure and draw angles. Using circle protractors helps students explore reflex angles.
- Instructional time should also be spent breaking apart angles into smaller angles so that students build understanding that angle measures are additive.

Common Misconceptions or Errors

- Students that have difficulty using a protractor to measure. To assist students with this misconception, they may:
 - use the centimeter ruler or inch ruler instead of the baseline when measuring the angles.
 - measure the length of each ray and find the sum of the lengths.
 - not correctly line up the angle to be measured on the protractor.

Strategies to Support Tiered Instruction

- Instruction includes using a right angle, 90 degrees measure, as a benchmark to estimate angle measures prior to measuring with a protractor. The teacher provides students with a right angle to overlap with the angles they are measuring as a way to compare their size.
 - For example, when given an angle, students will determine if the angle is 90 degrees, greater than 90 degrees, or less than 90 degrees. Students then measure the angle using a protractor and determine if their measurement makes sense based on their estimate.
- The teacher provides angles that have a baseline ray labeled so that students know which ray to line up with the baseline on the protractor and begin their measurement from. Students explain how they will use the protractor to measure the angle (which set of numbers they will use to measure and how they know where to stop measuring).
 - For example, the teacher provides an angle similar to the one shown below. Students line up the baseline of the protractor with the ray on the angle that is labeled as the baseline. Students will start measuring with the set of numbers that begins with 0 at the end of the ray and follow the measurements around to the point where the other ray intersects with the protractor.



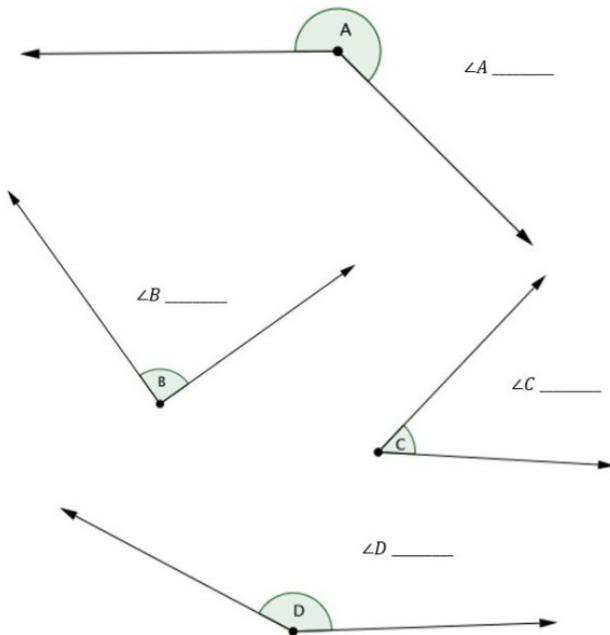
Questions to ask students:

- **Point to the numbers on a protractor. Ask, How do you know which number to use when measuring the angle?**
 - Sample answer that indicates understanding: *I know when I looked that the angle that it was acute, so I would look at the numbers that are less than 90° .*
 - **Before a student measures with a protractor... Estimate the size of the angle using benchmark fractions or angles. Is this angle acute, right or obtuse? What does that mean for the measure of the angle?**
 - Sample answer that indicates understanding: *When I look at this fraction it looks like half of a right angle. That makes me think that it will be close to 45° . The angle is acute so I know it can't measure more than 89° or less than 1° so 45° is a reasonable estimate for the angle measure.*
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Instructional Tasks

Instructional Task 1

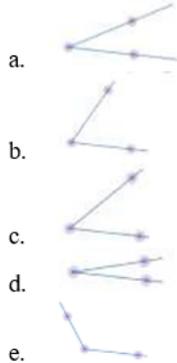
Use a protractor to find the measure of each indicated angle.



Instructional Items

Instructional Item 1

Which angles when added together make a right angle?



Achievement Level Descriptors

Benchmark		Context	Assessment Limits
<p>MA.4.GR.1.2 Estimate angle measures. Using a protractor, measure angles in whole-number degrees and draw angles of specified measure in whole-number degrees. Demonstrate that angle measure is additive.</p> <p>Clarification 1: Instruction includes measuring given angles and drawing angles using protractors.</p> <p>Clarification 2: Instruction includes estimating angle measures using benchmark angles (30°, 45°, 60°, 90° and 180°).</p> <p>Clarification 3: Instruction focuses on the understanding that angles can be decomposed into non-overlapping angles whose measures sum to the measure of the original angle.</p>		Mathematical	<p>Items will contain graphics. Whole number degree measures, sums, and differences will only be within 0° and 360°.</p> <p>Items estimating angle measures must use benchmark angles (30°, 45°, 60°, 90°, 180°).</p> <p>Items will not have an unknown angle represented by a variable.</p> <p>Items will not have angles decomposed into more than three angles.</p>
ALD 2	ALD 3	ALD 4	ALD 5
estimates angle measures of benchmark angles (45, 90, 180); using a	estimates angle measures using benchmark angles (30, 45, 60, 90, 180);	estimates angle measures: using a protractor, measures angles in whole-	estimates angle measures: using a protractor, measures angles in whole-

protractor, measures angles of 30, 45, 60, 90, and 180.	using a protractor, measures angles in whole-number degrees; recognizes that angle measure is additive.	number degrees and draws angles of specified measure in whole-number degrees; demonstrates that angle measure is additive.	number degrees and draws angles of specified measure in whole-number degrees; demonstrates that angle measure is additive including straight or reflex angles.
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Additional Resources:

[CPALMS Resources](#)

[Khan Academy Measure Angles With Protractor](#)

[Alien Angles Online Game](#)

Resources/Tasks to Support Your Child at Home:

Using a protractor, have your child practice measuring the angles of different objects within your home. Also, give them a specific measurement from 1° - 180° to draw using the protractor. (Remember to include angles that open to the right and angles that open to the left).