

Unpacked South Dakota State Mathematics Standards

Purpose: In order for students to have the best chance of success, standards, assessment, curriculum resources, and instruction must be aligned in focus, coherence, and rigor. Unpacked standards documents are intended to help align instruction to the focus, coherence, and rigor of the South Dakota State Mathematics Standards. The standards have been organized in clusters as they are not so much built from topics, but rather woven out of progressions. Not all content in a given grade is emphasized equally in the mathematics standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. To say that some things have greater emphasis is not to say that anything in the standards can safely be neglected in instruction. Neglecting standards will leave gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade.

Domain: Measurement and Data		Grade Level: 4
4.MD.C Cluster: Geometric measurement: understand concepts of angle and measure angles.		
This cluster focuses on activities to measure angles using protractors. Learners will recognize angles as geometric shapes formed wherever two rays share a common endpoint and sketch angles of specified measure.		
<p>**This is an ADDITIONAL cluster. Students should spend the large majority of their time (65-85%) on the major work of the grade. Supporting work and, where appropriate, additional work should be connected to and engage students in the major work of the grade.</p> <p>4.MD.5. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement.</p> <ul style="list-style-type: none"> a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through $1/360$ of a circle is called a “one-degree angle,” and can be used to measure angles. b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees. <p>4.MD.6. Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.</p> <p>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.</p>		
Aspects of Rigor: (Conceptual, Procedural, and/or Application)		
Conceptual Understanding	Procedural Fluency	Application
The number of one degree turns determines the measurement of angles (4.MD.5)		
Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement (4.MD.5)		
	Use a protractor to find or sketch the angle of a specified measure (4.MD.6)	
Understand two non-overlapping (adjacent) angles can be added together to find the sum of both	Add and subtract to find unknown angles (4.MD.7)	Solve addition and subtraction problems to find unknown angles on a diagram in real world and

angles (4.MD.7)		mathematical problems using equations and symbols (4.MD.7)
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Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices

1. **Make sense of problems and persevere in solving them.**
 - Solve word problems involving measurement of angles
2. **Reason abstractly and quantitatively.**
 - Recognize angle measurement as additive in relation to the reference to a circle
3. **Construct viable arguments and critique the reasoning of others.**
4. **Model with mathematics.**
 - Draw and create angles to identify the measurement
5. **Use appropriate tools strategically.**
 - Use protractors, arms, clocks, licorice, string, straws, clay, etc. to create angles
6. **Attend to precision.**
 - Attend to precision with specific vocabulary to describe the measurement of angles
7. **Look for and make use of structure.**
8. **Look for and express regularity in repeated reasoning.**

Vertical and Horizontal Coherence and Learning Progressions

<u>Previous Learning Connections</u>	<u>Current Learning Connections</u>	<u>Future Learning Connections</u>
<p>Learners recognize the number of angles in shapes in previous grade levels, but measuring angles is not addressed.</p> <p>Learners understand that shapes in different categories may share attributes. (3.G.1)</p> <p>Learners recognize and draw shapes having specified attributes, such as a given number of angles. (2.G.1)</p> <p>Learners will use addition and subtraction within 100 to solve one- and two-step word problem (2.OA.1)</p> <p>Learners will find the unknown whole number using addition and subtraction (1.OA.8)</p>	<p>Learners draw and identify lines and angles. (4.G.1)</p> <p>Learners classify two-dimensional figures based on lines and angles. (4.G.2)</p>	<p>Learners construct triangles from three measures of angles. (7.G.2)</p> <p>Learners use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write, and use them to solve simple equations for an unknown angle in a figure. (7.G.5)</p>

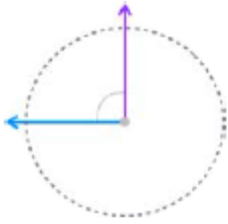
Vocabulary (key terms and definitions)

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|---|---|---|
| <ul style="list-style-type: none"> • Acute angle • Angle • Arc • Area • Center | <ul style="list-style-type: none"> • Circle • Degree • Endpoint • Formula • Fraction | <ul style="list-style-type: none"> • Obtuse angle • Perimeter • Protractor • Ray • Ray angle |
|---|---|---|

Relevance, Explanations, and Examples:

4.MD.5 Examples

Pose the question: A water sprinkler rotates one-degree at each interval. If the sprinkler rotates a total of 100° , how many one-degree turns has the sprinkler made?



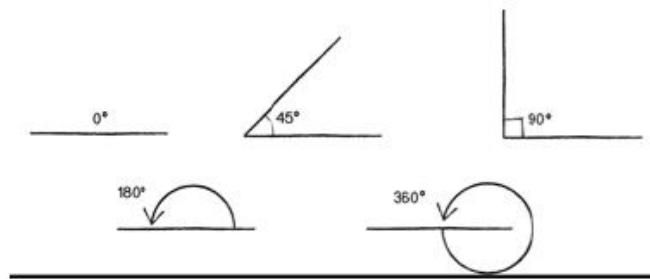
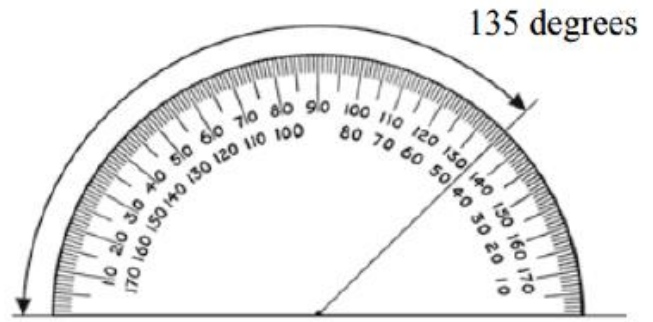
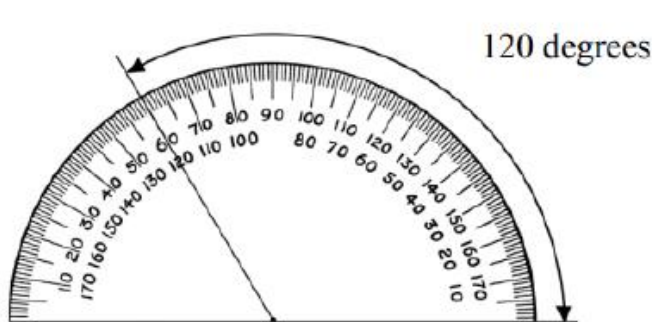
An angle

name	measurement
right angle	90°
straight angle	180°
acute angle	between 0 and 90°
obtuse angle	between 90° and 180°
reflex angle	between 180° and 360°

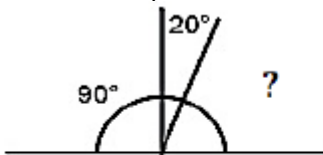
- Connect prior knowledge of clocks to the concept of 360° in a circle
- Use arms to make angles

4.MD.6 Examples

Students should measure and sketch angles.

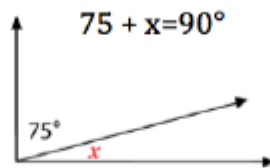


4.MD.7 Examples



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

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



$$75 + x = 90^\circ$$

If the sum of the angles measures 90° . What is does m equal?



Solve problems such as the following: A lawn water sprinkler rotates 50 degrees and then pauses. It then rotates an additional 25 degrees. What is the total degrees the sprinkler has rotated? If the water sprinkler rotates a total of 25 degrees then pauses. How many 25 degree cycles will it go through for the rotation to reach at least 90 degrees?

Achievement Level Descriptors

Cluster: Geometric measurement: understand concepts of angle and measure angles.

Concepts and Procedures

Level 1:

Level 2: Students should be able to recognize whole-number degrees on a protractor and measure angles in whole-number degrees using a protractor.

Level 3: Students should be able to construct angles in whole-number degrees using a protractor, use understanding of angle concepts to decompose a larger angle with two or more smaller angles that have the same sum as the original, and determine an unknown angle measure in a diagram.

Level 4: Students should be able to solve addition and subtraction problems to find unknown angles on a diagram in problems by using an equation with a symbol for the unknown angle measure.