

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: Geometry		Grade Level: 7th
<p>7.G.B Cluster: Solve real-life and mathematical problems involving angle measure, area, surface area and volume.</p> <p>Students work on geometric problem solving. Students use basic information such as area, surface area, and volume formulas and facts about types of angles (supplementary, complementary, vertical, and adjacent) to solve real-world problems.</p>		
<p>**This is an ADDITIONAL cluster. <i>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.</i></p>		
<p>7.G.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.</p>		
<p>7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.</p>		
<p>7.G.6. Solve real-world and mathematical problems involving area, volume and surface area of two- and three dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.</p>		
Aspects of Rigor for Student Learning: (Conceptual, Procedural, and/or Application)		
Conceptual Understanding	Procedural Fluency	Application
<p>Students understand the relationship between radius and diameter. (7.G.4)</p> <p>Students also understand the ratio of circumference to diameter can be expressed as pi. Building on these understandings, students generate the formulas for circumference and area. (7.G.4)</p> <p>(To “know” means to have an understanding of why the formula works and how the formula relates to the measure (area and volume) and the figure.) (7.G.4)</p> <p>Note: Current state assessments do not provide formulas.</p>	<p>Apply formulas to determine area, circumference, diameter, and radius of a circle to solve real-world problems. (7.G.4)</p>	<p>Solve real world problems involving circumference and area of a circle. (7.G.4)</p>

<p>Students understand the angle sum of complementary angles and of supplementary angles. (7.G.5)</p> <p>Students recognize vertical angles in a diagram and know that they are congruent. (7.G.5)</p>	<p>Students use understandings of angles (supplementary, complementary, vertical, adjacent) and deductive reasoning to write and solve equations. (7.G.5)</p> <p>Write and solve equations based on a diagram of intersecting lines with some known angle measures. (7.G.5)</p>	<p>Justify angle measurements using facts about complementary, supplementary, vertical and/or adjacent angles. (7.G.5)</p>
	<p>Calculate the area, volume and surface area of two-dimensional and three-dimensional objects. (7.G.6)</p> <p>“Know the formula” does not mean memorization of the formula. To “know” means to have an understanding of why the formula works and how the formula relates to the measure (area and volume) and the figure. This understanding should be for all students.</p> <p>Note: Current state assessments do not provide formulas.</p> <p>Note: Students will not work with cylinders, as circles are not polygons. No nets will be given at this level.</p>	<p>Students solve real-world problems involving geometry concepts such as area, volume, and surface area. Students justify those solutions. (7.G.6)</p>

Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices

1. **Make sense of problems and persevere in solving them.**
 - Students solve problems involving geometric principles.
2. **Reason abstractly and quantitatively.**
 - Students use deductive reasoning to find an unknown angle measurement.
3. **Construct viable arguments and critique the reasoning of others.**
 - Students justify their reasoning involving geometric concepts while solving real world problems.
4. **Model with mathematics.**
 - Students use geometric models to solve problems.
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
 - Students use correct formula pertaining to area, circumference, volume, and surface area.
7. **Look for and make use of structure.**
8. **Look for and express regularity in repeated reasoning.**

Vertical and Horizontal Coherence and Learning Progressions

<i>Previous Learning Connections</i>	<i>Current Learning Connections</i>	<i>Future Learning Connections</i>
<p>In 4th grade, learners find area of rectangles, special quadrilaterals, triangles, and polygons.</p> <p>In 6th grade, learners find the volume of rectangular prisms, find surface area using nets, and find volume of rectangular prism.</p>	<p>In 7th grade, learners use their knowledge of angle measurements along with algebra to determine missing information about particular geometric figures.</p>	<p>In 8th grade, learners use formulas to find the volume of cones, cylinders, and spheres.</p>

Vocabulary (Key Terms Used by Teachers and Students in this Cluster):

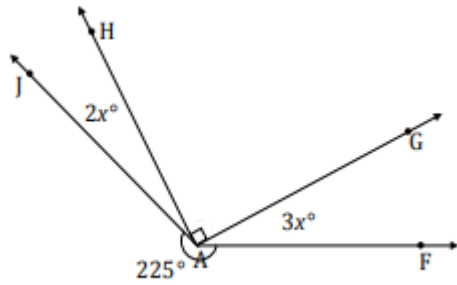
- Circumference
- Radius
- Diameter
- Center
- Area
- pi (π)
- Supplementary

- Complementary
- Vertical angles
- Adjacent angles
- Intersecting lines
- Surface area
- Volume

- Slant height
- Base
- Altitude
- Height
- Pyramids
- Face

Relevance, Explanations, and Examples:

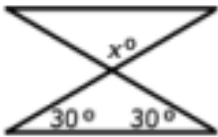
7.G.5 Examples



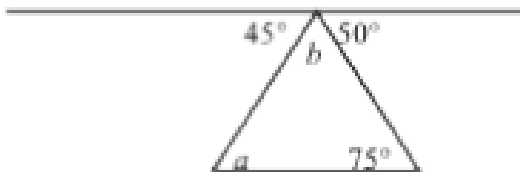
Write and Solve an equation to find the measure of angle x.



Find the measure of angle x.



Find the measure of angle b.



Achievement Level Descriptors

Cluster: Solve real-life and mathematical problems involving angle measure, area, surface area and volume.

Concepts and Procedures

Level 1: Students should be able to identify appropriate formulas for the area and circumference of a circle; calculate the area of triangles and rectangles and the volume of cubes; classify pairs of angles as supplementary, complementary, vertical, or adjacent; and measure angles with appropriate tools.

Level 2: Students should be able to use supplementary, complementary, vertical, or adjacent angles to solve problems with angles expressed as numerical measurements in degrees; calculate the circumference of a circle; and calculate the area of circles, quadrilaterals, and polygons and the volume of right rectangular prisms.

Level 3: Students should be able to use supplementary, complementary, vertical, and adjacent angles to solve one- or two-step problems with angle measures expressed as variables in degrees; use formulas for the area and circumference of a circle to solve problems; and solve problems involving the area of polygons, the surface area of three-dimensional objects composed of triangles and/or quadrilaterals, and the volume of right prisms.

Level 4: Students should be able to solve problems involving surface area and volume of three-dimensional figures with polygonal faces. They should be able to use supplementary, complementary, vertical, and adjacent angles to solve multi-step problems with angle measures expressed as variables in degrees.