### Common Core Standards

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<tr>
<td>7.G.1.</td>
<td>Solve problems involving scale drawings of geometric figures, such as computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.</td>
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### Background Knowledge/Examples

Students determine the dimensions of figures when given a scale and identify the impact of a scale on actual length (one-dimension) and area (two-dimensions). Students identify the scale factor given two figures. Using a given scale drawing, students reproduce the drawing at a different scale. Students understand that the lengths will change by a factor equal to the product of the magnitude of the two size transformations.

Example:

- Julie showed you the scale drawing of her room. If each 2 cm on the scale drawing equals 5 ft, what are the actual dimensions of Julie’s room? Reproduce the drawing at 3 times its current size.

```
5.6 cm
4 cm
1.2 cm
2.8 cm
```

**Solution:**

- 5.6 cm → 14 ft
- 1.2 cm → 3 ft
- 2.8 cm → 7 ft
- 4.4 cm → 11 ft
- 4 cm → 10 ft

### Resources/Sample Lessons/Assessments

- **Bellwork:**
  - 7.G.1 Bell Work Open Response
  - 7.G.1 Scale Drawings Bell Work

- **Tasks:**
  - Floor Plan Open Response

- **Lessons:**
  - Blue Squares and Beyond Unit
  - 7.G.1 Scale Factor Lesson Plan
  - 7.G.1 Scale Factor Ppt
  - 7.G.1 Scale Factor using Division ppt

- **District Textbook**
  - 168-178, 180, 186-187

- **TF:**
  - GE042

- **RL:**
  - Objective 106 - Determine the scale for a drawing or map question
  - Objective 107 - WP: Solve a problem involving a map or scale drawing
Example 2:
If the rectangle below is enlarged using a scale factor of 1.5, what will be the perimeter and area of the new rectangle?

| 7 inches | 2 inches |

Solution:
The perimeter is linear or one-dimensional. Multiply the perimeter of the given rectangle (18 in.) by the scale factor (1.5) to give an answer of 27 in. Students could also increase the length and width by the scale factor of 1.5 to get 10.5 in. for the length and 3 in. for the width. The perimeter could be found by adding 10.5 + 10.5 + 3 + 3 to get 27 in. The area is two-dimensional so the scale factor must be squared. The area of the new rectangle would be 14 x 1.52 or 31.5 in².

Performance Tasks:
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| 7.G.2.  
Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. | 7.G.2 Students draw geometric shapes with given parameters. Parameters could include parallel lines, angles, perpendicular lines, line segments, etc.  
Example 1:  
Draw a quadrilateral with one set of parallel sides and no right angles.  
Students understand the characteristics of angles and side lengths that create a unique triangle, more than one triangle or no triangle.  
Example 2:  
Can a triangle have more than one obtuse angle? Explain your reasoning.  
Example 3:  
Will three sides of any length create a triangle? Explain how you know which will work.  
Possibilities to examine are:  
   a. 13 cm, 5 cm, and 6 cm  
   b. 3 cm, 3cm, and 3 cm  
   c. 2 cm, 7 cm, 6 cm  
Solution:  
“A” above will not work; “B” and “C” will work. Students recognize that the sum of the two smaller sides must be larger than the third side.  
Examples:  
Is it possible to draw a triangle with a 90° angle and one leg | Bellwork:  
7.G.2 Two Dimensional Shapes Bell Work  
7.G.2 Rectangles Bell Work  
7.G.2 Triangles Bell Work  

Lessons:  
7.G.2 Engage NY Lessons: Constructing Triangles  
5. Unique Triangles  
6. Drawing Geometric Shapes  
7. Drawing Parallelograms  
8. Drawing Triangles  
9. Unique Triangle—3 sides and 2 sides  
10. Unique Triangle---2 angles, given side  
11. Conditions on Measurements  
12. Unique Triangles-2 sides non included angle  
13-14. Checking for Identical Triangles  
15. Using Unique Triangles to solve real world problems.  

Power Points  
7.G.2 Drawing Triangles with Diff. Angles Ppt  
7.G.2 Drawing Triangles with Different Sides Ppt  
7.G.2 Possible Triangle Constructions  

District Textbook  
(G.2) 179, 323-324, 331, 334-335, 337, 342-343 |
that is 4 inches long and one leg that is 3 inches long? If so, draw one. Is there more than one such triangle?

(NOTE: Pythagorean Theorem is NOT expected – this is an exploration activity only)

Example 5:
Draw a triangle with angles that are 60 degrees. Is this a unique triangle? Why or why not?

Example 6:
Draw an isosceles triangle with only one 80 degree angle. Is this the only possibility or can you draw another triangle that will also meet these conditions?

Through exploration, students recognize that the sum of the angles of any triangle will be 180°
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| 7.G.3. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. | Example:  
- Using a clay model of a rectangular prism, describe the shapes that are created when planar cuts are made diagonally, perpendicularly, and parallel to the base.  

![Diagram](image)

If the pyramid is cut with a plane parallel to the base, the intersection of the pyramid and the plane is a square cross section.

If the pyramid is cut with a plane passing through the top vertex and perpendicular to the base, the intersection of the pyramid and the plane is a triangular cross section.

If the pyramid is cut with a plane perpendicular to the base, but not through the top vertex, the intersection of the pyramid and the plane is a trapezoidal cross section. | Bellwork:  
7.G.3 Three Dimensional Shapes Bell Work  
7.G.3 Cross Sections Bell Work  

Lessons:  
Cross Section Power Point  
7.G.3 Describe 2 Dimensional Shapes Ppt  
7.G.3 Engage NY Lessons: Slicing Solids  
16. Slicing a Right Rectangular Prism  
17. Slicing a Right Rectangular Pyramid  
18. Slicing on an Angle  
19. Understanding 3 Dimensional Figures  

District Textbook  
378-379  

TF: None  

RL: None  

Tasks:  
Cube Ninjas Open Response  

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<td>7.G.4. Know the formulas for the area and circumference of a circle and solve problems; give an informal derivation of the relationship between the circumference and area.</td>
<td>7.G.4 Students understand the relationship between radius and diameter. 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. The illustration shows the relationship between the circumference and area. If a circle is cut into wedges and laid out as shown, a parallelogram results. Half of an end wedge can be moved to the other end a rectangle results. The height of the rectangle is the same as the radius of the circle. The base length is ½ the circumference (2Πr). The area of the rectangle (and therefore the circle) is found by the following calculations:</td>
<td>Bellwork: 7.G.4 Area and Circumference Bell Work 7.G.4 Circles Bell Work</td>
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<tr>
<td></td>
<td>Area = \frac{1}{2} (2\Pi r) \times r</td>
<td></td>
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<tr>
<td></td>
<td>Area = \Pi r \times r</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Area = \Pi r^2</td>
<td></td>
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<tr>
<td></td>
<td><a href="http://mathworld.wolfram.com/Circle.html">http://mathworld.wolfram.com/Circle.html</a></td>
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<tr>
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<td>Students solve problems (mathematical and real-world) involving circles or semi-circles.</td>
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<td><strong>Note:</strong> Because pi is an irrational number that neither repeats nor terminates, the measurements are approximate when 3.14 is used in place of \Pi.</td>
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**Bellwork:**
- 7.G.4 Area and Circumference Bell Work
- 7.G.4 Circles Bell Work

**Lessons:**
- 7.G.4 Area of a Circle Ppt lesson
- 7.G.4,6 Engage NY Lesson: Use Equations and Inequalities to Solve Geometry Problems

**District Textbook**
- 361-367, 372

**TF:**
- GE024, GE033, GE035

**RL:**
- Objective 84 - Determine the circumference of a circle in terms of pi
- Objective 85 - Solve a problem involving the
Example 1:
The seventh grade class is building a mini-golf game for the school carnival. The end of the putting green will be a circle. If the circle is 10 feet in diameter, how many square feet of grass carpet will they need to buy to cover the circle? How might someone communicate this information to the salesperson to make sure he receives a piece of carpet that is the correct size? Use 3.14 for pi.

Solution:
\[ \text{Area} = \pi r^2 \]
\[ \text{Area} = 3.14 \times (5)^2 \]
\[ \text{Area} = 78.5 \text{ ft}^2 \]

To communicate this information, ask for a 9 ft by 9 ft square of carpet.

If a circle is cut from a square piece of plywood, how much plywood would be left over?

\[ \leftarrow 28'' \rightarrow \]

Solution:
The area of the square is 28 x 28 or 784 in². The diameter of the circle is equal to the length of the side of the square, or 28”, so the radius would be 14”. The area of the circle would be approximately 615.44 in². The difference in the amounts (plywood left over) would be 168.56 in² (784 – 615.44).
Example 4:
What is the perimeter of the inside of the track.

Solution:
The ends of the track are two semicircles, which would form one circle with a diameter of 62m. The circumference of this part would be 194.68 m. Add this to the two lengths of the rectangle and the perimeter is 2194.68 m.

“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 circumference) and the figure. This understanding should be for *all* students.
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| 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. | 7.G.5 Students use understandings of angles and deductive reasoning to write and solve equations. | **Bellwork:**
7.G.5 Equations with Angles
7.G.5 Missing Angles Bell Work |
| | Angle relationships that can be explored include but are not limited to:  
- Same-side (consecutive) interior and same-side (consecutive) exterior angles are supplementary. | **Power Points:**
7.G.5 Vertical Supplementary Angles Ppt lesson
7.G.5 Writing Equations using angles ppt
7.G.5 Supplementary angles Ppt |
| | Examples:  
- Write and solve an equation to find the measure of angle \( x \). | **Lessons:**
7.G.5 Engage NY Lessons: Unknown Angles  
1. Complementary and Suppem. Angles  
2-4. Solve for Unknown Angles Using Equations |
| | Solution:  
The measure of angle \( x \) is supplementary to 50°, so subtract 50 from 180 to get a measure of 130° for \( x \).  
- Write and solve an equation to find the measure of angle \( x \). | **District**
Textbook  
314-315, 317-319, 323-325 |
| | Since the 120 is a vertical angle to \( x \), the measure of \( x \) is also 120°. | **TF:**
GEO047 |
| | **RL:**
Objective 115 - Identify vertical, adjacent, complementary, or supplementary angles  
Objective 116 - Determine the measure of a missing angle using angle relationships | **Tasks:**
|
### Common Core Standards


### Background Knowledge/Examples

Students understanding of volume can be supported by focusing on the area of base times the height to calculate volume. Students understanding of surface area can be supported by focusing on the sum of the area of the faces. Nets can be used to evaluate surface area calculations.

Examples:

- Choose one of the figures shown below and write a step by step procedure for determining the area. Find another person that chose the same figure as you did. How are your procedures the same and different? Do they yield the same result?

- A cereal box is a rectangular prism. What is the volume of the cereal box? What is the surface area of the cereal box? (Hint: Create a net of the cereal box and use the net to calculate the surface area.) Make a poster explaining your work to share with the class.

- Find the area of a triangle with a base length of three units and a height of four units.

- Find the area of the trapezoid shown below using the formulas for rectangles and triangles.

### Resources/Sample Lessons/Assessments

**Bellwork:**
- 7.G.6 Area, Surface Area and Volume Bell Work
- 7.G.6 Real World Problem Bell Work

**Lessons:**
- Mining Prospector Lesson Plan
- Money Munchers Lesson

**Engage NY Lessons:**
- 7.G.6 Problems Involving Area, Surface Area and Volume
  - 20. Real World Area Problems
  - 21. Mathematical Area Problems
  - 22. Area Problems with Circular Regions
  - 23-24. Surface Area
  - 25. Volume of Right Prisms
  - 26. Volume of 3 Dimensional Objects
  - 27. Real-World Volume Problems

**District Textbook**
369-372, 383-385, 387, 390-391

**TF:**
- GE034, GE039, GE041, GE045, ME038, ME040

**RL:**
- Objective 86 - Determine the area of a trapezoid
- Objective 93 - Determine the volume of a rectangular or a triangular prism
Objective 100 - WP: Determine the surface area of a geometric solid

Performance Tasks:
- Designing a Garden / Drawing to Scale
- Which is Bigger? Performance Task (1,4,6)
- Pizza Crust Perf. Task (4,6)
- Lawn Mower Perf. Task

Lessons and Tasks:
- Geometry Unit (GA) (1-6)
- Tasks
  - Take The Ancient Greek Challenge ........8
  - Roman Mosaic (SCT) ......................10
  - Octagon Tile ...............................12
  - Think Like a Fruit Ninja .................14
  - What’s My Solid? ..........................16
  - Saving Sir Cumference ..................17
  - Circle Cover Up ............................20
  - Gold Rush (FAL) .........................26
  - Designing a Sports Bag (FAL) ..........28
  - Applying Angle Theorems (FAL) ........30
  - Designing a Garden (FAL) ...............32
  - I Have A Secret Angle ....................34

Assessments:
- 7.G Engage NY Assessments