	Minimum Requirements
Case #1 (Pythagorean Theorem) **Math.Content.8.G.B.6** Explain a proof of the Pythagorean Theorem and its converse. **Math.Content.8.G.B.7** Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. **Math.Content.8.G.B.8** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	1. Proof of the Pythagorean Theorem 2. Solve a problem given two legs 3. Solve a problem given a leg and hypotenuse 4. Prove the triangle must be or not be a right triangle given the three sides (Pythagorean triples) 5. Find the distance between two points showing how the Pythagorean Theorem applies to the distance 6. Include a perimeter problem that requires the usage of the Pythagorean Theorem

	Minimum Requirements
Case #2 (Surface Area of Circles & Spheres) **Math.Content.7.G.B.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. **Math.Content.8.G.C.9** Know the formulas for the volumes of ~~cones, cylinders, and~~ spheres and use them to solve real-world and mathematical problems.	1. Define pi 2. Define all parts of circle and a sphere (include center, radius, diameter & chord) 3. Show how formula for circumference can be developed 4. Show how formula for area of circle can be developed by relating it to a parallelogram. 5. Solve problems for circumference and area of circles 6. Include problems where the circumference and area are known and you are trying to find the radius or diameter 7. Show students how to find the surface area of a sphere

	Minimum Requirements
Case #3 (Volumes of Prisms & Pyramids) **Math.Content.6.G.A.2** Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. **Math.Content.7.G.A.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. **Math.Content.7.G.B.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.	1. Define prisms, cubes & pyramids 2. Define where the height is in each case 3. Define cross section 4. Volume formulas for prisms and pyramids 5. Relate volume of cylinders and prisms 6. Relate volume of cones and pyramids 7. Discuss top, front and side views 8. Have problems for each
	Minimum Requirements
Case #4 (Surface Area of Prisms & Pyramids) **Math.Content.6.G.A.4** Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems. **Math.Content.7.G.B.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.	1. Review area formulas that will be used for surface area 2. Use nets for prisms and pyramids 3. Define slant height for pyramids 4. Relate surface area of cylinders & prisms 5. Relate surface area of cones & pyramids 6. Have problems for each

	Minimum Requirements
Case #5 (Size Transformation/Dilation) **Math.Content.7.G.A.1** Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	1. Define dilation. Be sure to discuss the need for a center of dilation 2. Draw the lines from the center through the corresponding vertices and relate the scaling factor to those segments 3. Discuss how linear measurements change and how angle measurements don't change 4. Define similarity 5. Write correct correspondences between similar polygons and show how to tell if they are similar 6. Show why area changes as the scaling factor squared 7. Show why volume changes as the scaling factor cubed
	Minimum Requirements
Case #6 (Area by Subdivision) **Math.Content.6.G.A.1** Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	1. Thorough explanation for area of parallelograms, trapezoids, and triangles 2. Sub-divide a figure to find its area and perimeter using those shapes 3. Show examples of obtuse triangles with the height outside of the triangle and how to find the area, if the height is given 4. Compare areas of two different figures… which is bigger? (Do a minimum of two problems with different shapes)

	Minimum Requirements
Case #7 (Constructions with a focus on triangles) **Math.Content.7.G.A.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.	1. Show how to construct copies of line segments, angles, and triangles. These should not be classis constructions. Be sure to remember that your audience is 7th garders. 2. Show at least one example of how given the three angle measures, more than one triangle could be drawn. 3. Show that if given SSS, SAS, ASA, or AAS that it is possible to construct only one triangle. NOTE: Here you are NOT discussing the triangle congruence theorems, rather simply showing students how to create triangle given only those three pieces of information. Emphasize that is the ONLY way the triangle can be drawn. 4. Show an example of how given two sides and an angle (SSA) will result in two different triangls rather than ones.
	Minimum Requirements
Case #8 (Parallel Lines) **Math.Content.8.G.A.5** Use informal arguments to establish facts ~~about the angle sum and exterior angle of triangles~~, about the angles created when parallel lines are cut by a transversal, ~~and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line,~~ and give an argument in terms of transversals why this is so.	1. Define parallel lines & transversal 2. Define all angle pairs created; be sure to show them VISUALLY! 3. Congruence of corresponding alternate exterior, and alternate interior angles when parallel lines are cut by a transversal, and that such congruencies imply parallel lines 4. Supplementary relationship between same side (co) interior angles 5. Have students identify angles by name AND find their angle measures

	Minimum Requirements
Case #9 (Similar & Congruent Figures) **Math.Content.8.G.A.4** Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	1. Define similarity, scale factor, and congruence 2. Discuss the correct correspondence of sides and angles between shapes, be sure to include prime notation and transformation notation 3. Given a correspondence identify which sides would have to be proportional and what angles would have to be congruent for 2-D and 3-D shapes 4. Determine whether two solids are similar or congruent 5. Find the missing angle or side measures of similar or congruent shapes
	Minimum Requirements
Case #10 (Lines and Angles) **Math.Content.7.G.B.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.	1. Define all terms in the standard 2. Relationships of vertical angles, complementary angles, supplementary angles (NOTE: be sure to VISUALLY show these relationships.) 3. Have problems where students identify the type of angle 4. Have problems where students find the angle measure 5. Have problems where students must use proper symbols to name lines and angles

	Minimum Requirements
Case #11 (Triangles) **Math.Content.8.G.A.5** Use informal arguments to establish facts about the angle sum and exterior angle of triangles, ~~about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.~~ For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line~~, and give an argument in terms of transversals why this is so.~~	1. Given three lengths, show those that would make a triangle and those that do not (triangle inequality) 2. Define interior and exterior angles of triangles 3. Discuss triangle sum (angle sums = 180) 4. Define remote interior angles of triangles 5. Prove the relationship between the exterior angles and the corresponding remote interior angles 6. Types of triangles (by side and by angle) 7. Have problems for each
	Minimum Requirements
Case #12 (Isometric Transformations) **Math.Content.8.G.A.1** Verify experimentally the properties of rotations, reflections, and translations: **Math.Content.8.G.A.1a** Lines are taken to lines, and line segments to line segments of the same length. **Math.Content.8.G.A.1b** Angles are taken to angles of the same measure. **Math.Content.8.G.A.2** Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. **Math.Content.8.G.A.3** Describe the effect of ~~dilations~~, translations, rotations, and reflections on two-dimensional figures using coordinates	1. Write correct correspondences between congruent figures 2. Define reflection, include line of reflection 3. Define rotation, include center 4. Define translation 5. Relate these transformations to congruence (isometry) 6. Apply them to solve problems NOTE: Middle school students are not familiar with composite symbols, so be sure to list the transformations as a sequence

	Minimum Requirements
Case #13 (Polygons & Coordinate Plane) **Math.Content.6.G.A.3** Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	1. Define polygons (list each name up to 12 sided) 2. Discuss n-gon 3. Discuss concave and convex polygons 4. Show why the sum of the exterior angles of a convex polygon is 360° 5. Discuss coordinate plane, be sure to show how to plot points in the coordinate plane. Explain how the quadrants are numbered. 6. When finding lengths of sides, be sure to have a problem where coordinates of polygon are in different quadrants.
	Minimum Requirements
Case #14 (Volume of Cones, Cylinders & Spheres) **Math.Content.8.G.C.9** Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	1. Define cylinders, cones & spheres 2. Define where the height is in each case 3. For cones, explain slant height 4. Discuss formula for the volume of cones, cylinders & spheres 5. Have problems for each 6. Include a problem where volume is known and height or area of the base is being found