Geometry Lesson Plans Week #20

Teacher: Ngoma Botumile A **Subject:** Geometry

Week of: 1/16-1/20/2017 **Grade:** 10

Day/Date: Monday/Tuesday 1/16/2017

Unit 14: Right Triangles and Trigonometry
Students apply the Pythagorean Theorem to various real-world situations, develop a pattern for special right triangles, and apply properties of triangles to the study of right-triangle trigonometry.

Today's Objective: Students will close lesson on similar figures and connect Pythagorean theorem to special right triangles.

D. E. A. R: First 10 min of class.
1) As required school wide, points will be lost for lack of participation. See your D.E.A.R. download for this week.
2) No points for tardy students during D.E.A.R.

Warm-up: From warm-up table download

Agenda:
1. D.E.A.R.
2. Warm up solution
3. Check downloads week 20
4. Similar figures lesson and special right triangles.
5. Similar Triangles video: 9 min https://www.khanacademy.org/math/algebra-basics/alg-basics-equations-and-geometry/alg-basics-intro-to-triangle-similarity/v/similar-triangle-basics
6. Similar Vs Congruent Video: 2 min. http://houstonpbs.pbslearningmedia.org/resource/mgbh-math-ee-gcongsim/congruent-vs-similar-triangles/

Homework: POW#20, and HOW #20,. **Do not forget weekend study.**

Evaluation/Exit Ticket: Start Summary of what you have learned today at level "0" CHAMP. (Must include Vocab and Essential understanding/Guiding Questions from lesson plan for each day)

TEKS:
See TEKS List below

ELPS: : C.3D, C.3H, C.3E, C.5G, C.1E, & C.2H
(ELPS detail descriptions are posted in Class)

Vocabulary:

1) Similar triangles
2) AA and SSS,
3) Scale factor, Ratio, Proportion, Geometric Probability,

Essential Understanding/Guiding Questions:

1) How does similarity differ from congruency in triangles.

Day/Date: Wednesday/Thursday 1/18/2017

Unit 14: Right Triangles and Trigonometry
Students apply the Pythagorean Theorem to various real-world situations, develop a pattern for special right triangles, and apply properties of triangles to the study of right-triangle trigonometry.

Today's Objective: Students will use Pythagorean theorem to analyze special right triangles.

D. E. A. R: First 10 min of class.
1) As required school wide, points will be lost for lack of participation. See your D.E.A.R. download for this week.
2) No points for tardy students during D.E.A.R.

Warm-up: From warm-up table download

Agenda:
1. D.E.A.R.
2. Warm up solution
3. Special right triangles.
4. Special right triangle: 9 min https://www.youtube.com/watch?v=D4DMvjTRXeI
5. Special Right Triangles: 13 min. https://www.youtube.com/watch?v=nVTtSE5nv7c

Homework: POW#20, and HOW #20,. **Do not forget weekend study.**

Evaluation/Exit Ticket: Start Summary of what you have learned today at level "0" CHAMP. (Must include Vocab and Essential understanding/Guiding Questions from lesson plan for each day)

TEKS:
See TEKS List below

ELPS: : C.3D, C.3H, C.3E, C.5G, C.1E, & C.2H
(ELPS detail descriptions are posted in Class)

Vocabulary:

1) Special right triangle
2) Equilateral triangle to 30, 60, 90
3) Short leg, long leg, and hypotenuse.
4) Isosceles triangle.

Essential Understanding/Guiding Questions:

2) What does special right triangle mean to you?
3) How does special right triangle differ from Pythagorean theorem?
4) What are the limitations of both Pythagorean theorem and special right triangle?

Day/Date: Friday, 1/20/2017

Unit 14: Right Triangles and Trigonometry
Students apply the Pythagorean Theorem to various real-world situations, develop a pattern for special right triangles, and apply properties of triangles to the study of right-triangle trigonometry.

Today's Objective: Students will will work in pairs to solve math problems involved in math competitions such as UH math, Rice math contest, ACM, etc

D. E. A. R: First 10 min of class.
1) As required school wide, points will be lost for lack of participation. See your D.E.A.R. download for this week.
2) No points for tardy students during D.E.A.R.

Warm-up: From warm-up table download

Agenda:
1. D.E.A.R. (Start your Problem solving: UH math 2015)
2. Start Problem solving, work must be detailed.
3. Class grade is based on your focus and quiz grade is based on your work.
4. All work must be done in the notebook, do not copy the problem but copy the graph if necessary, but specify your question, Test, and partner name.
5. Turn in your work in your dropbox folder before leaving the class.
6. If you are absent you still have to complete this work and turn in by 10:00 pm Friday.

Homework: POW#20, and HOW #20,. **Do not forget weekend study.**

Evaluation/Exit Ticket: Start Summary of what you have learned today at level "0" CHAMP. (Must include Vocab and Essential understanding/Guiding Questions from lesson plan for each day)

TEKS:
Mathematical Process Standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:
GEOM.1B Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.
GEOM.1C Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.
GEOM.1G Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

ELPS: : C.3D, C.3H, C.3E, C.5G, C.1E, & C.2H
(ELPS detail descriptions are posted in Class)

Vocabulary:

1) Based on contest question , list two

Essential Understanding/Guiding Questions:

1) Write a note on your experience based on the question you solved today.

Math Contest: AMC
http://www.maa.org/math-competitions/amc-1012

UH Math Contests:
http://mathcontest.uh.edu/

Rice Univ. Math contest:
http://www.ruf.rice.edu/~eulers/RMT.html

Cycle 4 Geometry Units

Unit 13: Similarity
Students solve geometric problems involving similarity.

Unit 14: Right Triangles and Trigonometry
Students apply the Pythagorean Theorem to various real-world situations, develop a pattern for special right triangles, and apply properties of triangles to the study of right-triangle trigonometry.

Unit 15: Circle Measurement
Students apply properties of circles to determine the area of a sector and the length of an arc.

Unit 16: Circles in the Coordinate Plane
Students write the equation of a circle and graph the circle in the coordinate plane.

Unit 17: Circle Theorems
Students analyze and apply properties of tangents to a circle and the angles and polygons formed within.

Cycle 4 Geometry TEKS

Similarity, Proof, and Trigonometry. The student uses the process skills in applying similarity to solve problems. The student is expected to:

Ⓢ **GEOM.7A** Apply the definition of similarity in terms of a dilation to identify similar figures and their proportional sides and the congruent corresponding angles.

Ⓡ **GEOM.7B** Apply the Angle-Angle criterion to verify similar triangles and apply the proportionality of the corresponding sides to solve problems.

Similarity, Proof, and Trigonometry. The student uses the process skills with deductive reasoning to prove and apply theorems by utilizing a variety of methods such as coordinate, transformational, axiomatic and formats such as two-column, paragraph, flow chart. The student is expected to:

Ⓢ **GEOM.8A** Prove theorems about similar triangles, including the Triangle Proportionality theorem, and apply these theorems to solve problems.

Ⓢ **GEOM.8B** Identify and apply the relationships that exist when an altitude is drawn to the hypotenuse of a right triangle, including the geometric mean, to solve problems.

Similarity, Proof, and Trigonometry. The student uses the process skills to understand and apply relationships in right triangles. The student is expected to:

Ⓡ **GEOM.9A** Determine the lengths of sides and measures of angles in a right triangle by applying the trigonometric ratios sine, cosine, and tangent to solve problems.

Ⓡ **GEOM.9B** Apply the relationships in special right triangles (30º-60º-90º and 45º-45º-90º) and the Pythagorean Theorem, including Pythagorean triples, to solve problems.

Circles. The student uses the process skills to understand geometric relationships and apply theorems and equations about circles. The student is expected to:

Ⓢ **GEOM.12B** Apply the proportional relationship between the measure of an arc length of a circle and the circumference of the circle to solve problems.

Ⓢ **GEOM.12C** Apply the proportional relationship between the measure of the area of a sector of a circle and the area of the circle to solve problems.

Ⓢ **GEOM.12D** Describe radian measure of an angle as the ratio of the length of an arc intercepted by a central angle and the radius of the circle.

Circles. The student uses the process skills to understand geometric relationships and apply theorems and equations about circles. The student is expected to:

Ⓢ **GEOM.12E** Show that the equation of a circle with center at the origin and radius r is $x^2 + y^2 = r^2$ and determine the equation for the graph of a circle with radius r and center (h, k), $(x - h)^2 + (y - k)^2 = r^2$.

1. A right triangle with sides 3 cm, 4 cm and 5 cm is rotated the side of 3 cm to form a cone. The volume of the cone so formed is:

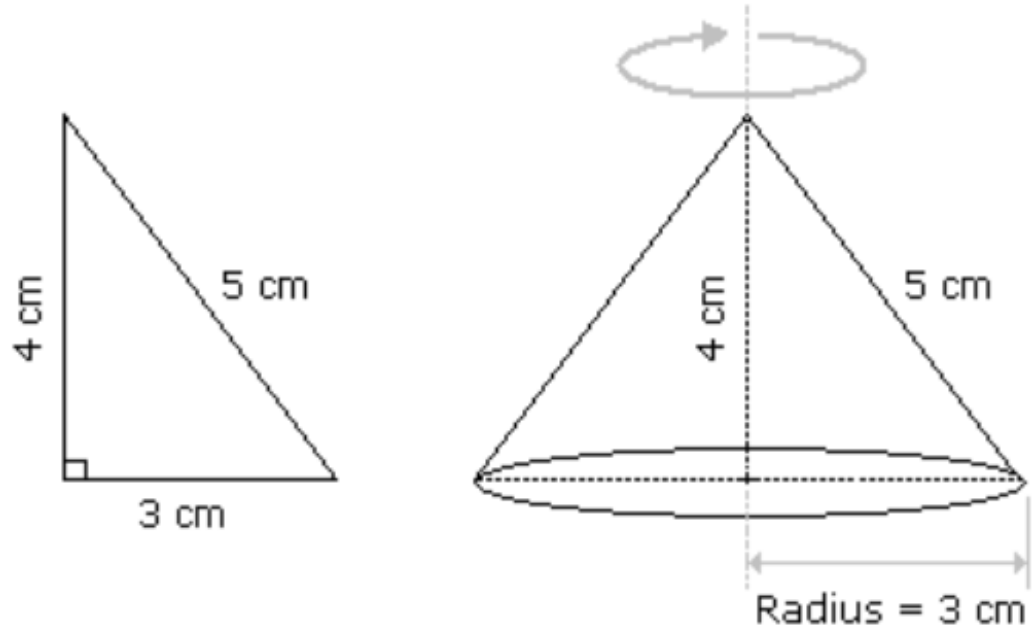
   [A]. 12π cm^3

   [B]. 15π cm^3

   [C]. 16π cm^3

   [D]. 20π cm^3

Explanation:



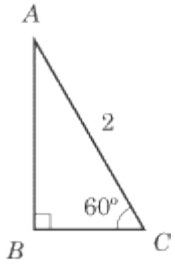
Clearly, we have $r = 3$ cm and $h = 4$ cm.

$$\therefore \text{ Volume} = \frac{1}{3}\pi r^2 h = \left(\frac{1}{3} \times \pi \times 3^2 \times 4\right) cm^3 = 12\pi \text{ cm}^3.$$

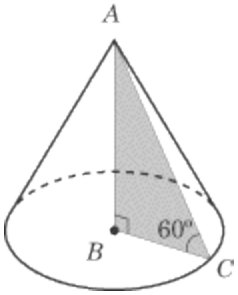
Solids Produced by Rotating Polygons

Another type of Math IC question that you may come across involves a solid produced by the rotation of a polygon. The best way to explain how this type of problem works is to provide a sample question:

What is the surface area of the geometric solid produced by the triangle below when it is rotated 360 degrees about the axis *AB*?



When this triangle is rotated about *AB*, a cone is formed. To solve the problem, the first thing you should do is sketch the cone that the triangle will form.

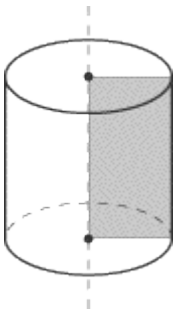
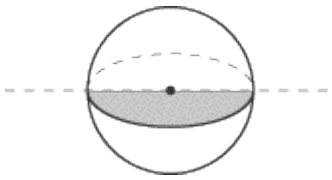
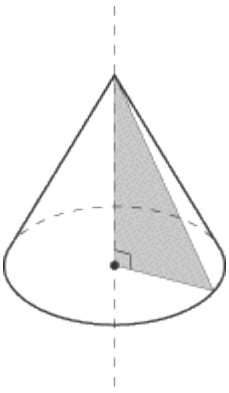


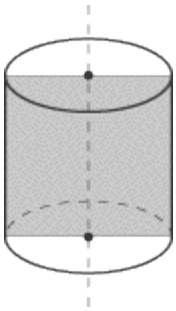
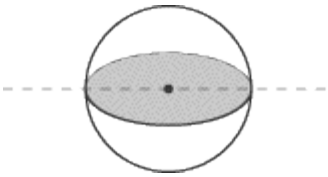
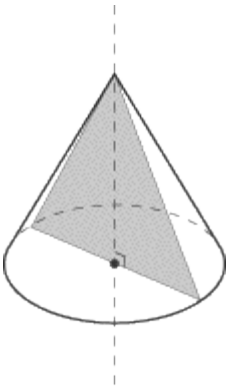
The question asks you to figure out the surface area of the cone. The formula for surface area is $\pi r^2 + \pi rl$, which means you need to know the lateral height of the cone and the radius of the circle. If you've drawn your cone correctly, you should see that the lateral height is equal to the hypotenuse of the triangle. The radius of the circle is equal to side *BC* of the triangle. You can easily calculate the length of *BC* since the triangle is a 30-60-90 triangle. If the hypotenuse is 2, then *BC*, being the side opposite the 30° angle, must be 1. Now plug both values of *l* and *r* into the surface area formula and then simplify:

$$\begin{aligned}\text{Total Surface Area} &= \pi(1)^2 + \pi(1)(2)\\ &= \pi + 2\pi\\ &= 3\pi\end{aligned}$$

Common Rotations

You don't need to learn any new techniques or formulas for problems that deal with rotating figures. You just have to be able to visualize the rotation as it's described and be aware of which parts of the polygons become which parts of the geometric solid. Below is a summary of which polygons, when rotated a specific way, produce which solids.

		
A rectangle rotated about its edge produces a cylinder.	A semicircle rotated about its diameter produces a sphere.	A right triangle rotated about one of its legs produces a cone.

		
A rectangle rotated about a central axis (which must contain the midpoints of both of the sides that it intersects) produces a cylinder.	A circle rotated about its diameter produces a sphere.	An isosceles triangle rotated about its axis of symmetry (the altitude from the vertex of the non-congruent angle) produces a cone.

<< RETURN TO THE PREVIOUS SECTION | CONTINUE TO THE NEXT SECTION >>