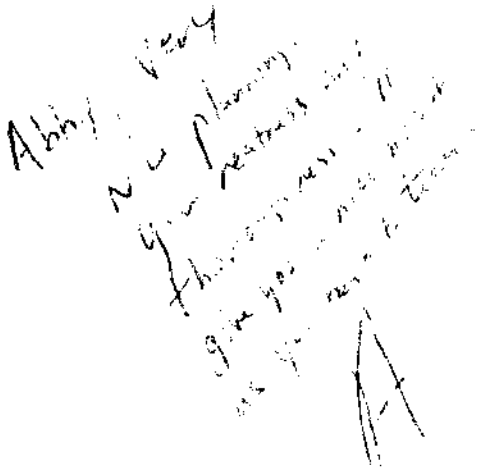
Geometry

Right Triangles and Trigonometry



Abby Dutch

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UBD

TITLE:
TOPIC: RIGHT TRIANGLES AND TRIG.
DESIGNERS: Abby Dutch

SUBJECT/COURSE: GEOMETRY
GRADES: 8^{TH}-10^{TH}

Desired Results

Established Goals:

Mathematics (NM-GEO.9-12.1)

- Explore relationships (including congruence and similarity) among classes of two- and three-dimensional geometric objects, make and test conjectures about them, and solve problems involving them.
- Use trigonometric relationships to determine lengths and angle measures.

Mathematics (NM-GEO.9-12.1)

- Use geometric ideas to solve problems in, and gain insights into, other disciplines and other areas of interest such as art and architecture.

Mathematics (NM-GEO.6-8.1)

- Create and critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.
- Understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects.

Mathematics (M:G&M:HS:5)

- Applies concepts of similarity to define the trigonometric functions as ratios of sides of right triangles; uses the ratios of the sides of special right triangles to determine the sine, cosine and tangent of; and solves related problems.

Mathematics (NM-NUM.6-8.2)

- Understand and use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems.

Mathematics (NM-NUM.6-8.2)

- Understand and use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems.

Mathematics (M:G&M:6:1)

- Uses properties or attributes of angles (right, acute, or obtuse) or sides (number of congruent sides, parallelism, or perpendicularity) to identify, describe, classify, or distinguish among different types of triangles (right, acute, obtuse, equiangular, scalene, isosceles, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).

Understandings:	**Essential Questions:**
○ How to use the Pythagorean Theorem ○ How to use the Sine Function ○ How to use the Cosine Function ○ How to use the Tangent Function ○ How to use Special Right Triangles ○ The Common Right Triangles ○ Obtuse and Acute ○ Geometric Mean ○ Similarity in Right Triangles	○ When to use the sine, cosine, and tangent functions. ○ When would you use the Pythagorean Theorem? ○ How many degrees are in a right triangle? ○ What requirements are needed to have an obtuse triangle? ○ What are the requirements of an acute triangle?
Students will know…	***Students will be able to…***
○ What the Pythagorean Theorem is. ○ What an obtuse triangle is. ○ What an acute triangle is. ○ What the geometric mean is. ○ What the special right triangles are. ○ What the common triangles are.	○ Find the missing side of a Right Triangle ○ Find an angle using the sine, cosine, and tangent functions ○ Find the geometric mean ○ Find the missing side of a special Right Triangle ○
Assessment Evidence	
Performance Tasks:	**Other Evidence:**
○ Classifying Triangles Using Geoboards. ○ The Pythagorean Investigation ○ Angles of a Triangle Investigation.	○ Unit test ○ Quiz over the first four lessons ○ All worksheets done in class and out of class.
Learning Plan	
Learning Activities: ○ investigation of similar triangles ○ Pythagorean Theorem Investigation ○ Angles of a Triangle Investigation ○ Classifying Triangles using geoboards ○ Triangle Investigation	

Lesson Plans

Geometry- Lesson 1

Standards:

Mathematics (NM-GEO.9-12.1)

- Explore relationships (including congruence and similarity) among classes of two- and three-dimensional geometric objects, make and test conjectures about them, and solve problems involving them.

Mathematics (NM-NUM.6-8.2)

- Understand and use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems.

Objectives:

- The students will be able to simplify radicals.
- The students will be able to use geometric mean to solve problems by the end of the lesson.
- The students will be able to determine if triangles are similar.
- By the end of the unit the students will be able to simplify radicals found in any problem.

Materials:

Teacher:

- Enough index cards for each student and a few extras, a ruler for each student that has mm on it, scissors for each student, and geoboards along with elastics are needed for each student.

Student:

- Pencil and paper for notes.

Procedure (Step-by-Step):

1. First the students will be given a quiz over the previous work that they have done that will then lead into what the class will be talking about today. They will be learning about similarity in right triangles. Refer to Appendix B, pg. B1.
2. When all the students have finished the class will then go over the question.
3. Next the teacher will make sure the students remember the definition of an altitude. Refer to Appendix A, pg. A1 to see the definition.
4. Then the students will start an investigation of similar triangles using an index card. The students will try to discover the next theorem. Refer to Appendix C, Pg. C1 to see the worksheet.
5. After the students have completed the investigation or had sufficient time then the teacher will bring the class back together and put the Altitude to Hypotenuse of

Right Triangle Theorem on the board. Refer to Appendix A, pg. A3 to see this theorem.

6. Next the students will work in pairs to answer the roof question. Refer to Appendix C, pg. C2 to see this problem.
7. Once the students have had time to work on the problem then the class will go over the problem together.
8. The teacher will then put the definition of geometric mean on the board along with two corollaries. Refer to Appendix A, pg. A1.
9. The teacher will go over a few examples with the students and then give them four examples to try on their own. Refer to Appendix C, pg. C4- C5 to see the examples.
10. After the students have completed the examples the teacher will teach students how to simplify radicals. Refer to Appendix C, pg. C5 to see the examples the teacher should use.
11. The teacher will then give the students a few more radical examples to simplify. Refer to Appendix C, pg. C5 to see these examples.
12. After the teacher feels that the students are comfortable this the students will then work on the Similar Triangle Worksheet Using Geoboards. Refer to Appendix C, pg. C6- C7 to see this worksheet.
13. The students will then be given some more problems to try for homework. Refer to Appendix D, pg. D1 to see the Geometric Mean Worksheet.

Assessment:

Formative:

- The students will be assessed with how they complete their worksheets.

Summative:

- The students will be assessed with a final unit test.

Technology Used:

- None for this lesson.

Geometry- Lesson 2

Standards:

Mathematics (NM-NUM.6-8.2)

- Understand and use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems.

Mathematics (NM-GEO.6-8.1)

- Create and critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.
- Understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects.

Objectives:

- The students will be able to use the Pythagorean Theorem to find the missing side by the end of the unit.
- They will be able to simplify their results in radical form.

Materials:

Teacher:

- Graph paper for students, rulers, markers or colored pencils

Student:

- Pencil and paper for notes.

Procedure (Step-by-Step):

1. The class will begin with a class starter that goes over the material from last class. Refer to Appendix B, pg. B2.
2. Next the class will go over the homework by having the student put the answers up on the board and going over any problems that the students got wrong or had questions about.
3. Then we will start learning about the Pythagorean Theorem. To do this the students will perform an investigation in pairs. Given a sheet of paper that has a right triangle on it, it will be the students' job to figure out $a^2 + b^2 = c^2$. Refer to Appendix C, p. C8 to see the Pythagorean Theorem Investigation Sheet.
4. After the student have completed this the teacher will bring the class back together and tape on the board a bigger version of what the students have done and allow them to see $a^2 + b^2 = c^2$. Then the teacher will write the definition of the Pythagorean Theorem on the board. Refer to Appendix A, pg. A3. The teacher

can also show a visual. Refer to Appendix C, pg. C8 to see the site. After this the teacher will go over a few different examples with the students (See Appendix C, pg. C9).

5. Students will then be given a worksheet to practice what they have learned about the Pythagorean Theorem (See Appendix C, pg. 10). What they don't finish will be for homework along with a few word problems involving the Pythagorean Theorem.

Assessment:

Formative:

- The students will be assessed on how well they do on the Pythagorean Theorem investigation along with their ability to complete the worksheets.

Summative:

- The students will be assessed at the end of the unit to show their understanding.

Technology Used:

- Calculators are optional. A projector hooked up to the computer.

Geometry- Lesson 3

Standards:

Mathematics (M:G&M:6:1)

- Uses properties or attributes of angles (right, acute, or obtuse) or sides (number of congruent sides, parallelism, or perpendicularity) to identify, describe, classify, or distinguish among different types of triangles (right, acute, obtuse, equiangular, scalene, isosceles, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).

Objectives:

- The students will be able to use the Obtuse Right Triangle Theorem and the Acute Right Triangle Theorem to determine whether a triangle is obtuse or acute by the end of the unit.
- The students will know the Common Right Triangles.

Materials:

Teacher:

- Geoboards are needed along with elastics, scissors, paper, and protractors for each student.

Student:

- Pencil and paper for notes.

Procedure (Step-by-Step):

1. The class will begin with a homework quiz after any questions that the students have are answered. Refer to Appendix B, pg. 3 to see the class starter.
2. Then the class will start learning about common right triangles and get into obtuse and acute triangles. First they will be given what the Right Triangle Theorem is. Refer to Appendix A, pg. 3.
3. The students will then be given a few problems that are on the list of common right triangles to see if they can see if they are right triangles. Then the teacher will ask the students if they are able to gather anything from the problems that they just computed. Then have the students copy the list of Common Right Triangle Lengths. Refer to Appendix C, pg. 13 for the list and just take problems off of that.
4. After this have the students copy down the Acute Triangle Theorem and the Obtuse Triangle Theorem. Refer to Appendix A, pg. 3 to see the theorems.
5. The teacher will then have the students complete an activity that allows students to investigate the relationship between the angles in a triangle. Refer to Appendix C, pg. 14 to see the Angles of a Triangle Activity.

6. The teacher will go over a few examples with the students so that they are able to use these theorems. Refer to Appendix C, pg. 15 to see these examples.
7. Next the students will work in groups to work on a set of problems using a Geoboard. Refer to Appendix C, pg. 16 to see the Classifying Triangles by their Angles and Sides worksheet.
8. The students will be given homework at the end of class. Refer to Appendix D, pg. 4-5.

Assessment:

Formative:

- The students will be assessed on their ability to complete the homework quiz at the beginning of class. The students will also be assessed on their ability to complete their worksheets.

Summative:

- The students will be assessed on the complete understanding of the material on their unit test.

Technology Used:

- There is none needed for this lesson.

Geometry- Lesson 4

Standards:

Mathematics (M:G&M:HS:5)

- Uses the ratios of the sides of special right triangles to solve related problems.

Objectives:

- The students will know the different special right triangles by the end of the unit.
- The students will be able to determine the missing side using the Special Right Triangle Theorems by the end of the lesson.

Materials:

Teacher:

- Protractors are need for each student, and graph paper maybe helpful for some students.

Student:

- Pencil and paper for notes.

Procedure (Step-by-Step):

1. The class will start with a homework quiz after the teacher goes over any questions that the students may have. Refer to Appendix B, pg. 4.
2. The teacher will then introduce the two special right triangles. The students will copy down the 30-60-90 Triangle Theorem and the 45-45-90 Triangle Theorem. Refer to Appendix A, pg. 3.
3. The teacher will then go over a couple examples with the students and then give them a few to try. Refer to Appendix C, pg. 18 to see these examples.
4. The students will then be arranged into groups four or five groups depending on the size of the class. In each group student will be given a problem. As a group they are to solve the problem and then put their answer in a folder. Then after 5- 10 minutes per problem the students will then pass their problems in a counter clock wise direction. The students will then complete all the questions without looking at any of the other group's answers. Once each group has gotten back their original problem they will then decide which of the answers are correct. After every group has made a decision. Each group will come up to the board at once to explain the correct answer. Refer to Appendix C, pg. 19 to see the questions.
5. If the students finish and there is extra time in the class the teacher can give the students a worksheet to work on. Refer to Appendix C, pg. 24.
6. The students will be given a worksheet to complete for homework. Refer to Appendix D, pg. 6 to see this.

Assessment:

Formative:

- Students will be assessed on their abilities to perform the special triangle investigation and ability to work well in groups.

Summative:

- The students will be tested on their knowledge at the end of the unit.

Technology Used:

- None for this lesson.

Geometry- Lesson 5

Standards:

Mathematics (NM-GEO.9-12.1)

- Explore relationships (including congruence and similarity) among classes of two- and three-dimensional geometric objects, make and test conjectures about them, and solve problems involving them.

Mathematics (NM-NUM.6-8.2)

- Understand and use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems.

Mathematics (NM-NUM.6-8.2)

- Understand and use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems.

Mathematics (NM-GEO.6-8.1)

- Create and critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.
- Understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects.

Mathematics (M:G&M:5:1)

- Uses properties or attributes of angles (right, acute, or obtuse) or sides (number of congruent sides, parallelism, or perpendicularity) to identify, describe, classify, or distinguish among different types of triangles (right, acute, obtuse, equiangular, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).

Objectives:

- The students will show what they know about simplifying radicals, common right triangles, special triangles, the Pythagorean Theorem, and similarity today on a quiz.

Materials:

Teacher:

- There are none needed for this lesson

Student:

- Pencil and paper for notes.

Procedure (Step-by-Step):

1. The teacher will review with the students before they take their quiz. The students will be able to ask any questions that they may have. The teacher will also go over problems she or he feels the students are struggling with.
2. The students will be having a quiz over lessons one through four. Refer to Appendix E, pg. 1 to see the quiz.

Assessment:

Formative:

- The students will be assessed with a quiz.

Summative:

- The students will have an exam at the end of the lesson to check their understanding of the material

Technology Used:

- Calculators are optional depending on the teacher and class.

Geometry- Lesson 6

Standards:

Mathematics (M:G&M:HS:5)

- Applies concepts of similarity to define the trigonometric functions as ratios of sides of right triangles; uses the ratios of the sides of special right triangles to determine the sine, cosine and tangent of, and solves related problems.

Objectives:

- Students will know how to use the Sine, Tangent and Cosine Functions to find missing lengths.
- By the end of the unit the students will be able to determine the missing angles and sides of triangles.
- By the end of the unit the students will be able to apply trigonometry to real world situations.

Materials:

Teacher:

- None for this lesson

Student:

- Pencil and paper for notes.

Procedure (Step-by-Step):

1. The teacher will start the class by going over the quiz. Refer to Appendix E, pg. 1 to see the quiz.
2. After the teacher goes over the quiz the students will then start their exploration of the sine, cosine, and tangent functions.
3. The teacher will start with an example in which the students can not solve using the method that they have been using. The teacher can then ask the students if they have any suggestions of how they could find the missing side. Then the teacher can get into the trigonometric functions.
4. The teacher will give the students the definition of a trigonometric function. Refer to Appendix A, pg. 2 to see the definition.
5. The teacher will then get into the different types of trigonometric functions. Such as the sine, cosine, and tangent functions. The teacher will give the students definitions of each. Refer to Appendix A, pg. 1 and 2 to see the definitions. The teacher will start with a function and give a few examples.
6. The first function could be the sine function. After the teacher goes over the definition, the teacher will go over a couple examples, and then the students will try a few. Refer to Appendix C, pg. 26 to see the examples.

7. The teacher will then give the students another example to try that the student can not use the sine function to solve. The teacher will pose some questions to see if the students know what to do. Then the teacher will give the students the definition of the Cosine Function. Refer to Appendix A, pg. 1 to see the definition.
8. Then the teacher will then go over a couple more examples with the students and give them several to try. Refer to Appendix C, pg. 27 to see the examples.
9. After the students have had time to work on these problems they will be given their last scenario. The students will then learn about the tangent function.
10. They will be given the definition (Refer to Appendix A, pg. 2), and then the teacher will go over a couple of examples with the students and give them several to try. Refer to Appendix C, pg. 28 to see the examples. The students will also be given the definition of angle of elevation and angle of depression. Refer to Appendix A, pg. 1.
11. After the students have learned the three trig functions the teacher will give the students a way of remembering the definition. The students will learn SOHCAHTOA. Refer to Appendix A, pg. 2 for the meaning of this.
12. Refer to Appendix C, pg. 36 to see the trigonometric table that the students will be using when doing problems.
13. The teacher will then put the students into four different groups. The students will go through a set of stations. Having fifteen minutes at each station. The students will be able to use their graphing calculator to complete the worksheets. The first station will have a worksheet with problems using Sine, station 2 will have a worksheet with Cosine problems, station 3 will have a worksheet on Tangent functions, and station 4 will have a worksheet that requires the use of more than one trigonometric function. Refer to Appendix C, pg. 29 the station worksheets.
14. The students will complete any worksheets that they have not finished during class for homework. Refer to Appendix C, pg. 29 to see the station worksheets. The students will also need to think of a question to go over in class tomorrow. This lesson could take a few days to complete so you may have to be flexible with determining the homework.

Assessment:

Formative:

- The students will show their understanding with the worksheets they complete in their groups.

Summative:

- The students will be assessed on their abilities of using the sine and cosine function on the unit test.

Technology Used:

- Calculators are needed for each student.

Geometry- Lesson 7

Standards:

Mathematics (NM-GEO.9-12.1)
- Explore relationships (including congruence and similarity) among classes of two- and three-dimensional geometric objects, make and test conjectures about them, and solve problems involving them.
- Use trigonometric relationships to determine lengths and angle measures.

Mathematics (NM-GEO.9-12.1)
- Use geometric ideas to solve problems in, and gain insights into, other disciplines and other areas of interest such as art and architecture.

Mathematics (NM-GEO.6-8.1)
- Create and critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.
- Understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects.

Mathematics (M:G&M:HS:5)
- Applies concepts of similarity to define the trigonometric functions as ratios of sides of right triangles; uses the ratios of the sides of special right triangles to determine the sine, cosine and tangent, and solves related problems.

Objectives:

- The students will combine the usage of all different trigonometric functions.
- The students will be able to classify special right triangles and so they can find the missing side.
- The students will be able to use the Pythagorean Theorem to find the missing side of a right triangle.
- The students will be able to use the sine function to find the missing side of a right triangle.
- The students will be able to use the cosine function to find the missing side of a right triangle.
- The students will be able to use the tangent function to find the missing side of a right triangle.
- The students will be able to classify the common sides of right triangles.
- The students will be able to use a trigonometric ratio table and the calculator.
- The students will be able to do all of the above by the end of the unit.

Materials:

Teacher:
- Any problems that the students may be having trouble with written down to go over with them.

Student:

- Pencil and paper for notes.

Procedure (Step-by-Step):

1. The teacher will go over any problems that he or she feels are important of ones the students have been having trouble with.
2. The teacher will pass around a black piece of paper to ever student. The students are then giving 5- 10 minutes to put any questions or problems that they are having trouble with. The teacher will then collect all the problems and then pick them one by one and go over each problem that the students have written down if time permits.

Assessment:

Formative:

- The students will be assessed with their ability to answer any problems that are put on the board along with their ability to recall anything learned so far.

Summative:

- The students will be assessed with an exam at the end of the unit.

Technology Used:

- None needed for this lesson.

Geometry- Lesson 8

Standards:

Mathematics (NM-GEO.9-12.1)

- Explore relationships (including congruence and similarity) among classes of two- and three-dimensional geometric objects, make and test conjectures about them, and solve problems involving them.
- Use trigonometric relationships to determine lengths and angle measures.

Mathematics (NM-GEO.9-12.1)

- Use geometric ideas to solve problems in, and gain insights into, other disciplines and other areas of interest such as art and architecture.

Mathematics (NM-GEO.6-8.1)

- Create and critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.
- Understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects.

Mathematics (M:G&M:HS:5)

- Applies concepts of similarity to define the trigonometric functions as ratios of sides of right triangles; uses the ratios of the sides of special right triangles to determine the sine, cosine and tangent of; and solves related problems.

Objectives:

- The students will be able to classify special right triangles and so they can find the missing side.
- The students will be able to use the Pythagorean Theorem to find the missing side of a right triangle.
- The students will be able to use the sine function to find the missing side of a right triangle.
- The students will be able to use the cosine function to find the missing side of a right triangle.
- The students will be able to use the tangent function to find the missing side of a right triangle.
- The students will be able to classify the common sides of right triangles.
- The students will be able to use a table to find the trigonometric ratios.
- The students will be able to do all of the above today on their unit exam.

Materials:

Teacher:

- Extra pencils are the only thing needed for this lesson.

Student:

- Pencil and paper for the exam.

Procedure (Step-by-Step):

1. The teacher will pass out the unit test. The teacher will make sure that the students are all separated so there will be no cheating going on. The students will have the whole class to work on their exam and if they do not finish they will have to set up a time with the teacher to come back and finish. Refer to Appendix E, pg. 3 to see the exam.

Assessment:

Formative:

- The students will be assessed by their ability to recall information.

Summative:

- The students will show the knowledge that they have learned on the unit test.

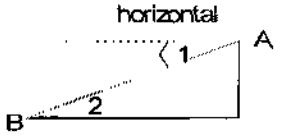
Technology Used:

- Calculators are needed for this lesson.

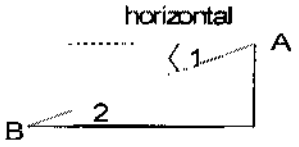
Appendix A- Definitions

Definitions

- Altitude- also known as the height. Is a line that extends from one vertex of a triangle perpendicular to the opposite side.
- Angle of Depression- when a point B is viewed from a higher point A, as shown by the diagram below, $\angle 1$ is the angle of depression.



- Angle of Elevation- When a point A is viewed from a lower point B, as shown by the diagram below, $\angle 2$ is the angle of elevation.



- Cosine Function- the ratio of the lengths of the side of the triangle adjacent to the angle and the hypotenuse, i.e.,

$$\cos(x) = \frac{adjacent}{hypotenuse}$$

- Geometric Mean- If a, b, and x are positive numbers and $\frac{a}{x} = \frac{x}{b}$, then x is called the geometric mean.

  - Corollary 1 – When the altitude is drawn to the hypotenuse of a right triangle, the length of the altitude is the geometric mean between the segments of the hypotenuse.

  - Corollary 2- When the altitude is drawn to the hypotenuse of a right triangle, each leg is the geometric mean between the hypotenuse and the segment of the hypotenuse and the segment of the hypotenuse that is adjacent.

- Hypotenuse- is the side opposite the right angle in a right triangle.
- Leg- In a right triangle, the legs are the two sides of the triangle that are not the hypotenuse.

- Sine Function- the ratio of the lengths of the side of the triangle opposite the angle and the hypotenuse, i.e.,

$$Sin(x) = \frac{opposite}{hypotenuse}$$

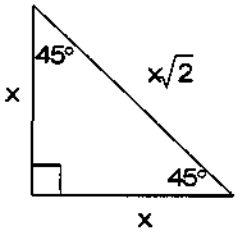
- SOHCAHTOA- SOH is for the sine function. S is sin, O is for opposite, and H is for hypotenuse. CAH is for the cosine function. C is for cosine, A is for adjacent, and H is for the hypotenuse. TOA is for the tangent function. T is for tangent, O is for opposite, and A is for adjacent.
- Tangent Function- the ratio of the side lengths opposite to the angle and adjacent the angle.

$$\tan(x) = \frac{opposite}{adjacent} \quad \text{or} \quad \tan(x) = \frac{\sin(x)}{\cos(x)}$$

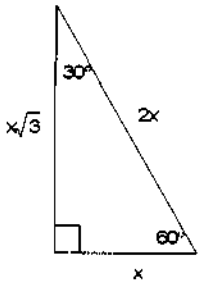
- Trigonometric Functions- A function of an angle expressed as the ratio of two of the sides of a right triangle that contains that angle.

Theorems

- Acute Triangle Theorem- If $c^2 < a^2 + b^2$, then $m < c < 90$, and ΔABC is acute.
- Obtuse Triangle Theorem- If $c^2 > a^2 + b^2$, then $m < c > 90$, and ΔABC is obtuse.
- Pythagorean Theorem- For a right triangle with legs a and b and hypotenuse c.
- Right Triangle Theorem- If the square of one side of a triangle is equal to the sum of the squares of the other two sides, then the triangle is a right triangle.
- Theorem (Altitude to hypotenuse of right triangle)- If the altitude is drawn to the hypotenuse of a right triangle, then the two triangles formed are similar to the original triangle and to each other.
  - Proof of Theorem:
    - Given: ΔABC is a right triangle; altitude CD is drawn to hypotenuse AB.
    - Prove: ΔCBD ~ ΔABC, ΔACD ~ ΔABC, ΔCBD ~ ΔACD
    - Plan for proof: First prove that ΔCBD ~ ΔABC. Each triangle has a right triangle and each includes ∠B. The triangles are similar by the AA Similarity Postulate. You can use similar reasoning to show that ΔACD ~ ΔABC. To show that ΔCBD ~ ΔACD, begin by showing that ∠ACD ≅ ∠B because they are both complementary to ∠DCB. Then you can use the AA Similarity Postulate
- 45°-45°-90° Theorem- In this type of triangle, the hypotenuse is $\sqrt{2}$ times as long as a leg.



- 30°-60°-90° Theorem- In this type of triangle, the hypotenuse is twice as long as the shorter leg, and the longer leg is $\sqrt{3}$ times as long as the shorter leg.

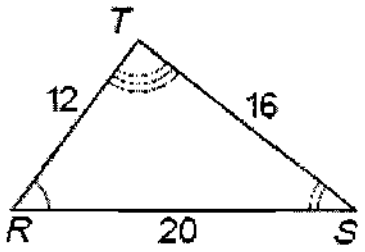


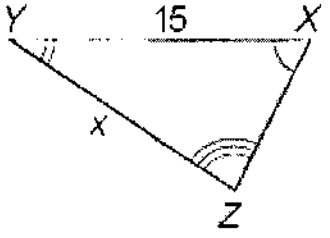
Appendix B- Do Nows

❖ Lesson 1

The students have previously learned that two triangles are similar if two of their corresponding angles are congruent.

What can you conclude from the information given? Explain what you see.





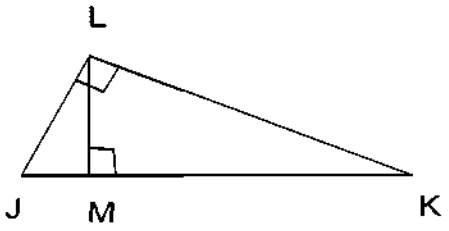
❖ Lesson 2

Simplify the following.

1.) $\sqrt{\frac{3}{7}}$

2.) $\frac{24}{3\sqrt{2}}$

Refer to the figure



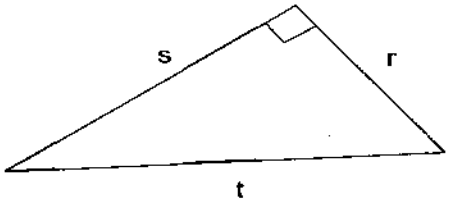
3.) If JL = 9 and JM = 6, find MK

4.) If LK = $3\sqrt{6}$ and MK = 6, find LM

❖ Lesson 3

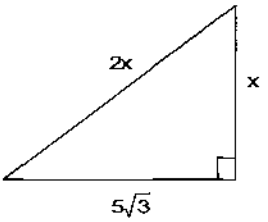
Use the diagram below to answer the question.

1.) If s = 9 and t =11, then r = _____

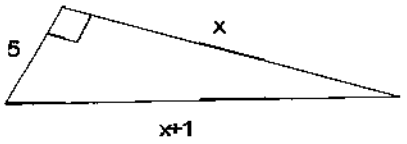


Find the values for x.

2.)



3.)



❖ Lesson 4

Fill in the blanks

1.) Right triangles have exactly 1 _____.

Obtuse triangles have one exactly 1 _____.

Acute triangles have all three angles _____.

If a triangle is formed with sides having the lengths given, is it acute, right, or obtuse? If a triangle can't be formed, say not possible.

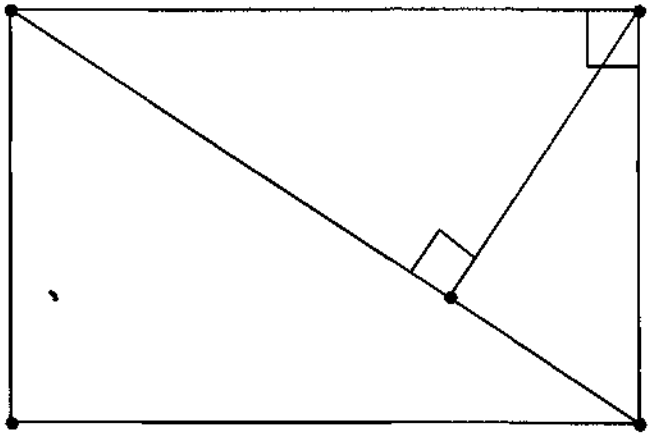
2.) 0.6, 0.8, 1 3.) 4n, 12n, 13n where $n > 0$ 4.) 0.6, 1.2, 1.3

Appendix C- In Class Practice

❖ Lesson 1

Similar Right Triangle Investigation

1. Cut an index card along one of its diagonals.
2. On one of the right triangles, draw an altitude from the right angle to the hypotenuse. Cut along the altitude to form two right triangles.
3. You should now have three right triangles. Compare the triangles. What special property do they share? Explain.
4. Tape your group's triangles to a piece of paper and place in labwork.



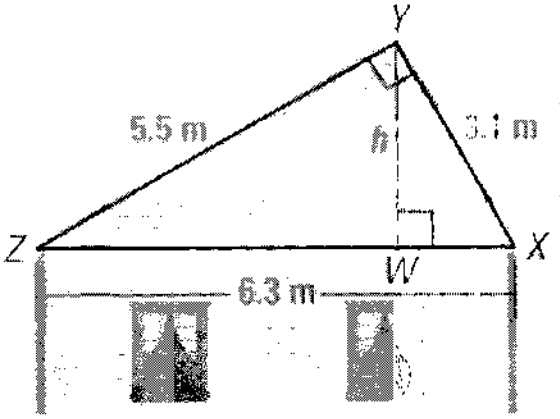
What did you discover?

Name: _____ Date: _____

Roof Problem

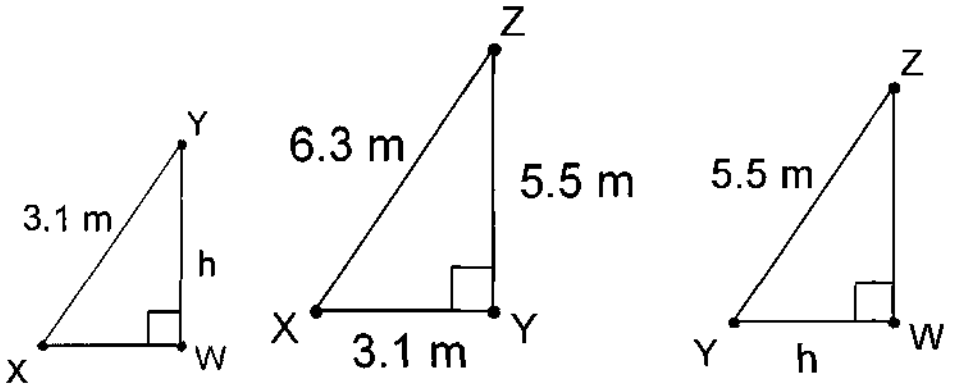
A roof has a cross section that is a right angle. The diagram shows the approximate dimensions of this cross section.

- A. Identify the similar triangles.
- B. Find the height h of the roof.



Solution

- ❖ You may find it helpful to sketch the three similar triangles so that the corresponding angles and sides have the same orientation. Mark the congruent angles. Notice that some sides appear in more than one triangle. For instance XY is the hypotenuse in ΔXYW and the shorter leg in ΔXZY.



$\Delta XYW \sim \Delta YZW \sim \Delta XZY$

Solution for part b

- Use the fact that $\Delta XYW \sim \Delta XZY$ to write a proportion.

$$\frac{YW}{ZY} = \frac{XY}{XZ}$$ Corresponding side lengths are in proportion

$$\frac{h}{5.5} = \frac{3.1}{6.3}$$ Substitute values

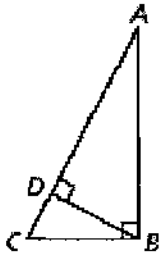
$$6.3h = 5.5(3.1)$$ Cross Product Property

$$h \approx 2.7$$ Solve for h

Teacher's Examples- Geometric Mean

1.) The geometric mean of two numbers is $2\sqrt{5}$. One of the numbers is 6. Find the geometric mean.

2.) AC = 16, and CD = 5. Find BC.



3.) Find the geometric mean of each pair of numbers.

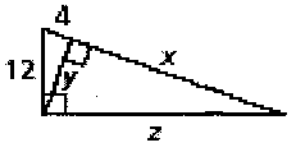
a.) 5 and 45

b.) $\frac{2}{3}$ *and* $\frac{27}{40}$

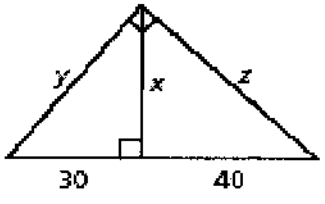
Examples for Students to Try

Find x, y, and z

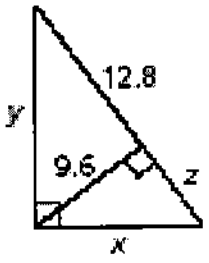
1.)



2.)

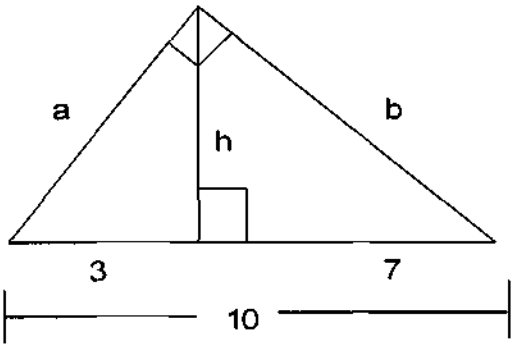


3.)



Use the diagram to find the values of h, a, and b.

4.)



Teacher Examples-for Simplifying Radicals

1.) $\sqrt{\frac{3}{7}}$ 2.) $3\sqrt{8}$ 3.) $\sqrt{42}$ 4.) $\frac{24}{3\sqrt{2}}$

Examples for Students to try

1.) $9\sqrt{40}$ 2.) $\sqrt{89}$ 3.) $\sqrt{30} * \sqrt{6}$ 4.) $\sqrt{135}$

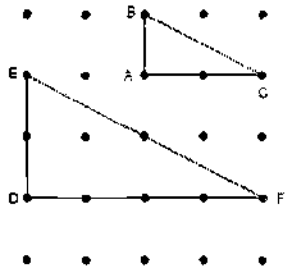
Name: _____ Date: _____

Similar Triangles Using Geoboards

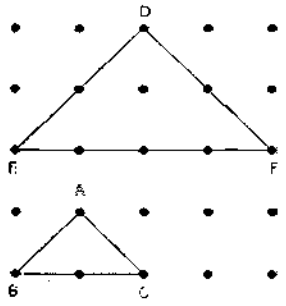
Similar shapes are figures that have the same shape, but are not necessarily the same size. Let's conduct an experiment with similar triangles. This experiment will help us answer questions about measuring inaccessible heights and distances later.

Six pairs of triangles are shown below. In each case the triangles are different in six, but the same in shape. Use your metric ruler to find the length of each side of each triangle in millimeters. Record your answers in the data table below. Then complete the table. Write each ratio in simplest form.

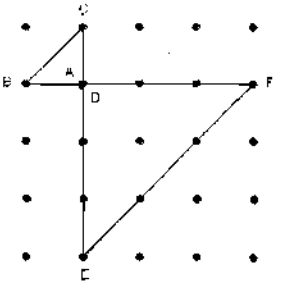
1.)



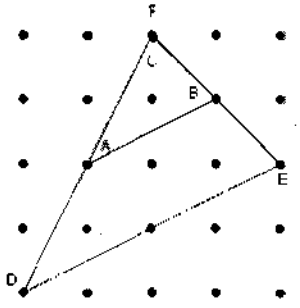
2.)



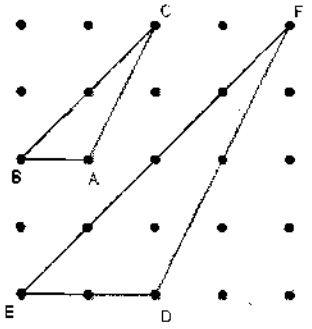
3.)



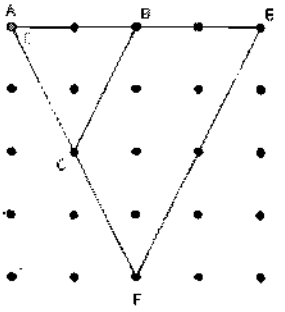
4.)



5.)



6.)



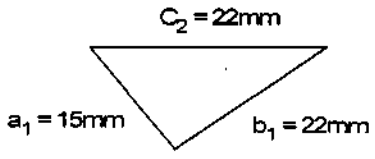
Data Table

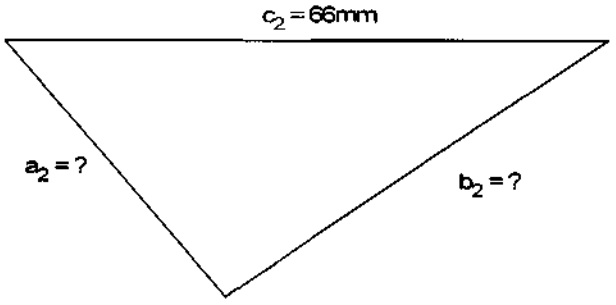
Side ->	Length AB	Length AC	Length BC	Length DE	Length DF	Length EF	$\frac{AB}{DE}$	$\frac{AC}{DE}$	$\frac{BC}{EF}$
1									
2									
3									
4									
5									
6									

7.) Examine the data in the table. What patterns do you notice?

8.) In the triangles pictured below, what is the length of a_2 and b_2?

Do these triangles fit the same patterns you noticed in problems 1-6? Explain





Adapted from Math Explorations with Geoboard

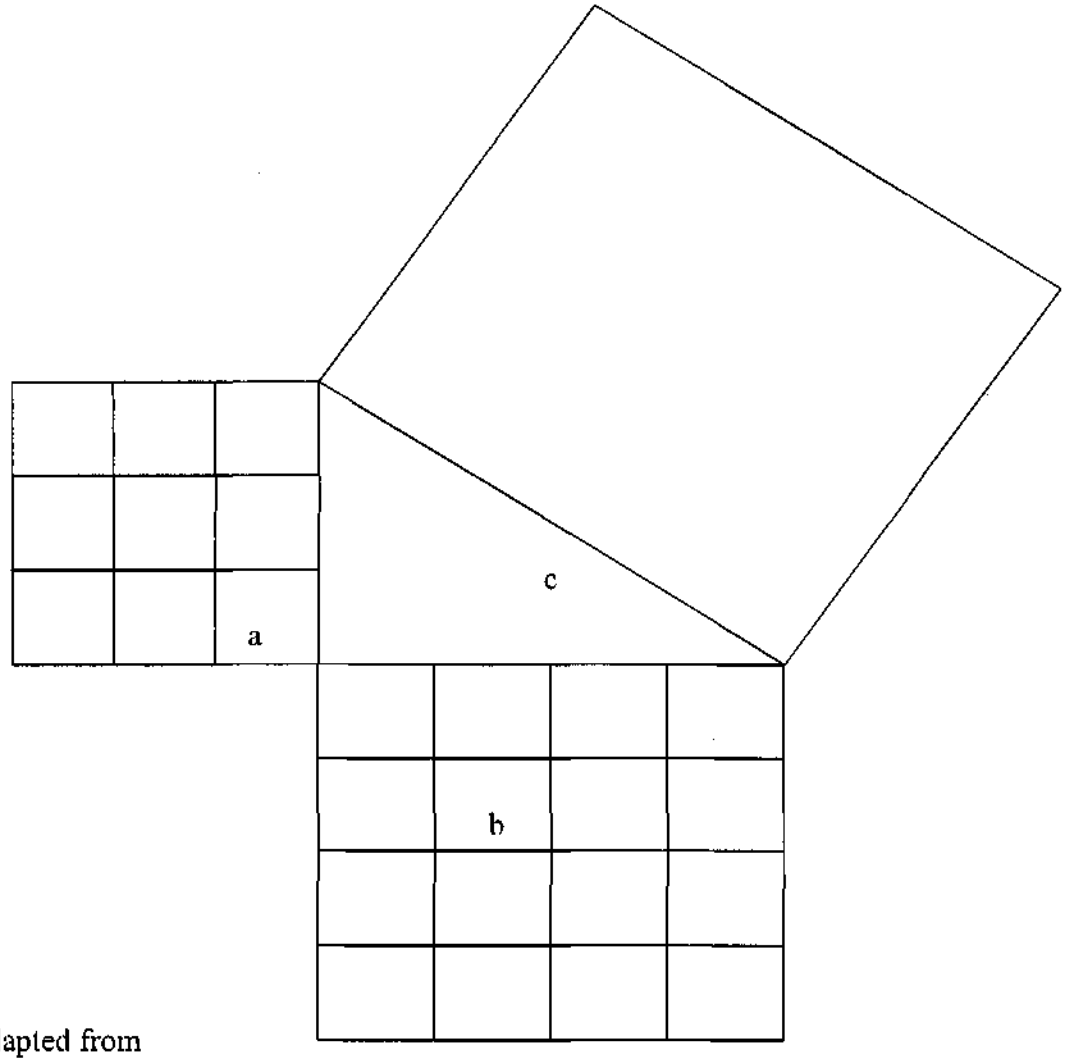
❖ Lesson 2

Name: _____ Date: _____

Pythagorean Theorem Investigation

Directions:

- Cut out the big squares and the triangle. **Do not** cut out the smaller squares inside the bigger ones.
- Find the area of square a, and b. Area of a = _____ Area of b = _____
- Determine the area of square c by using the mini squares in square a and square b. The Area of c = _____
- Do you notice anything about the areas of all the squares? If so what?



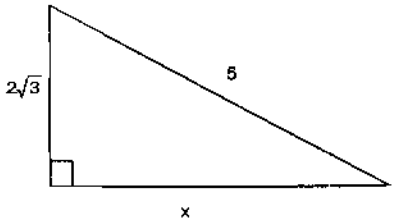
Adapted from
www.harrisonburg.k12.va.us/math/pacing/8ess/The%20**Pythagorean**%20**Theorem**.doc

Class Demo Site
http://www.pbs.org/wgbh/nova/proof/puzzle/theorem.html

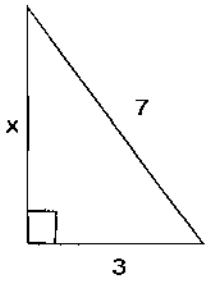
Examples for the teacher to do with the students

Find x, y, z in the simplest form.

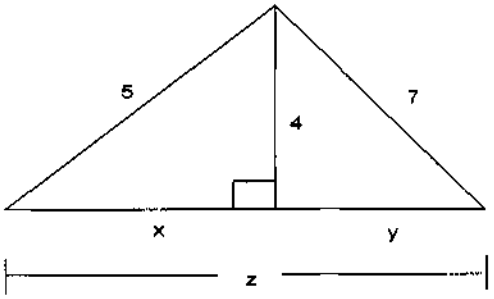
1.)



2.)



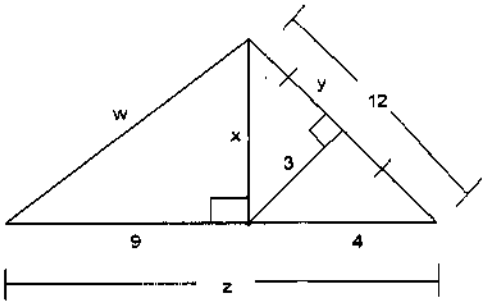
3.)



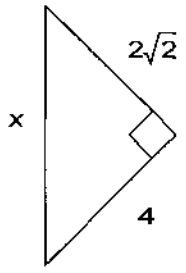
Examples for the students to try.

Find the values for x, y, z, w in simplest form.

1.)



2.)

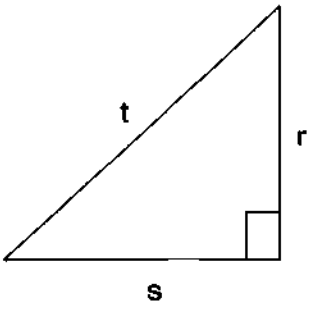


Name: _____ Date: _____

Pythagorean Worksheet

Which equations are correct for the right triangle shown?

1.)

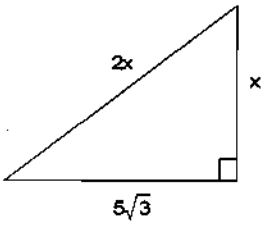


a.) $r^2 = s^2 + t^2$ b.) $s^2 = r^2 + t$ c.) $s^2 + r^2 = t^2$

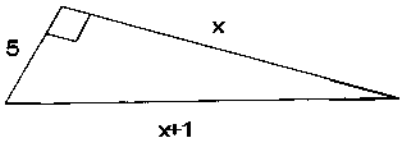
d.) $s^2 = t^2 - r^2$ e.) $t = r + s$ f.) $t^2 = (r + s)^2$

State an equation you could use to find the value of x. Then find the value of x in simplest radical form.

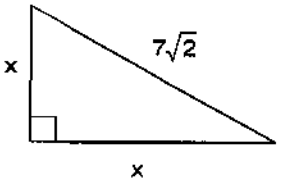
2.)



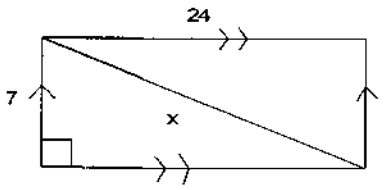
3.)



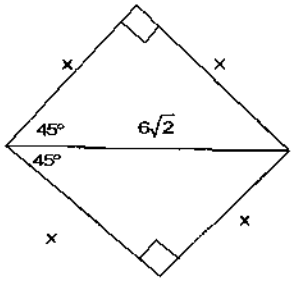
4.)



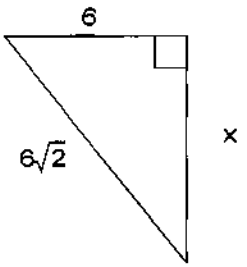
5.)



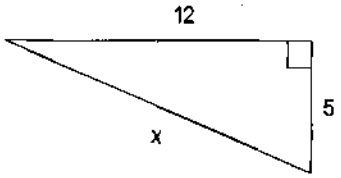
6.)


x
x
45°
$6\sqrt{2}$
45°
x
x

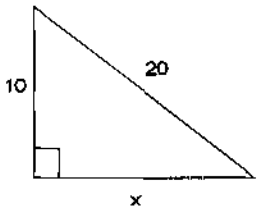
7.)


6
$6\sqrt{2}$
x

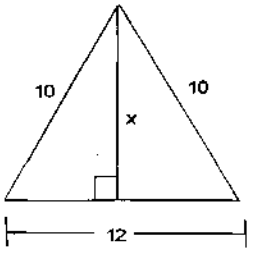
8.)


12
5
x

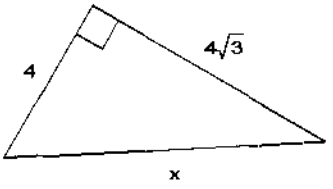
9.)


10
20
x

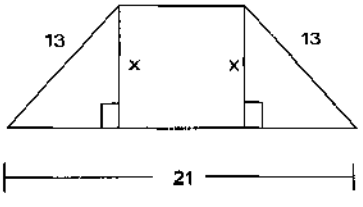
10.)


10
10
x
12

11.)


4
$4\sqrt{3}$
x

12.)


13
x
x
13
21

13.) A rectangle has length 2.4 and width 1.8. Find the length of a diagonal.

14.) A rectangle has a diagonal of 2 and length of $\sqrt{3}$. Find its width.

15.) Find the length of a side of a square with a diagonal of length 12.

16.) A triangle has legs of $2\sqrt{3}$ and 7. Find the length of the hypotenuse.

17.) A 10-foot ladder is leaning against the side of a house. If the base of the ladder is 3 feet away from the house, how high up the side of the house will the ladder reach?

18.) Rebecca left her house and walked 2 blocks east. She turned and walked 5 blocks north to get to the library. If each block is $\frac{1}{4}$ of a mile, how far is the direct route from Rebecca's house to the library?

Adopted from the Geometry text

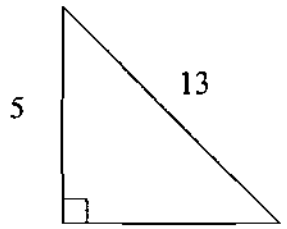
❖ Lesson 3

Common Right Triangles

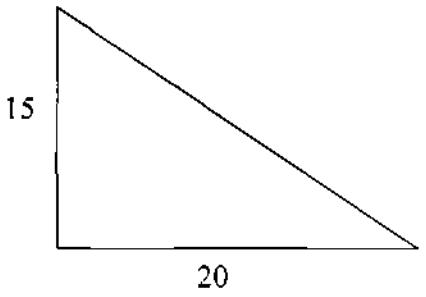
1.) 3, 4, 5	4.) 12, 16, 20	7.) 10, 24, 26
2.) 6, 8, 10	5.) 15, 20, 25	8.) 8, 15, 17
3.) 9, 12, 15	6.) 5, 12, 13	9.) 7, 24, 25

Examples for students to try

1.)



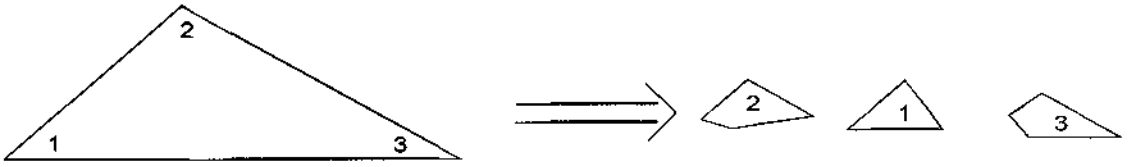
2.)



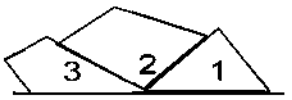
Name: _____ Date: _____

Angles of a Triangle Activity

Directions: In groups every student needs to draw their own triangle of any size but, it has to be different than anyone else. There needs to be at least one right, obtuse, acute, and isosceles triangle in your group.



Label the angles of each triangle 1, 2, 3. Tear off each angle and add them by placing the vertex (The common endpoint of two or more rays or line segments) of each angle at a point and putting the angles edge- to- edge using the protractor.



What type of angle is formed in each instance? What is the measure of this angle?

What generalizations can you make about the sum of the measures of the three angles of a triangle?

What do you think might happen if we did this same activity with an obtuse and acute triangle?

Adopted from Mathematics Activities

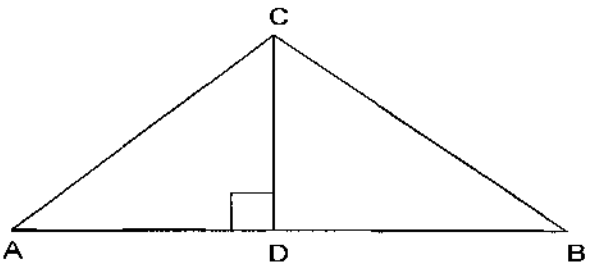
Examples for the teacher to do with the students

If a triangle is formed with sides having the lengths given, is it acute, right, or obtuse? If a triangle can't be formed, say not possible.

1.) 9, 40, 41 2.) 6, 7, 8 3.) 7, 8, 11 4.) 4, $4\sqrt{3}$, 8

Examples for the students to try

Use the information to decide if triangle ABC is acute, right, or obtuse.



AC = 13, BC = 15, and CD = 12
AC= 13, BC = $\sqrt{34}$, and CD = 3
AD = 2, DB = 8, and CD = 4

Name : _____ Date: _____

Classifying Triangles by Their Angles and Sides

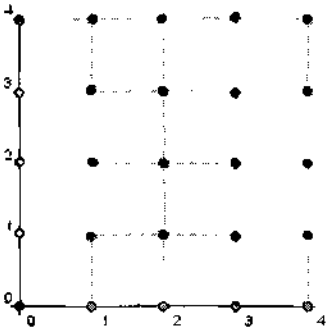
Triangles are sometimes classified according to the measurement of their angles

Angles:
- Acute triangle: all 3 angles have a measure less than 90°.
- Obtuse triangle: one angle measures more than 90°.
- Right triangle: one angle measures 90°.

Triangles are also sometimes classified according to the lengths of their sides.

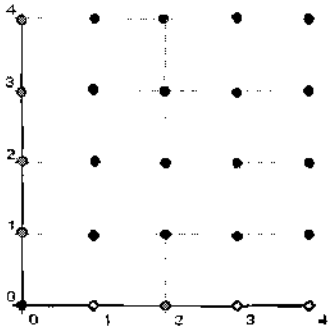
Sides:
- Scalene: no two sides have the same length.
- Isosceles triangle: two sides have the same length.
- Equilateral triangle: all three sides have the same length.

Plot the ordered pairs for the vertices (corners) of each triangle below and connect the vertices. Classify each triangle by circling the category to which it belongs. Use a metric ruler and a protractor to help when necessary.



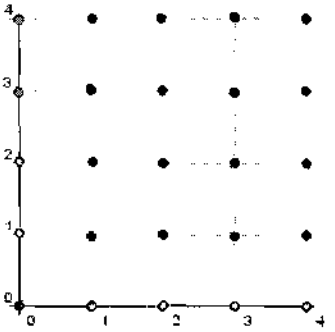
1.) (3, 0) (2, 4) (4, 2)

Acute Scalene
Obtuse Isosceles
Right Equilateral



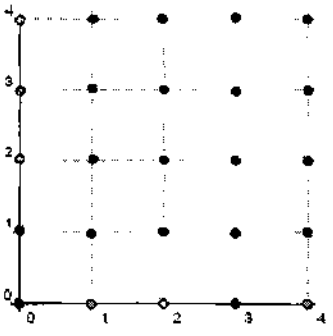
2.) (1, 1) (3, 1) (1, 4)

Acute Scalene
Obtuse Isosceles
Right Equilateral



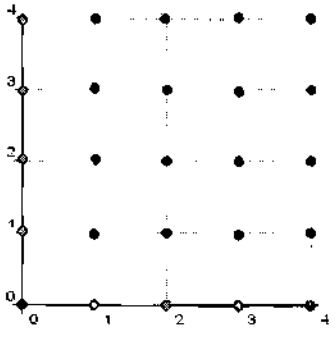
3.) (1, 2) (3, 2) (2, 4)

Acute Scalene
Obtuse Isosceles
Right Equilateral



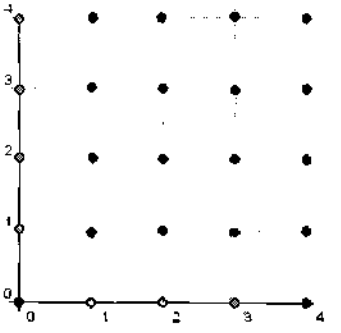
4.) (1, 2) (3, 0) (4, 4)

Acute Scalene
Obtuse Isosceles
Right Equilateral



5.) (1, 1) (2, 2) (1, 3)

Acute Scalene
Obtuse Isosceles
Right Equilateral

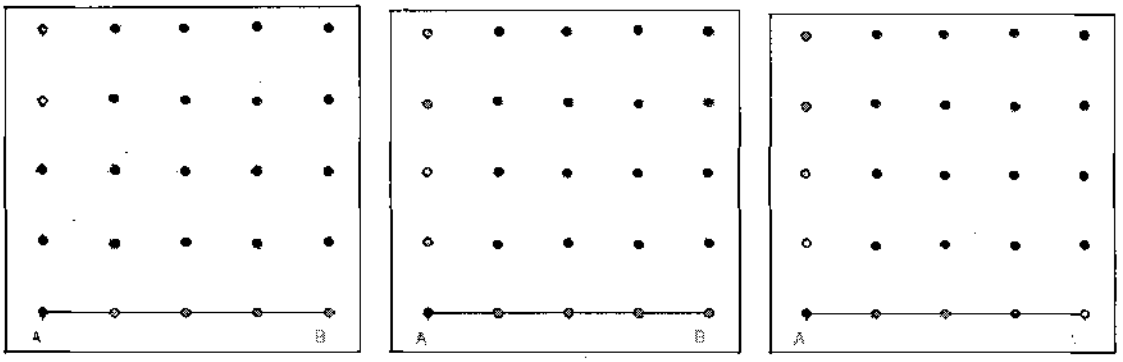


6.) (2, 2) (4, 3) (0, 3)

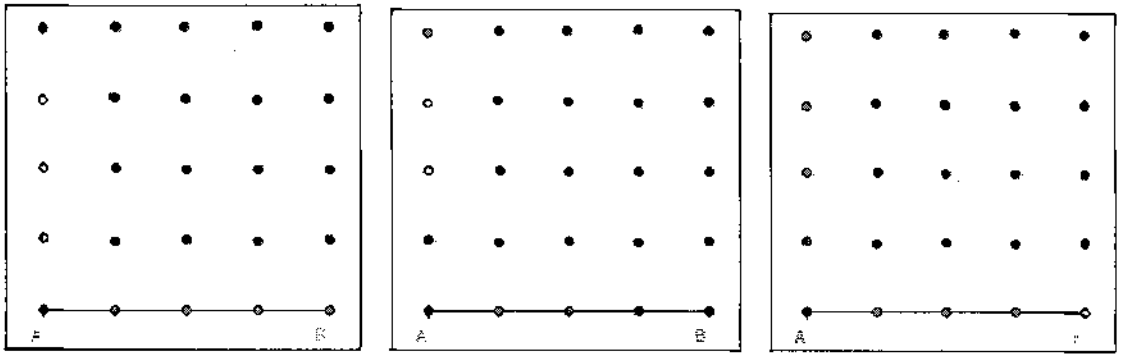
Acute Scalene
Obtuse Isosceles
Right Equilateral

Directions: Build the segment AB on a geoboard. Then use the segment to complete the exercise.

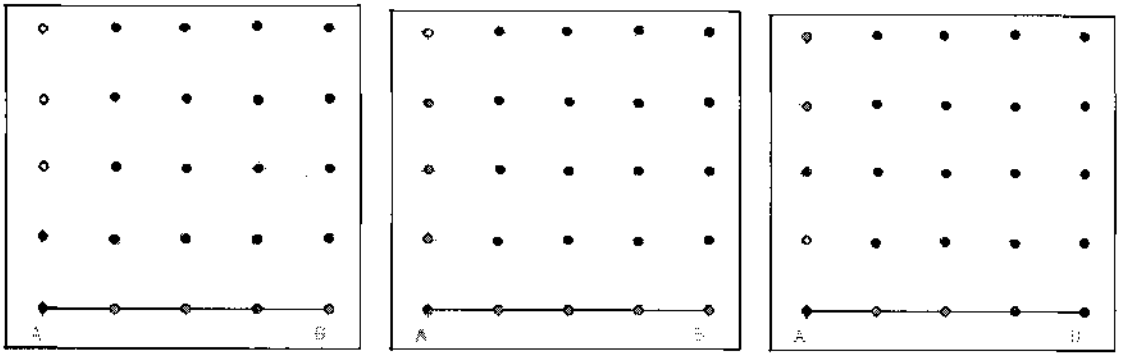
7.) Find three locations for a point P, above segment AB, so that triangle APB is a right triangle. Record your answers.



8.) Find three locations for a point P, above segment AB, so that triangle APB is acute triangle. Record your answers.



9.) Find three locations for a point P, above segment AB, so that triangle APB is obtuse triangle. Record your answers.



10.) How many triangles can be built on a geoboard that meet these conditions?

a.) Point P is above segment AB and triangle APB is a right triangle. _____

b.) Point P is above segment AB and triangle APB is an acute triangle. _____

c.) Point P is above segment AB and triangle APB is an obtuse. _____

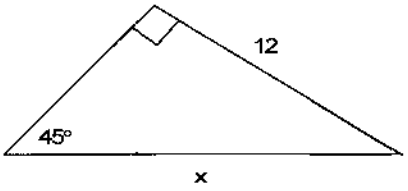
Adopted from Math Explorations

❖ Lesson 4

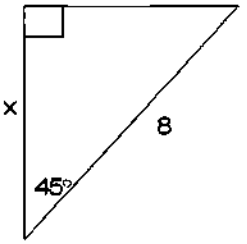
Examples for the teacher to do with the students

Find the value for x.

1.)

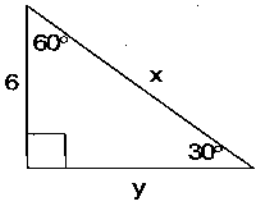


2.)

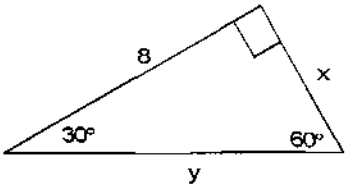


Find the values of x and y.

3.)

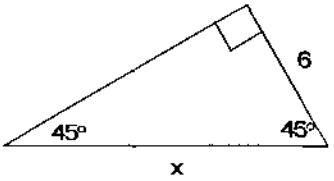


4.)

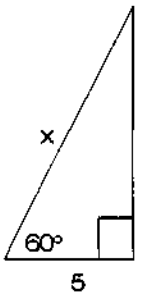


Examples for the students to try

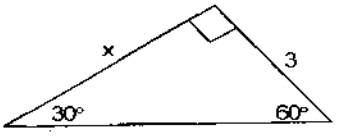
1.)



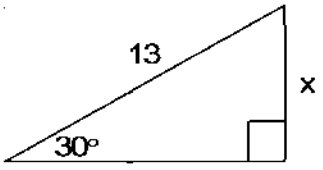
2.)



3.)



4.)

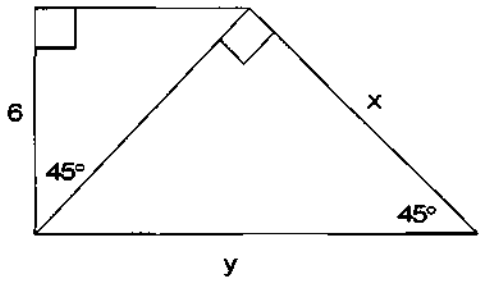


Question 1

Group names: _____ Date: _____

Directions: As a group complete the following problem. Show all your work. DO NOT look at anyone else's answers and when you are finished put your answer in the envelope.

Find the values of x and y

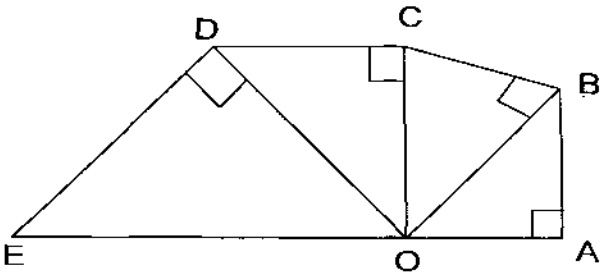


Question 2

Group names: _____ Date: _____

Directions: As a group complete the following problem. Show all your work. DO NOT look at anyone else's answers and when you are finished put your answer in the envelope.

The diagram shows four 45°- 45°- 90° triangles. If OA = 1, find OB, OC, OD, and OE.



Question 3

Group names: _____ Date: _____

Directions: As a group complete the following problem. Show all your work. DO NOT look at anyone else's answers and when you are finished put your answer in the envelope.

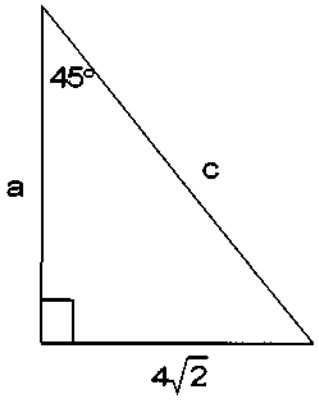
An altitude of an equilateral triangle has length $6\sqrt{3}$. What is the perimeter of the triangle?

Question 4

Group names: _____ Date: _____

Directions: As a group complete the following problem. Show all your work. DO NOT look at anyone else's answers and when you are finished put your answer in the envelope.

Find the value of a and c in the diagram below.

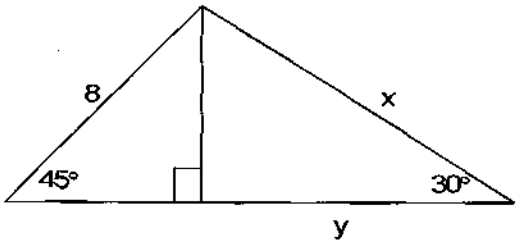


Question 5

Group names: _____ Date: _____

Directions: As a group complete the following problem. Show all your work. DO NOT look at anyone else's answers and when you are finished put your answer in the envelope.

Find the value of x and y in the diagram below.

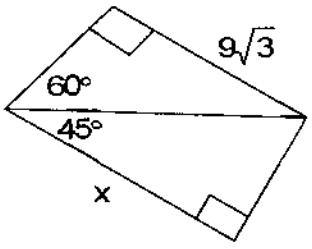


Name: _____ Date: _____

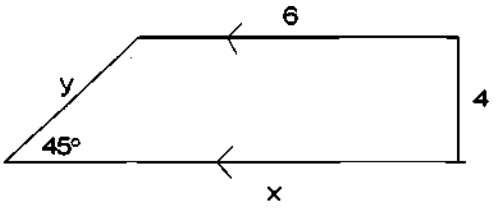
Special Triangles Worksheet

Find the lengths of the missing sides

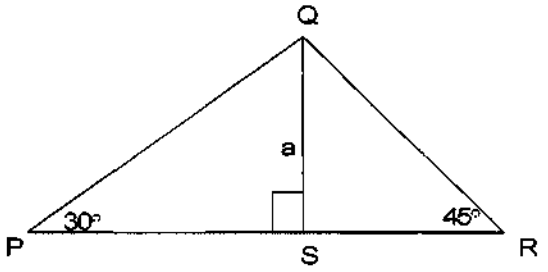
1.)



2.)

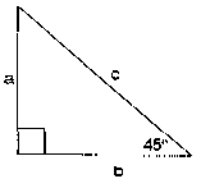


3.) Express PQ, PS, and QR in terms of a



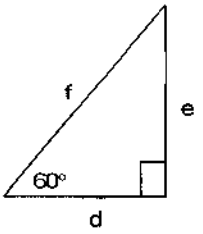
4.) If the measures of the angles of a triangle are in the ratio 1: 2: 3, are the lengths of the sides in the same ratio? Explain.

5.) Copy and complete the table using the diagram.



a	4		$\sqrt{5}$					
b		$\frac{2}{3}$					$+\sqrt{2}$	
c				$3\sqrt{5}$	6	$\sqrt{14}$		5

6.) Copy and complete the table



d	**7**	$\frac{1}{4}$	
e			$5\sqrt{3}$
f			

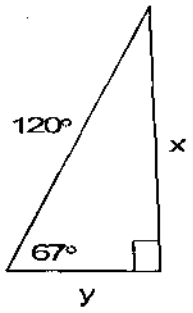
Adopted from the Geometry text

❖ Lesson 6

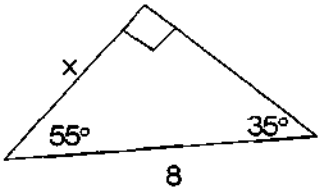
Example for the teacher to do with the students- Sine Function

Find the value of x.

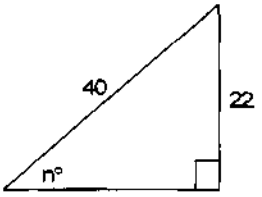
1.)



2.)

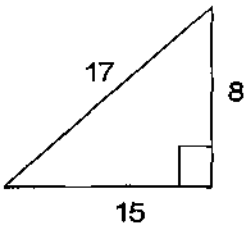


3.)



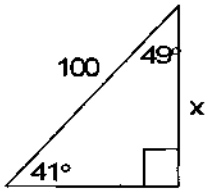
Examples for students to try

1.) Express Sin A as a fraction

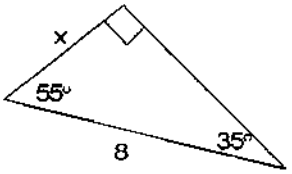


State the equation using the sine function that can be used to find x.

2.)



3.)



4.) Use the table to complete the statements.

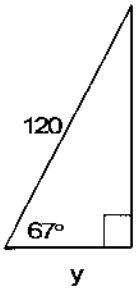
Sin 24° ≈ _____ Sin _____ ≈ 0.1045

Sin 87° ≈ _____

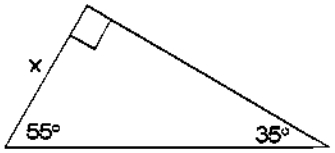
Examples for the teacher to do with the students- Cosine Function

Find the value for y.

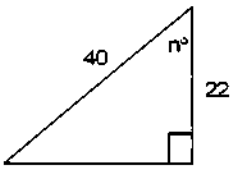
1.)



2.)



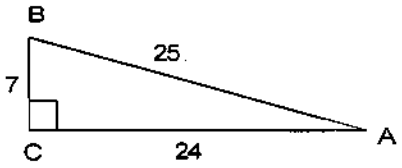
3.)



Examples for the students to try

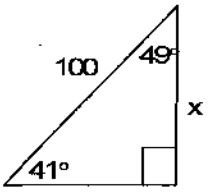
Express cos A as a fraction

1.)

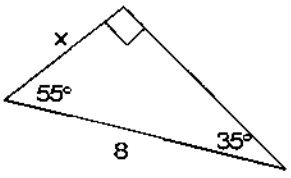


State the equation using the sine function that can be used to find x.

2.)



3.)



4.) Use the table to complete the statements.

Cos 57° ≈ _____

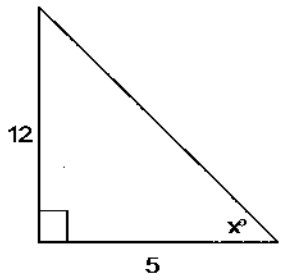
Cos _____ ≈ 0.1500

Cos ____° ≈ 0.9659

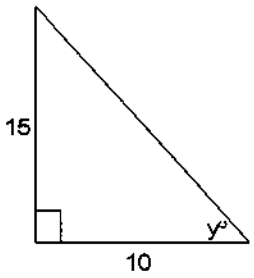
Examples for the teacher to do with the students- Tangent Function

Find tan x or tan y.

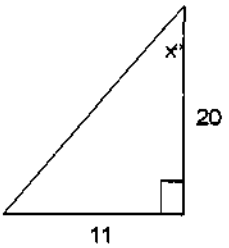
1.)



2.)



3.)



4.) A kite is flying at an angle of elevation of about 40°. All 80m of string have been let out. Ignoring the sag in the string, find the height of the kite to the nearest 10m.

Examples for the students to try

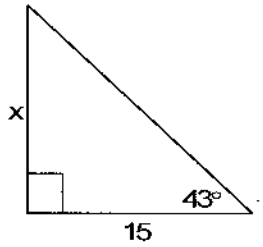
1.) Use the table to complete the statements.

Tan 35° ≈ _____ Tan _____ ≈ 1.6643

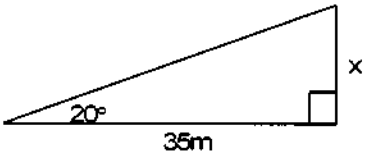
Tan ____° ≈ 0.7002

Find tan x

2.)



3.)



4.) Martha is 180cm tall and her daughter Heidi is just 90cm tall. Who casts the longer shadow, Martha when the sun is 70° above the horizon, or Heidi when the sun is 35° above the horizon? How much longer?

Station 1 Worksheet

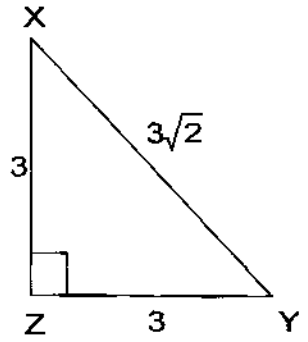
Name: _____ Date: _____

Sine Function

Use your calculator and the inverse sine function to find the angle for 1-3. Make sure your calculator is in degree mode!

1.) $\sin^{-1} 0.86 =$ _____ 2.) $\sin^{-1}\left(\frac{-5}{8}\right) =$ _____ 3.) $\sin^{-1} 0.5 =$ _____

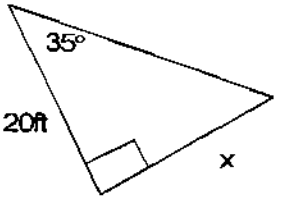
4.)



Sin Y = _____

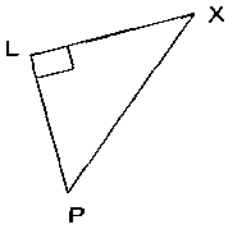
5.) Sine *is the* _____ *over the* _____

6.) Which trig ratio would be best to use to solve for x in the right triangle below? Why?



Find the value of x using the sine of the given angle.

7.)

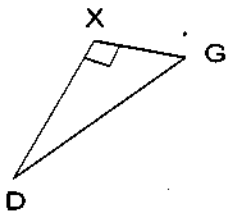


$\angle X = 54.25°$

PL = x

PX = 17.62

8.)

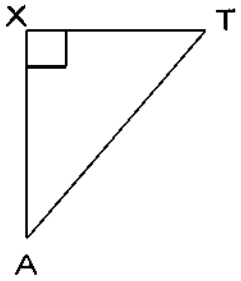


$\angle G = 65.6°$

DG = x

DX =10.6

9.)

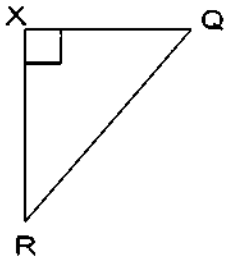


$\angle A = 85.9°$

AT = x

TX = 3.0

10.)



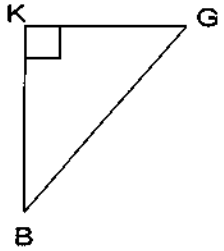
QX = 4.5

RQ = 6.22

RX = 4.3

$\sin \_\_\_\_\_ = \frac{4.3}{6.22}$

11.)



BK = 17.7

GK = 17.7

BG = 25.03

$\sin \_\_\_\_\_ = \frac{17.7}{25.03}$

Adopted from Edhelper

Station 2 Worksheet

Name: _____ Date: _____

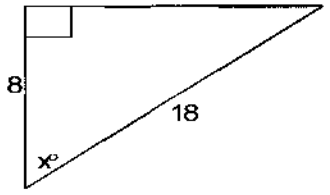
Cosine Function

Use your calculator and the inverse sine function to find the angle for 1-3. Make sure your calculator is in degree mode!

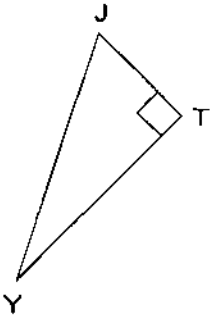
1.) $\cos^{-1} 0.1 =$ _____ 2.) $\cos^{-1}\left(\frac{1}{8}\right) =$ _____ 3.) $\cos^{-1} 0.3 =$ _____

4.) Cosine is the _____ over _____.

5.) Which trig ratio would be best to use to solve for c in the right triangle below and why?



6.) Find cos Y



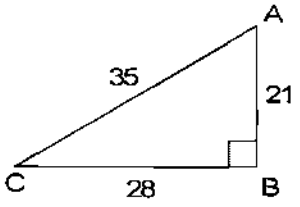
TJ = 0.23

YJ = 0.41

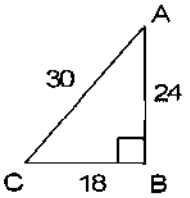
YT = 0.34

Find the value of each trigonometric ratio to the nearest ten- thousandth.

7.)

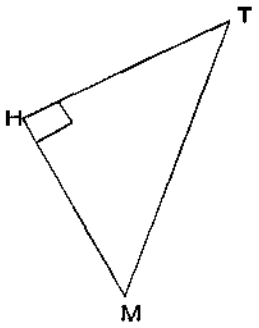


8.)



Find the value of x using the cosine of the given angle.

9.)

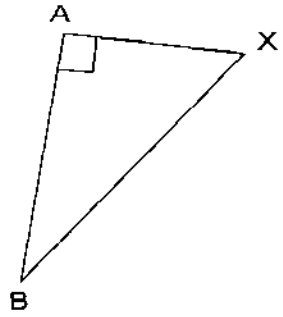


$\angle M = 57.45°$

$MT = 9.85$

$MH = x$

10.)

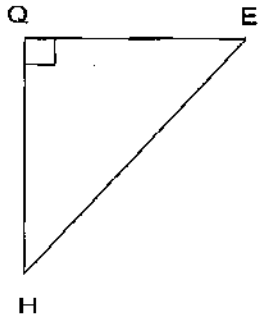


$\angle X = 58.99°$

$XA = 0.17$

$BX = x$

11.)



$\angle E = 45.72°$

$HE = x$

$EQ = 0.37$

Station 3 Worksheet

Name: _____ Date: _____

Tangent Function

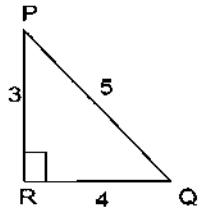
Draw pictures to help you visualize and show all your work.

1.) An advertising blimp hovers over a stadium at an altitude of 125m. The pilot sights a tennis court at an 8° of depression. Find the ground distance in a straight line between the stadium and the tennis court.

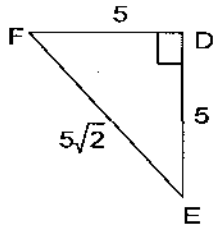
2.) An observer located 3km from a rocket launch site sees a rocket at an angle of elevation of 38°. How high is the rocket at that moment?

3.) To land, an airplane will approach an airport at a 3° angle of depression. If the plane is flying at 30,000ft, find the ground distance from the airport to the point directly below the plane when the pilot begins descending. Give your answer to the nearest 10,000ft.

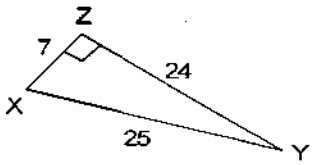
4.) Find tan P



5.) Find tan D



6.) Find tan Y



7.) Tangent is the _____ over the _____.

Use a calculator to solve. Round to the nearest degree.

8.) $\tan^{-1} 2.36 =$ _____ 9.) $\tan^{-1} 0.47 =$ _____ 10.) $\tan^{-1} 1.1 =$ _____

Station 4 Worksheet

Name: _____ Date: _____

All Three Functions

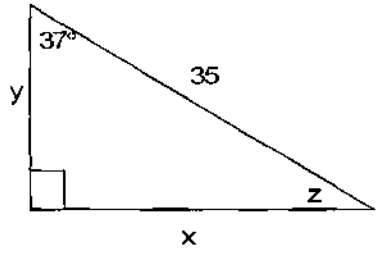
Complete the table using the diagram below.

1.) With reference to angle A, label the hypotenuse, opposite, and adjacent sides.

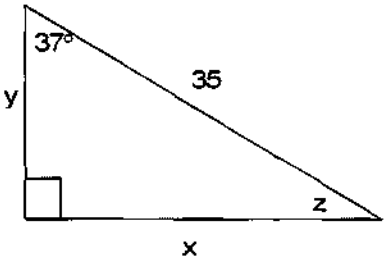
	Angle size	Tan	Cos	Sin
2	7°			
3	37.5°			
4	48°			
5	64°			
6	89°			

Find the values for x, y, and z.

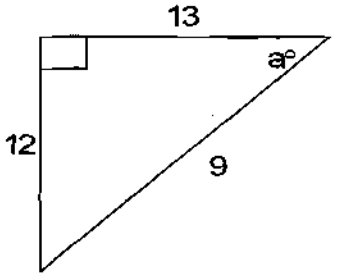
7.)



8.)



9.) Find the sin, cos, and tan of a.



Sin a = _____

Cos a = _____

Tan a = _____

Adopted from Edhelper

Table of Trigonometric Ratios

θ	sin θ	cos θ	tan θ	θ	sin θ	cos θ	tan θ
0	0	1	0	45	0.707	0.707	1
1	0.017	1	0.017	46	0.719	0.695	1.036
2	0.035	0.999	0.035	47	0.731	0.682	1.072
3	0.052	0.999	0.052	48	0.743	0.669	1.111
4	0.07	0.998	0.07	49	0.755	0.656	1.15
5	0.087	0.996	0.087	50	0.766	0.643	1.192
6	0.105	0.995	0.105	51	0.777	0.629	1.235
7	0.122	0.993	0.123	52	0.788	0.615	1.28
8	0.139	0.99	0.141	53	0.799	0.602	1.327
9	0.156	0.988	0.158	54	0.809	0.588	1.376
10	0.174	0.985	0.176	55	0.819	0.574	1.428
11	0.191	0.982	0.194	56	0.829	0.559	1.483
12	0.208	0.978	0.213	57	0.839	0.545	1.54
13	0.225	0.974	0.231	58	0.848	0.53	1.6
14	0.242	0.97	0.249	59	0.857	0.515	1.664
15	0.259	0.966	0.268	60	0.866	0.5	1.732
16	0.276	0.961	0.287	61	0.875	0.485	1.804
17	0.292	0.956	0.306	62	0.883	0.469	1.881
18	0.309	0.951	0.325	63	0.891	0.454	1.963
19	0.326	0.946	0.344	64	0.899	0.438	2.05
20	0.342	0.94	0.364	65	0.906	0.423	2.145
21	0.358	0.934	0.384	66	0.914	0.407	2.246
22	0.375	0.927	0.404	67	0.921	0.391	2.356
23	0.391	0.921	0.424	68	0.927	0.375	2.475
24	0.407	0.914	0.445	69	0.934	0.358	2.605
25	0.423	0.906	0.466	70	0.94	0.342	2.747
26	0.438	0.899	0.488	71	0.946	0.326	2.904
27	0.454	0.891	0.51	72	0.951	0.309	3.078
28	0.469	0.883	0.532	73	0.956	0.292	3.271
29	0.485	0.875	0.554	74	0.961	0.276	3.487
30	0.5	0.866	0.577	75	0.966	0.259	3.732
31	0.515	0.857	0.601	76	0.97	0.242	4.011
32	0.53	0.848	0.625	77	0.974	0.225	4.331
33	0.545	0.839	0.649	78	0.978	0.208	4.705
34	0.559	0.829	0.675	79	0.982	0.191	5.145
35	0.574	0.819	0.7	80	0.985	0.174	5.671
36	0.588	0.809	0.727	81	0.988	0.156	6.314
37	0.602	0.799	0.754	82	0.99	0.139	7.115
38	0.616	0.788	0.781	83	0.993	0.122	8.144
39	0.629	0.777	0.81	84	0.995	0.105	9.514
40	0.643	0.766	0.839	85	0.996	0.087	11.43
41	0.656	0.755	0.869	86	0.998	0.07	14.301
42	0.669	0.743	0.9	87	0.999	0.052	19.081
43	0.682	0.731	0.933	88	0.999	0.035	28.636
44	0.695	0.719	0.966	89	1	0.017	57.29
45	0.707	0.707	1	90	1	0	∞

Adopted from http://www.ocf.berkeley.edu/~gordeon/statstrig.html

Appendix D- Out of Class Practice

❖ Lesson 1

Name: _____ Date: _____

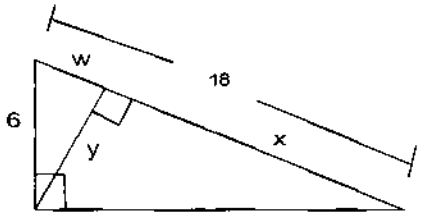
Geometric Mean Worksheet

Simplify.

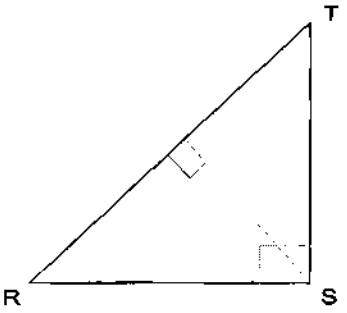
1.) $5\sqrt{18}$ 2.) $\sqrt{\frac{2}{3}}$ 3.) $\frac{15}{\sqrt{15}}$

Find x, w, y, and z.

4.)



Use the diagram to complete questions 5- 8.



5.) If $m\angle R = 30$, then $m\angle RSU =$ _____

$m\angle TSU =$ _____, and $m\angle T =$ _____

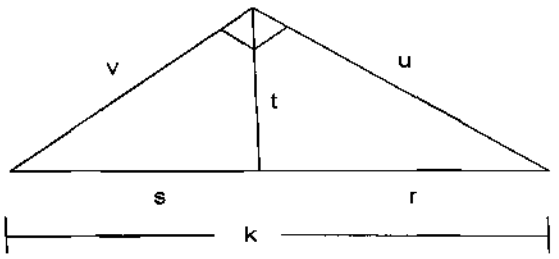
6.) If $m\angle R = k$, then $m\angle RSU =$ _____

$m\angle TSU =$ _____, and $m\angle T =$ _____

7.) $\Delta RST \sim \Delta$_____ $\sim \Delta$_____

8.) $\Delta RSU \sim \Delta$_____ $\sim \Delta$_____

Study the diagram. Then complete each statement.



9.) U is the geometric mean between _____ and _____.

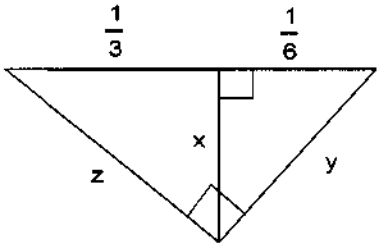
10.) T is the geometric mean between _____ and _____.

Find the geometric mean between two numbers.

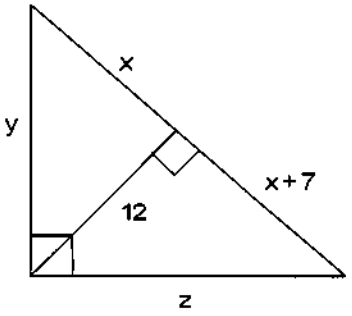
11.) 16 and 24 12.) 49 and 25 13.) 2 and 18

Find the values of x, y, and z

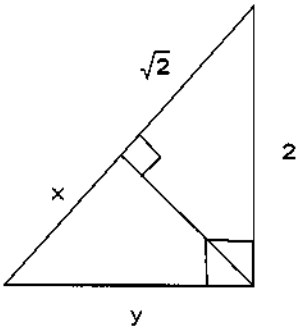
14.) x = _____ y = _____ z = _____



15.) x = _____ y = _____ z = _____



16.) x = _____ y = _____ z = _____



Adopted from the Geometry text

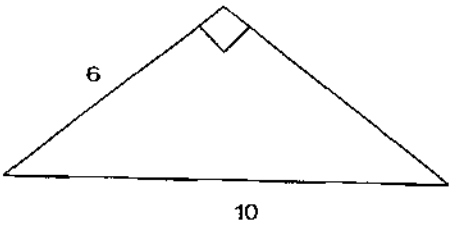
❖ Lesson 3

Name: _____ Date: _____

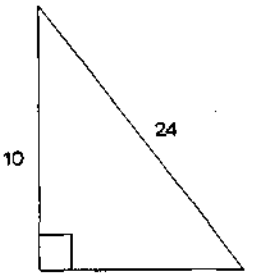
Common, Obtuse, and Acute Triangles

Find the missing side. Is it a common right triangle?

1.)



2.)



If a triangle is formed with sides having the lengths given, is it acute, right, or obtuse? If a triangle can't be formed, say not possible.

3.) 0.6, 0.8, 1

4.) 5n, 12n, 13n where $n > 0$

5.) 0.5, 1.2, 1.3

6.) 9, 9, 13

7.) $\sqrt{7}, \sqrt{7}, \sqrt{14}$

8.) 8, 14, 7

9.) In a triangle the measure of two angles is 30° and 40°. What is the measure of the third angle?

What type of triangle would this be? Why?

Fill in the blanks

10.) Right triangles have exactly 1 _____.

Obtuse triangles have one exactly 1 _____.

Acute triangles have all three angles _____.

11.) What kind of triangle has sides of length 12, 13, and 18?

a.) an obtuse triangle b.) a right triangle

c.) an acute triangle d.) an impossibility

Adopted from the Geometry text

❖ Lesson 4

Name: _____ Date: _____

Special Right Triangle Homework

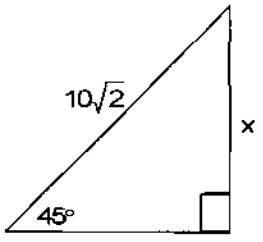
Draw a picture when necessary and show all your work.

1.) A regular hexagon is composed of 12 congruent 30°- 60°- 90° triangles. If the length of the hypotenuse of one of those triangles is $18\sqrt{3}$, find the perimeter of the hexagon.

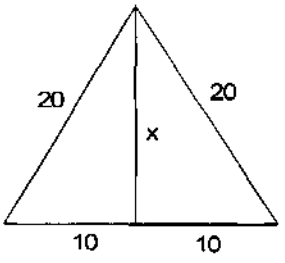
2.) A baseball diamond is in the shape of a square, with the distance between consecutive bases of 90 feet. The second baseman wants to make an out at home plate. How far must he throw the ball?

Find the value of x

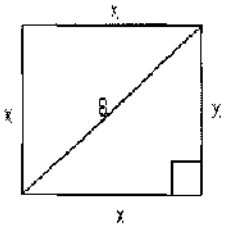
3.)



4.)

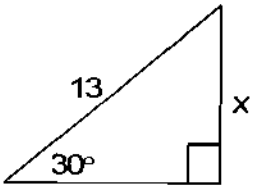


5.)

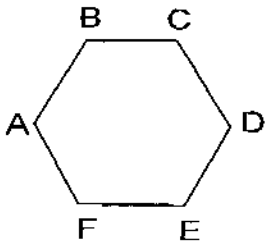


Find x.

6.)



7.) In regular hexagon ABCDEF, AB = 8. Find AD and AC.



Adopted from the Geometry text

Appendix E- Assessment

❖ Lesson 5

Name: _____ Date: _____

Quiz- Right Triangles and Trigonometry Unit

1.) Find the geometric mean between 12 and 3

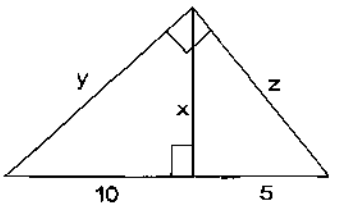
Use the diagram to help you answer questions 2- 4

2.)

x = _____

y = _____

z = _____



3.) The legs of a right triangle are 3 and 6. Find the length of the hypotenuse.

4.) The legs of an isosceles triangle are 1o units long and he altitude to the base is 8 units long. Find the length of the base.

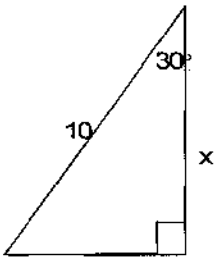
5.) The diagonal of a square has length 14. Find the length of a side.

Tell whether a triangle formed with the sides having the lengths named is acute, right, or obtuse. If a triangle can't be formed, write not possible.

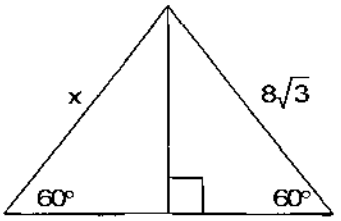
6.) 4, 6, 5 7.) $2\sqrt{3}, 3\sqrt{2}, 6$ 8.) 8, 8, 16

Find the value of x.

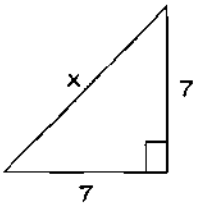
9.)



10.)



11.)



12.) The legs of an isosceles right triangle have length 12. Find the lengths of the hypotenuse and the altitude to the hypotenuse.

13.) Right triangles have exactly 1 _____.

14.) Obtuse triangles have one exactly 1 _____.

15.) Acute triangles have all three angles _____.

❖ Lesson 8

Name: _____ Date: _____

Right Triangle and Trigonometry Exam

1.) Sine is the _____ over the _____.

2.) Cosine is the _____ over the _____.

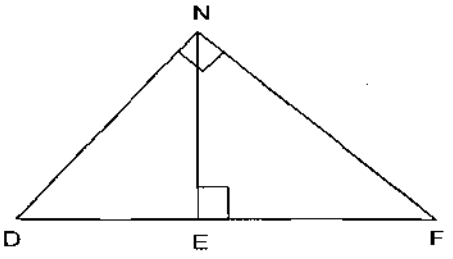
3.) Tangent is the _____over the _____.

Find the geometric mean between the numbers

4.) 5 and 20

5.) 2 and 6

In the diagram, $\angle DNF$ is a right angle and NE is perpendicular to DF



6.) $\Delta DNF \sim \Delta$_____, and $\Delta DNF \sim \Delta$_____.

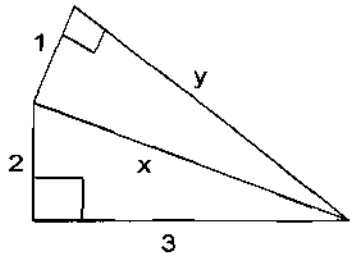
7.) NE is a geometric mean between _____ and _____.

8.) NF is the geometric mean between _____ and _____.

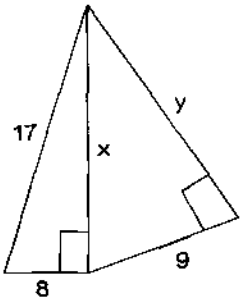
9.) If DE = 10 and EF = 15, then ND = _____.

Find the values for x and y.

10.)



11.)



Tell whether a triangle formed with sides having the lengths named is acute, right, or obtuse. If a triangle can't be formed, write not possible.

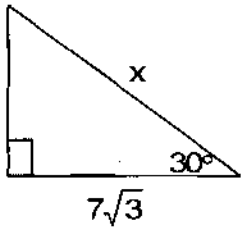
12.) 3, 4, 8

13.) $\frac{3}{5}, \frac{4}{5}, 1$

14.) 7, 7, 10

Find the value of x.

15.)



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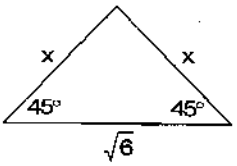

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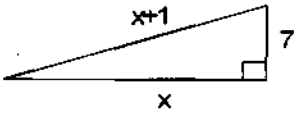
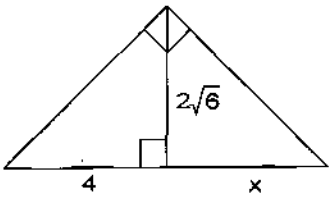
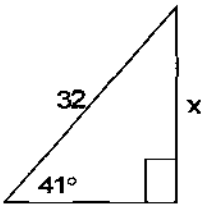


18.)



Find lengths correct to the nearest integer and angles correct to the nearest degree.

19.)



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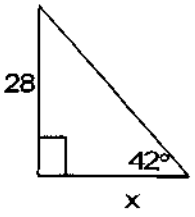

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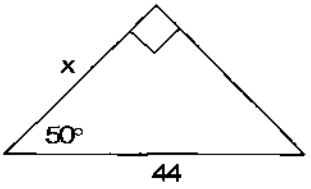

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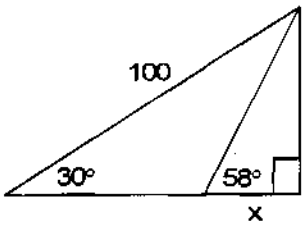


23.) From the top of a lighthouse 18m high, the angle of depression to sight a boat is 4°. What is the distance between the boat and the base of the lighthouse?

Find the value of each trigonometric ratio to the nearest ten- thousand.

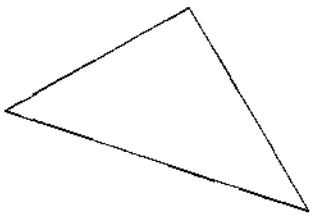
24.) cos 59° = _____ 25.) tan 57° = _____ 26.) tan 12° = _____

27.) sin 89° = _____ 28.) $\cos^{-1} 0.72$ = _____ 29.) $\sin^{-1}\left(\frac{-3}{4}\right)$ = _____

30.) $\tan^{-1} 0.53$ = _____

Classify the following triangles with obtuse, right, and acute.

31.)



32.)

33.)

Appendix G- Bibliography

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