Performance Based Learning and Assessment Task

Rom/Com Final Scene

I. ASSESSSMENT TASK OVERVIEW & PURPOSE:

The purpose of this task is for students to demonstrate their knowledge of the use of trigonometry and the Pythagorean Theorem for solving triangles in situations other than the normal worksheet problem

II. UNIT AUTHOR:

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III. COURSE:

Geometry

IV. CONTENT STRAND:

Geometry

V. OBJECTIVES:

1. Using prior knowledge of the Pythagorean Theorem and trigonometric ratios students will correctly sketch and label the diagram, identify the correct trigonometric ratio to use in order solve the problems posed and complete the given tasks

VI. REFERENCE/RESOURCE MATERIALS:

1. Review sheet for solving triangles using both the Pythagorean Theorem and trigonometric ratios (attached)
2. Calculators
3. Primary Task Worksheet (attached)

VII. PRIMARY ASSESSMENT STRATEGIES:

The students will start off the class with the review sheet in order to practice the skills they will need in order to complete the assignment. The teacher will observe the students as they work on the review sheet in order to address any problems/questions that may arise. After completion students will then self-check their own worksheets as the solutions are gone over. Volunteers will be called upon to show their correct solutions as needed.

Checklist for the students in order for them to see if they are meeting all of the components for the Primary Task. This checklist will act as the grading rubric for the teacher upon completion of the Primary Task.

VIII. EVALUATION CRITERIA:

Attached for the task. Benchmarks of exemplary work and scoring rubric

IX. INSTRUCTIONAL TIME:

One and a half 90 minute blocks.

Rom/Com Final Scene

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Geometry

Mathematical Objective(s)
Applying Pythagorean Theorem and Trigonometric ratios to find missing sides of a triangle

Related SOL G. 8 The student will solve real-world problems involving right triangles by using the Pythagorean Theorem and its converse, properties of special right triangles, and right triangle trigonometry

NCTM Standards
- Create and critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.
- Use trigonometric relationships to determine lengths and angle measures.
- Apply and adapt a variety of appropriate strategies to solve problems
- Communicate mathematical thinking coherently and clearly to peers, teachers, and others

Materials/Resources
- Review sheet for Pythagorean Theorem and Trigonometric Ratios
- Task worksheet (in class)
- Group Homework Sheet
- Presentation Boards
- calculators

Assumption of Prior Knowledge
- Students should have had practice with using the Pythagorean Theorem and Trigonometric Ratios to fine missing sides of triangles
- Proper setup of calculators (degree mode as opposed to radian)

Introduction: Setting Up the Mathematical Task

- In this activity you will be given a worksheet in order to review your knowledge of the Pythagorean Theorem and Trigonometric Ratios (worksheet attached)
- You will be given the following scenario (worksheet attached): Joe Cool and Susie Gold are on diagonally opposite sides of a 28 foot wide street. Joe is looking up at Susie with an angle of elevation of 36.87 degrees. You are to determine how far Joe and Susie will run in order to meet in the middle of the street. Show the diagram, label the parts and perform the proper operation
- In part 2: You will be given an additional fact: The streets length is 28 feet. Using another method verify your results from Part 1 of the problem. Additionally, you are to determine how far Joe and Susie would run if they did not head diagonally towards each other. Again, show the diagram, label the parts and perform the proper operation. In this part you will be asked to contrast the difference in the length of their runs.

- In part 3: The director is given more money for a longer scene: This time using the same angle as part 1 determine the length of Joe and Susie's run if the street is made to be 36 feet wide instead of 28 feet wide.
- For your homework you will choose groups and create a scene in your choice of movie type in which the concept of solving for a right triangle must be used. Your problem will be placed on a presentation board depicting your scene and the problem that you came up with. A written explanation of your scene as well as the solution to your problem must accompany your board. Boards will be displayed and you will work on the problems presented by the other groups.

Student Exploration

Student/Teacher Actions:

- The student will be given a worksheet in order to practice using skills they should already possess: using the Pythagorean Theorem and Trigonometric Ratios to find missing sides of triangles
- Teacher will move around the room monitoring students' progress on review sheet
- Students will present problem answers to the class
- During the in class portion the teacher will again move around the class prompting with leading questions such as; "Does this answer our question?" The teacher will also check to make sure proper ratios are being used; "What sides are you given?", "Is this the hypotenuse, or the opposite side?"

Monitoring Student Responses

- Students will present answers to review questions verbally and display needed problems on the board to the whole group
- Students will turn in labelled diagrams and work as well as grammatically correct statements at the end of class.
- During the next class students will turn in the written portion of their homework and display their boards.

Assessment List and Benchmarks

Assessment List: Part 1

Element	0	1	2
Picture Drawn and Labelled	No Picture	Picture drawn with incorrect or no labels	Picture drawn with proper labels
Mathematical Calculations are correct	Incorrect calculations	Some errors on calculations	Correct calculations
Question Answered	Question not addressed	Question only partially addressed	Question answered and explanation given

Assessment List: Part 2

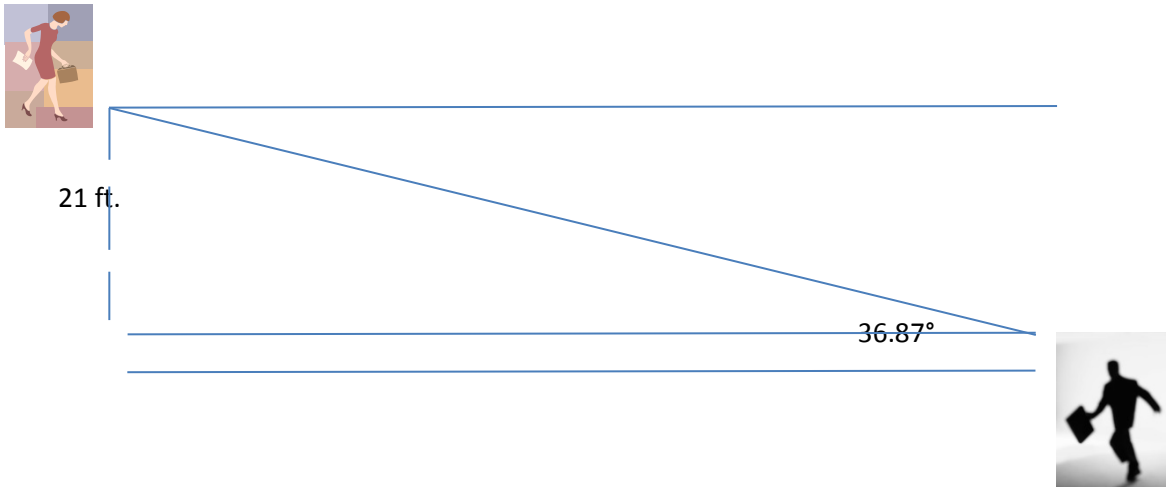
Element	0	1	2
Picture Drawn and Labelled	No Picture	Picture drawn with incorrect or no labels	Picture drawn with proper labels
Mathematical Calculations are correct	Incorrect calculations	Some errors on calculations	Correct calculations
Additional Calculations are correct	Incorrect calculations	Some errors on calculations	Correct calculations
Question Answered	Question not addressed	Question only partially addressed	Question answered and explanation given

Assessment List: Part 3

Element	0	1	2
Picture Drawn and Labelled	No Picture	Picture drawn with incorrect or no labels	Picture drawn with proper labels
Mathematical Calculations are correct	Incorrect calculations	Some errors on calculations	Correct calculations
Question Answered	Question not addressed	Question only partially addressed	Question answered and explanation given

SOL: G.8

1. While filming a big budget romantic/comedy the director is told by the studio that he is way over budget and that he has to wrap up the shoot as soon as possible in order to keep the cost down. In the final scene the characters of Susie Silver and Joe Cool are to start on opposite ends and sides of a street and run to each other in order to meet in the middle of the street (diagram below). The set people have set up the street to have a perpendicular distance of 21 feet between sidewalks making Joe look up the street toward Susie at an angle of 36.87 degrees. How far will Joe and Susie have to run in order to meet in the middle of the street?

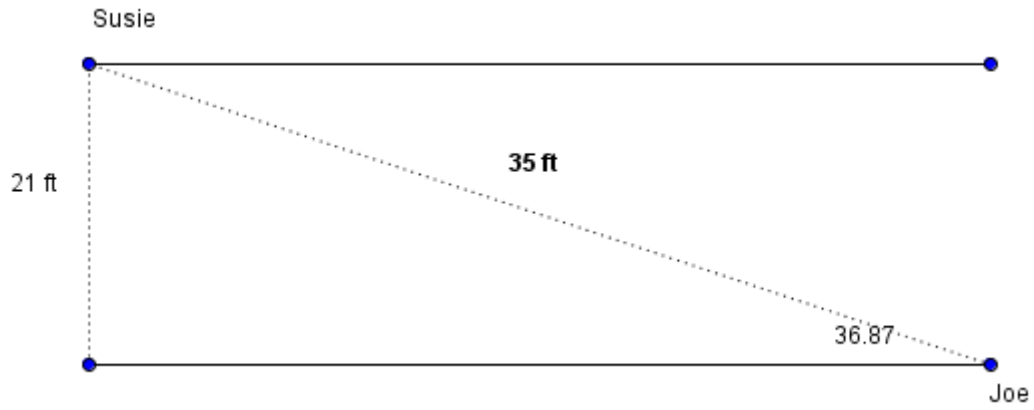


Part 2: If you know that the streets length is 28 feet what is another method you could use to find out how far Susie and Joe would have to run in order to meet in the middle of the street?

By how much would the distance Susie and Joe would have to run change if instead of heading diagonally they both decided to run halfway down the sidewalk then turn and meet in the middle of the street? Which way should the characters run in order to travel the shortest distance?

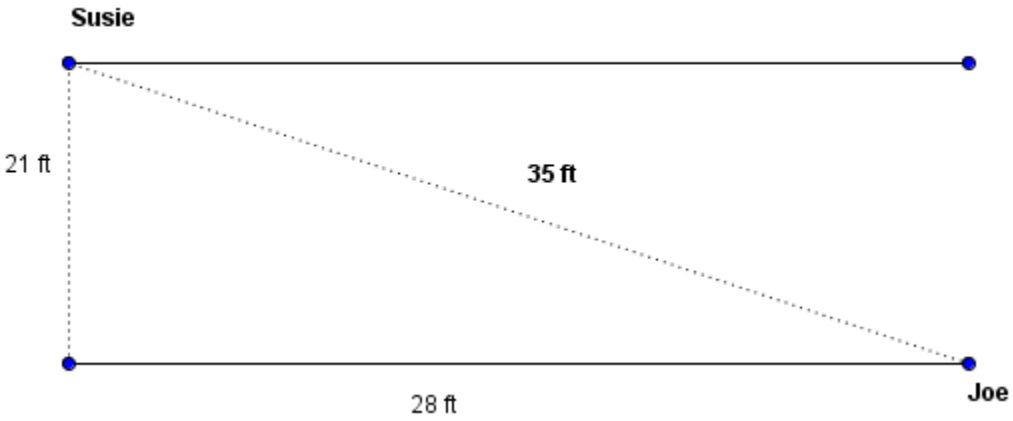
Part 3: After reviewing the movie the studio decides to give the director more money in order to have the movie he wants. The director wants to increase the drama of the scene by having Susie and Joe run longer distance. He then has the scene reshot with a wider street, this time with a distance of 36 feet between sidewalks. In this new scene how far will Susie and Joe have to run in order to meet in the middle of the street if the parameters remain the same from the first problem?

Part 1.



Sin 36.87° = $\frac{21}{x}$ → 34.999 ≈ 35 feet. Joe and Susie each will only have to run 17.5 feet each

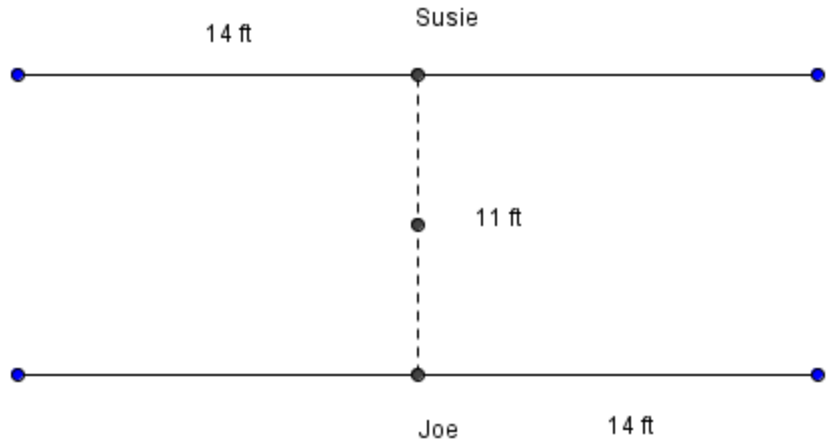
Part 2.



$21^2 + 28^2 = x^2$ since you were given 2 sides of the triangle you could use the Pythagorean Theorem to find the missing

$1225 = x^2$ side (the hypotenuse).

35 = x as before, Joe and Susie would only have to run 17.5 feet each.

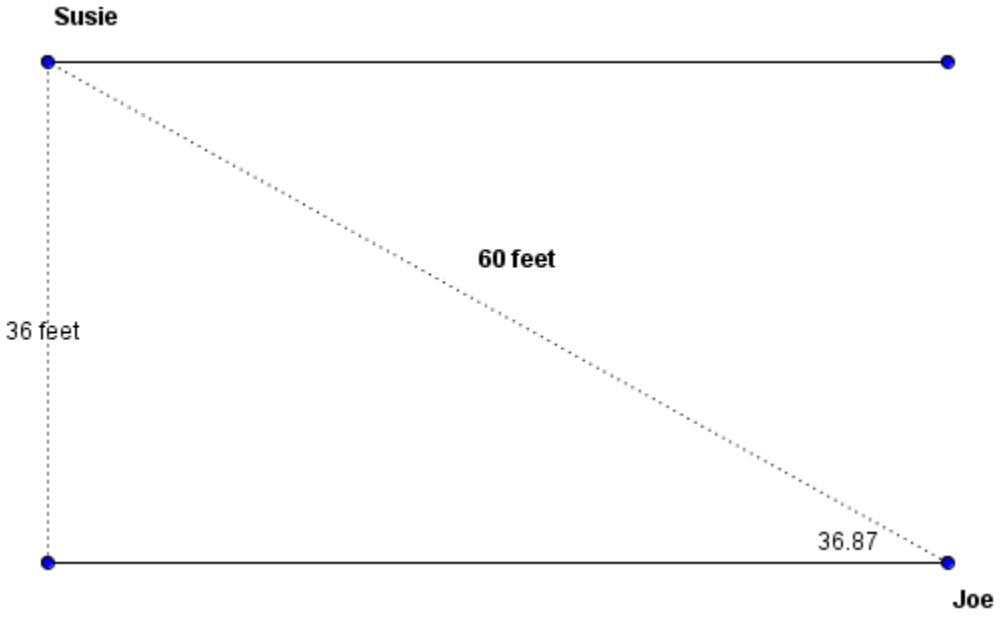


In this scenario Joe and Susie would have to run 25 feet each to meet in the middle of the street.

If Joe and Susie ran diagonally they each would only have to run 17.5 feet. But if they ran down the sidewalk then towards each other the distance would be 25 feet for each of them. The difference would be 7.5 feet.

In order to have the shortest distance they should run diagonally towards each other.

Part 3.

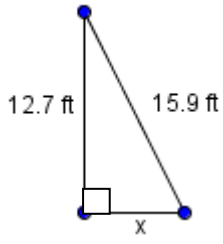


Sin 36.87° = $\frac{36}{x}$ ≈ 60. In the director's cut Joe and Susie would each have to run 30 feet in order to meet in the middle of the street.

 Name:_____

Find the missing side for each triangle. Round your answers to the nearest hundredth.

1)



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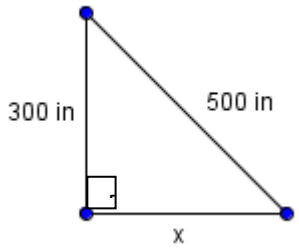

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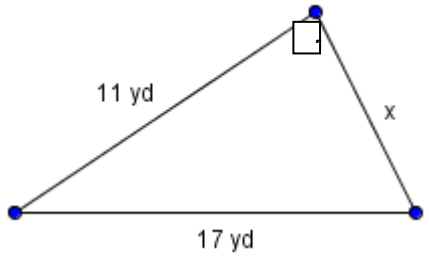

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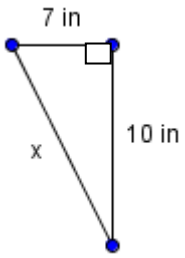
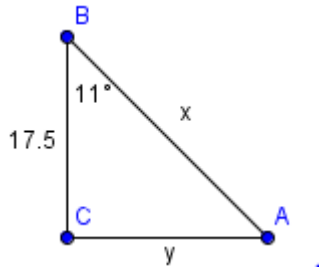


Using the correct trigonometric ratios find the missing sides of each triangle below. Round your answers to the nearest hundredth (C = 90°)

1)



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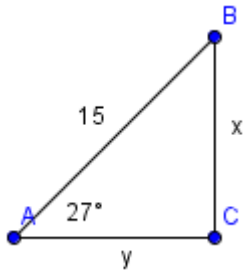

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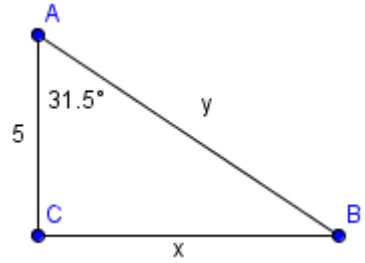

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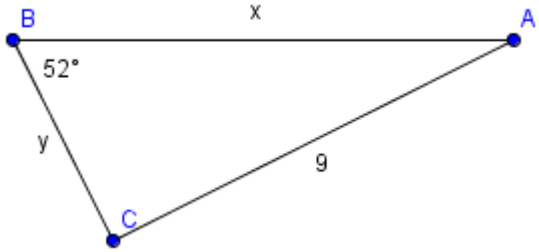

Review Sheet Key:

Part 1:

1) $15.9^2 = 12.7^2 + x^2$

$\sqrt{15.9^2 - 12.7^2} = x$

9.57 ft ≈ x

2) $500^2 = 300^2 + x^2$

$\sqrt{500^2 - 300^2} = x$

400.00 in ≈ x

3) $17^2 = 11^2 + x^2$

$\sqrt{17^2 - 11^2} = x$

12.96 yd ≈ x

4) $7^2 + 10^2 = x^2$

$\sqrt{7^2 + 10^2} = x$

12.21 in ≈ x

Part 2:

1) Cos 11 = $\frac{17.5}{x}$ Tan 11 = $\frac{y}{17.5}$

x ≈ 17.83 y ≈ 3.40

2) Sin 27 = $\frac{x}{15}$ Cos 27 = $\frac{y}{15}$

x ≈ 6.81 y ≈ 13.37

3) Tan 31.5 = $\frac{x}{5}$ Cos 31.5 = $\frac{5}{y}$

x ≈ 3.06 y ≈ 5.86

4) Sin 52 = $\frac{9}{x}$ Tan 52 = $\frac{9}{y}$

x ≈ 11.42 y ≈ 7.03

For this assignment you will work in groups of no more than 3 and design your own scene, which in some way will involve solving for sides of right triangles. You may choose any type of movie you wish.

Expectations:

You will create a scene from any type of movie you like and depict it on the provided presentation board. Be as creative as you like, but the scene must include a scenario in which missing sides of right triangles are represented and need to be found. Along with the board you are to provide (on a separate sheet of paper) a written solution and explanation to your problem. Complete sentences are a must.

Scoring Rubric:

Element	**0**	**1**	**2**
Problem is given	No problem is given	Problem is ambiguous	Problem is well defined
Problem is complete/labeled	Problem is not labeled	Problem is missing some labels	Problem is labeled
Presentation board is neat	Lacks neatness	Needs cleaned up	Neat
Written Explanation is given	No explanation	Explanation given but not in complete sentences	Explanation given in complete sentences and grammatically correct
Solution is given	No Solution given	Incomplete or incorrect solution	Complete and correct solution is given

Benchmark for Homework Assignment:

You are a spy for an intelligence agency and have just stolen a computer file from an office building. During the extraction of the file you were discovered and all the exits have been locked. The only way out of the building is to use a zip line from the office building to your getaway car parked on the sidewalk. If your zip line is only 75 feet long and the distance from the sidewalk to the building is 25 feet what floor must you get to in order to make good your escape?

A typical floor in an office building measures 10 feet in height.

Our group chose to do a scene from a spy movie. In order for the spy to escape they must reach the 7^{th} floor of the building they are trapped in. Below is the solution to our spy's dilemma.

$75^2 = 25^2 + x^2$

$5625 = 625 + x^2$

$x = \sqrt{5625 - 625}$

$x = \sqrt{5000}$

$x \approx 70.71$ feet which is roughly the equivalent of the 7^{th} floor since each floor is 10 feet high.