GEOMETRY IM INTERIM RUBRICS

2 Points:

Student response includes the following:

- Reasoning: demonstrates an understanding that $a + b + c = c + d$
- Reasoning: demonstrates an understanding that the exterior angle, d, is equal to the sum of a and b

Sample Student Response:

I know that $a + b + c = c + d$ since both equations in Part A equal 180. Thus, solving this equation for d, I know $d = a + b$.

1 Point:

1 element correct.

0 Points:

Incorrect or irrelevant response.

3 points:

Student response includes the following:

- Modeling: complete and correct work/explanation to determine the height of the larger sign (2 points)
- Computation: correct answer (1 point)

Sample Student Response:

$144 \times 1.25 = 180$

$30^2 + h^2 = 60^2$

$900 + h^2 = 3,600$

$h^2 = 2,700$

$h \approx 51.96$

The height of the larger sign is approximately 51.96 inches.

Note: Partial credit should be given for modeling if the student shows some understanding of correctly applying the Pythagorean Theorem.

Credit should be given to students who round their answer to 52 inches since the prompt does not call for rounding to a specific value.

2 points:

Complete and correct work/explanation with an incorrect answer or no answer given. Or a correct answer with partial valid work/explanation.

1 point:

Correct answer only. Or partial valid work/explanation only.

0 points:

Incorrect or irrelevant response.

2 Points:

Student response includes the following:

- Reasoning: complete and correct explanation for why $\sin X = \cos Y$ that includes trigonometric relationships with right triangles

Sample Student Response:

I know $\sin X = \cos Y$ because both are equivalent to the same ratio of side lengths. In this case, $\sin X = \frac{a}{c}$ which, from that angle, is the opposite side over the hypotenuse; and $\cos Y = \frac{a}{c}$ which, from that angle, is the adjacent side over the hypotenuse.

1 Point:

Partial correct explanation.

0 Points:

Incorrect or irrelevant response.

3 Points:

Student response includes the following:

- Correct value for the height of the building: 97.4 feet (other values that are correct to the tenth based on rounded values throughout should receive credit)
- Correct model that uses the given information
- Correct work based on the model

Sample Student Response:

I can create a model with 2 unknowns. The first is the height of the building which we can call a, and the distance from the camerawoman to the building after she moves 50 feet closer which we can call b.

This means that $\tan(37°) = \frac{a}{50+b}$ for the camerawoman in her initial position.

This also means that $\tan(52°) = \frac{a}{b}$ for the camerawoman in the second position.

Solving both equations for a results in:

$$a = (50 + b)\tan(37°)$$

and

$$a = b\tan(52°)$$

Substituting one value for a in one equation into the other yields $(50 + b)\tan(37°) = b\tan(52°)$. Solving this equation for b results in $b \approx 71.5778711085$.

This value can be substituted into the equation for the camerawoman in the second position $a = (71.5778711085)\tan(52°)$ to get $a \approx 91.6155$.

In order to find the height of the building, we must add the distance from the ground to the camerawoman's eye level which is 5.75 feet. This gives a building height rounded to the nearest tenth of 97.4 feet.

Note: An incorrect answer that is based on a computation error while working out a valid model should receive 2 points (1 for the model and 1 for the value and only lose the point for correct work).

2 Points:

2 elements correct.

1 Point:

1 element correct.

0 Points:

Incorrect or irrelevant response.

3 Points:

Student response includes the following 3 elements:

Computational component = 1 point

- Coordinates which satisfy the conditions: diagonal length is not congruent to the given diagonal length, coordinates are the same distance from the midpoint $(5, \ -0.5)$

Reasoning component = 2 points

- Explanation uses the given information
- Explanation includes a statement that is a geometric theorem or definition involving parallelograms

Sample Student Response:

The coordinates of the the endpoints for the other diagonal could be $(2, \ 2)$ and $(8, \ -3)$. I know that this makes a parallelogram because the diagonals of a parallelogram bisect each other. The midpoint of the given diagonal is $(5, \ -0.5)$ and this coincides with the midpoint of the diagonal with the endpoints I provided. Additionally, the parallelogram is not a rectangle since the diagonals of a rectangle are congruent but the diagonals of the parallelogram I have created have lengths of $\sqrt{89}$ and $\sqrt{61}$.

2 Points:

2 elements correct.

1 Point:

1 element correct.

0 Points:

Incorrect or irrelevant response.

3 Points:

Student response includes the following:

- Modeling: complete and correct work and/or explanation to determine the dimensions of the larger triangle and corresponding dimensions directly related to student modeling
- Modeling: complete and correct work and/or explanation to determine the correct angle measures, approximately 49 and 41 degrees

Sample Student Response:

Since the crowd of 22,000 people is approximately one-ninth of a crowd of 200,000 people, I want the area of the larger right triangle to be approximately nine times more than the area of the smaller triangle. Increasing the area by 9 times requires increasing the side lengths by the square root of 9 which is 3. Therefore, the dimensions of the larger right triangle would be approximately 900 feet, 1050 feet, and 1383 feet.

To determine the measures of the acute angles of the larger triangle, I can solve $\tan x = \frac{1050}{900}$ which gives $x \approx 49.4$. Then, subtracting 49.4 from 90, I get 40.6 degrees which represents the measure of the other acute angle.

2 Points:

A majority of the work/explanation is correct.

1 Point:

Some of the work/explanation is correct.

0 Points:

Incorrect or irrelevant response.

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