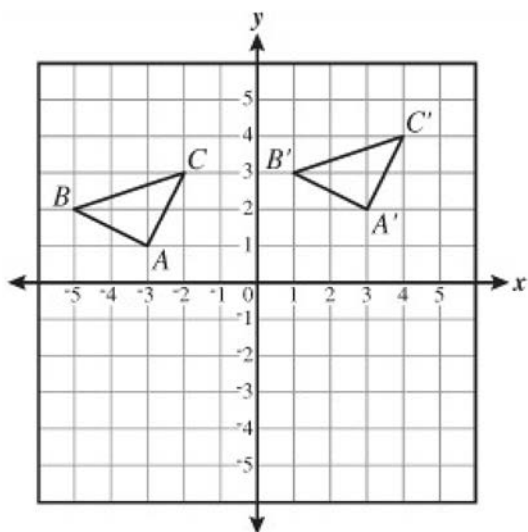


2. $\triangle ABC$ is translated to form $\triangle A'B'C'$ as shown on the coordinate plane.



What are the translations applied to $\triangle ABC$ to form $\triangle A'B'C'$?

Scoring Instructions:

Acceptable responses include

Translation 6 units right and 1 unit up

OR

$(x + 6, y + 1)$

OR equivalent

5. Isabella graphed a quadrilateral with coordinates $W(1, 1)$, $X(4, 0)$, $Y(6, -2)$, and $Z(3, -1)$ on a coordinate plane.

Part A. Use the coordinates of the points to prove that $WXYZ$ is a parallelogram.

Part B. Isabella thinks that quadrilateral $WXYZ$ is also a rectangle. Is she correct? Explain.

Use words and/or numbers to show your work.

Scoring Instructions:

Rubric:

- 2 Work demonstrates a **clear and complete** understanding of the mathematical concepts and/or procedures required by the task. Appropriate strategy is shown with clear and complete explanations and interpretations.
- 1 Response demonstrates a **partial** understanding of the mathematical concepts and/or procedures. Appropriate strategy is shown, but explanation or interpretation has minor flaws.
- OR
- Response is incorrect because of calculation errors. Work and strategy indicate a **clear** understanding of the mathematical concepts and/or procedures required by the task.
- 0 Response is irrelevant, inappropriate, or not provided.

SCORING EXEMPLAR**Maximum Points—2****Part A – 1 point**

- To prove that $WXYZ$ is a parallelogram, Isabella needs to show that the opposite sides of the quadrilateral are of equal lengths or the opposite sides are parallel. (*or other appropriate response*)

Side length $WX = \sqrt{10}$ unitsSide length $XY = \sqrt{8}$ unitsSide length $YZ = \sqrt{10}$ unitsSide length $WZ = \sqrt{8}$ units

So, the opposite sides of quadrilateral $WXYZ$ are equal since $WX = YZ$ and $XY = WZ$.

- To prove that the opposite sides of the quadrilateral are parallel, the slopes of opposite sides must be equal.

$$\text{Slope of } \overline{WX} = \frac{(0-1)}{(4-1)} = -\frac{1}{3}$$

$$\text{Slope of } \overline{YZ} = \frac{-2-(-1)}{6-3} = -\frac{1}{3}$$

$$\text{Slope of } \overline{XY} = \frac{(-2-0)}{(6-4)} = \frac{-2}{2} = -1$$

$$\text{Slope of } \overline{WZ} = \frac{(-2-0)}{(6-4)} = \frac{-2}{2} = -1$$

So, the slopes of the opposite sides \overline{WX} and \overline{YZ} are equal, and the slopes of the opposite sides \overline{XY} and \overline{WZ} are equal.

- Therefore, Isabella can prove that $WXYZ$ is a parallelogram.

or equivalent work

Part B – 1 point

- The difference between a parallelogram and a rectangle is that the adjacent sides of a rectangle are perpendicular. To prove that the adjacent sides are perpendicular, the product of the slopes of the adjacent sides must equal -1 .

The product of the slopes of the adjacent sides \overline{WX} and \overline{XY} is $-\frac{1}{3} \times (-1) = \frac{1}{3}$.

Similarly, the product of the slopes of the adjacent sides \overline{YZ} and \overline{WZ} is

$$-\frac{1}{3} \times (-1) = \frac{1}{3}$$

- Isabella is incorrect; the product of the slopes of the adjacent sides of quadrilateral $WXYZ$ do not equal -1 so it is not a rectangle.

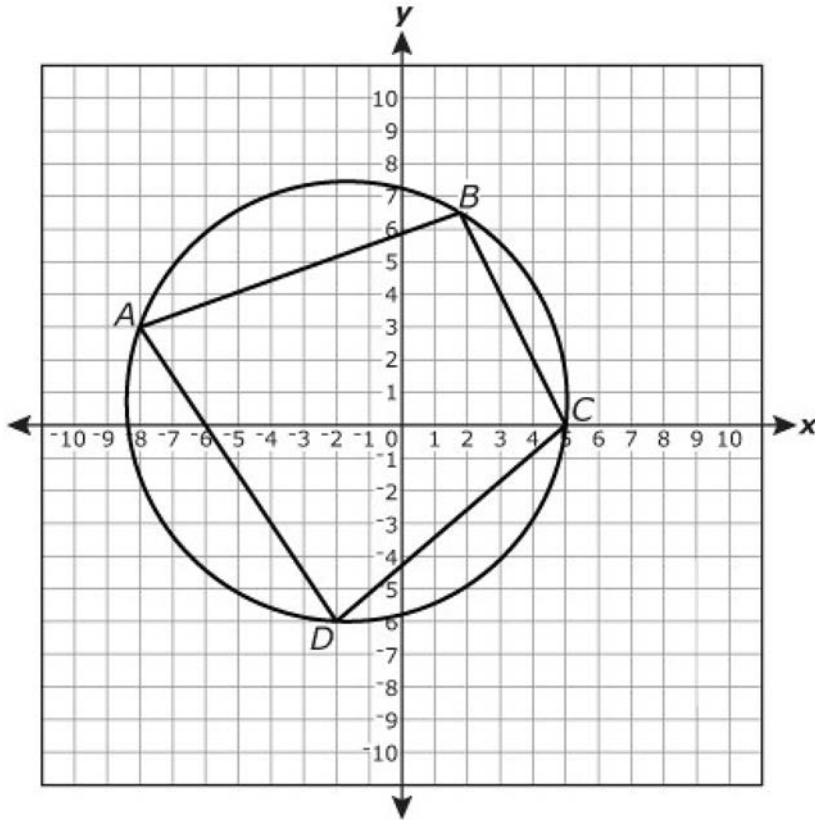
or equivalent work

8. Given points $M(4,5)$, $N(-6,10)$, and $L(-2,8)$, what is the value of the ratio $ML:LN$?

Scoring Instructions:

3:2

10. Quadrilateral ABCD is considered a cyclic quadrilateral because there is a circle passing through all four of its vertices.



What is the sum, in degrees, of $\angle A$ and $\angle C$? Explain your answer.

Scoring Instructions:

Rubric:

- 2 Work demonstrates a **clear and complete** understanding of the mathematical concepts and/or procedures required by the task. Appropriate strategy is shown with clear and complete explanations and interpretations.
- 1 Response demonstrates a **partial** understanding of the mathematical concepts and/or procedures. Appropriate strategy is shown, but explanation or interpretation has minor flaws.
- OR
- Response is incorrect because of calculation errors. Work and strategy indicate a **clear** understanding of the mathematical concepts and/or procedures required by the task.
- 1 Response is irrelevant, inappropriate, or not provided.

SCORING EXEMPLAR

Maximum Points—2

[1 point for correct number of degrees]

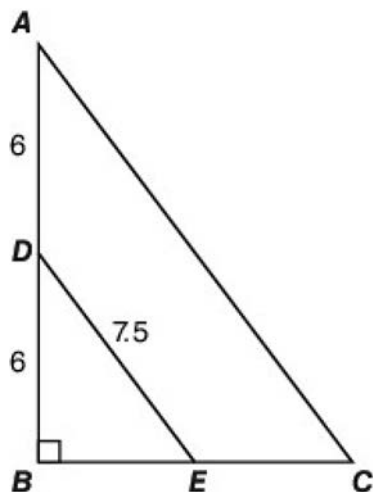
180°

[1 point for explanation]

The measure of an inscribed angle is one-half its intercepted arc. Since there are two inscribed angles that intercept arcs where the sum of their intercepted arcs is 360, one-half of that total would be 180.

or a similar explanation

14. In the figure below, $\triangle DBE \sim \triangle ABC$.



Write a proportion using the side lengths of the triangles that can be used to prove that $\cos D = \cos A$.

Scoring Instructions:

$$\frac{6}{7.5} = \frac{12}{15}$$

15. Part A. A cone is carved from a cylinder so that the cone has a volume of $4\pi \text{ ft}^3$ and a diameter of 4 ft. If the cylinder has the same height and base as the cone, find the height and the volume of the cylinder. Show your work.

Part B. A cone is carved from a cylinder. If the cylinder has the same height and base as a cone, explain how to determine the volume of the cylinder without determining the height or the size of the base.

Use words and/or numbers to show your work.

Scoring Instructions:

Rubric:

- 2 Work demonstrates a **clear and complete** understanding of the mathematical concepts and/or procedures required by the task. Appropriate strategy is shown with clear and complete explanations and interpretations.
- 1 Response demonstrates a **partial** understanding of the mathematical concepts and/or procedures. Appropriate strategy is shown, but explanation or interpretation has minor flaws.
- OR
- Response is incorrect because of calculation errors. Work and strategy indicate a **clear** understanding of the mathematical concepts and/or procedures required by the task.
- 2 Response is irrelevant, inappropriate, or not provided.

SCORING EXEMPLAR**Maximum Points—2****Part A – 1 point**

- The height of the cylinder is 3 feet, and the volume of the cylinder is $12\pi \text{ ft}^3$.

To determine the height of the cone and the cylinder, the formula for the volume of a cone can be used, so

$$V = \frac{1}{3}\pi r^2 h$$

$$4\pi = \frac{1}{3}\pi(2)^2 h$$

$$4\pi = \frac{1}{3}\pi(4)h$$

$$1 = \frac{1}{3}h$$

$$3 = h$$

To find the volume of the cylinder, $V = \pi(2)^2(3) = 12\pi$

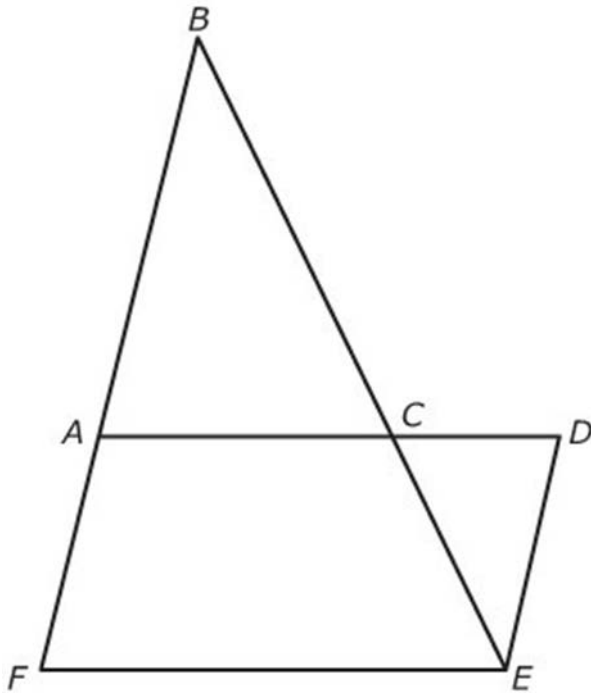
or equivalent work

Part B – 1 point

- A cone with the same height and base as a cylinder has a volume that is one-third the volume of the cylinder. To find the volume of the cylinder, multiply the volume of the cone by 3.

or equivalent work

17. In the diagram below, $\triangle ABC \sim \triangle DEC$.

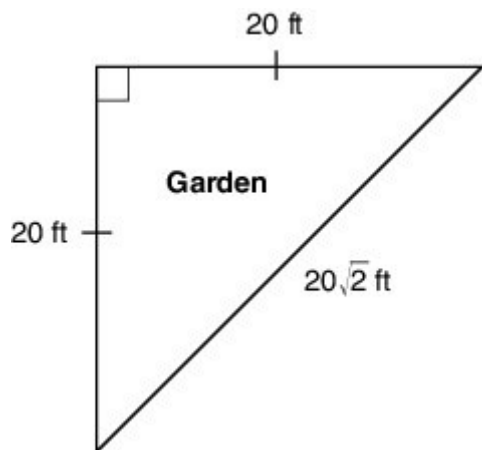


What is the most precise classification for quadrilateral $ADEF$?

Scoring Instructions:

Trapezoid

21. Mark is planting a garden in a corner of his backyard. He wants to divide the garden into different sections for different vegetables, and he wants the sections to be congruent to each other so that he is sure that the different types of plants have the same amount of space.



Part A. Sketch one segment that would divide the garden to produce two congruent triangles.

Part B. Use a paragraph proof to explain how you know that the two triangles are congruent.

Part C. Now, Mark wants to divide each of the two triangular sections in half so the garden will have a total of four congruent triangles. Sketch one possible way Mark can do this, and label the side lengths and angle measures.

Part D. Explain how you know that all four triangles are congruent, using a paragraph proof and a different congruence postulate than used in part A.

Part E. How does the side length of the original garden relate to the side length of the four small triangles? Explain, using a paragraph proof and geometric postulates to support your answer.

Place an "X" in the answer box below.

Answer the question on the Response Document provided.

Click next.

Scoring Instructions:

Teacher Instructions:

Before administration, discuss congruence and similarity criteria for triangles.

Read the problem aloud and respond to any questions.

Instruct students to use words, numbers, pictures, and/or models to show their work.

Allow 15 minutes for this task.

Make all necessary materials available.

Guide students and answer questions, but encourage independent thinking.

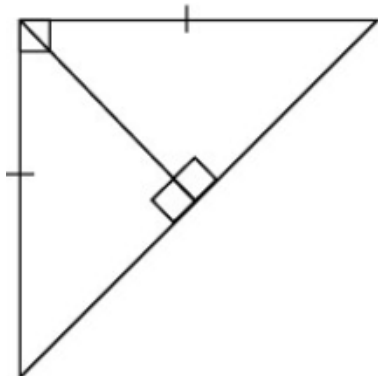
After the task, discuss answers as time permits.

Suggested Materials: Paper, pencils

SCORING EXEMPLAR

Maximum Points—5

Part A – 1 point



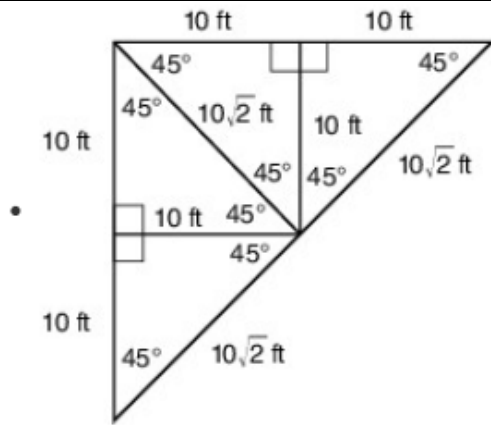
Part B – 1 point

Answers may vary. Two sample responses are shown below.

- Using ASA (angle-side-angle), we know that each triangle has a 90-degree angle, they share a side adjacent to the 90-degree angle, and they each have a 45-degree angle adjacent to the shared side.
- Using SAS (side-angle-side), we know that each triangle shares a side, each has a 45-degree angle adjacent to the shared side, and each has another adjacent side of the same length.

or equivalent work

Part C – 1 point



Part D – 1 point

Answers may vary. Two sample responses are shown below.

- Each of the four small triangles is similar to the original garden. The ratio of the lengths of the sides of the small triangle to the lengths of the sides of the original garden is 1:2, and corresponding sides are proportional. The triangles are similar by SSS proportionality.
or equivalent work

22. What is the center of a circle given by the equation: $x^2 + y^2 + 4y = 0$?

Scoring Instructions:

(0, -2)