

3. Which of these are essential characteristics needed to properly define a circle? Select all that apply and write the numbers corresponding to the characteristics in the answer space.
1. the measure of the radius
 2. a set of points on a plane
 3. a line drawn through a specified point
 4. the measure of an angle that forms a sector
 5. a central, fixed point
 6. the measure of the circumference

Scoring Instructions:

1, 2, and 5

5. The coordinates of the endpoints of \overline{AB} are $A(-2, -5)$ and $B(4, 3)$.

Part A. What are the coordinates of a point C that divides \overline{AB} such that $AC:CB$ is equal to 1:3?

Part B. Find the ratio in which the x -axis divides \overline{AB}

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**

- The point that divides the segment in a ratio of 1:3 is one-fourth of the way from $(-2, -5)$ to $(4, 3)$, so one way it can be found is by finding the midpoint and then finding the midpoint again.

Let $M(x, y)$ represent the midpoint of the line segment \overline{AB} , so M divides \overline{AB} in the ratio of 1:1.

We find $x = \frac{-2+4}{2}$ and $y = \frac{-5+3}{2}$, so the coordinates of the midpoint M are $(1, -1)$.

The point C is the midpoint of \overline{AM} .

We find $x = \frac{-2+1}{2}$ and $y = \frac{-5+(-1)}{2}$, so the coordinates of C are $(-0.5, -3)$.

or equivalent work

Part B – 1 point

- Suppose the x -axis divides \overline{AB} in the ratio of $m:n$ from A to B at point P so P will have the coordinates of $(a, 0)$.

$$\text{So, } 0 = \frac{m(3)+n(-5)}{m+n}$$

$$3m - 5n = 0$$

$$3m = 5n$$

$$\frac{m}{n} = \frac{5}{3}$$

So, the x -axis divides the line segment \overline{AB} in the ratio of 5:3.

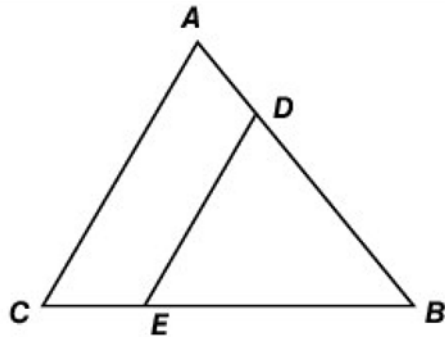
or equivalent work

8. Using the figure shown, complete the following.

- Write statements and reasons to complete the proof.

Given: $\overline{DE} \parallel \overline{AC}$

Prove: $\frac{AD}{DB} = \frac{CE}{EB}$



Proof:

Statements	Reasons

- Why was the given information necessary to show that this relationship was true? What else could the given have stated that would allow this proportional relationship to be proven? Explain.

Use words and/or numbers to show your work.

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SCORING EXEMPLAR

Response is correct. Work indicates a **clear and complete** understanding of the problem. A correct answer should include:

Statements	Reasons
1. $\overline{DE} \parallel \overline{AC}$	1. Given
2. $\angle CAB \cong \angle EDB$; $\angle ACB \cong \angle DEB$	2. Corresponding angle postulate
3. $\triangle ACB \sim \triangle DEB$	3. AA congruency postulate
4. $\frac{AB}{DB} = \frac{CB}{EB}$	4. Corresponding parts of similar triangles
5. $\frac{AB - DB}{DB} = \frac{CB - EB}{EB}$	5. Subtraction property of equality
6. $AD + DB = AB$; $BE + EC = BC$	6. Segment addition postulate
7. $AB - DB = AD$; $BC - EB = EC$	7. Subtraction property of equality
8. $\frac{AD}{DB} = \frac{CE}{EB}$	8. Substitution property of equality

- The given information was necessary because it allowed for the corresponding angles to be shown to be congruent. This led to the triangles being shown to be similar, which was necessary information to prove the proportional relationship. If the segments had not been given as parallel, listing one or both pairs of corresponding angles as congruent also would have been sufficient for the proof.

OR equivalent work

Response is correct. Work indicates a **partial** understanding of the problem. A strategy is shown but with minor errors. For example:

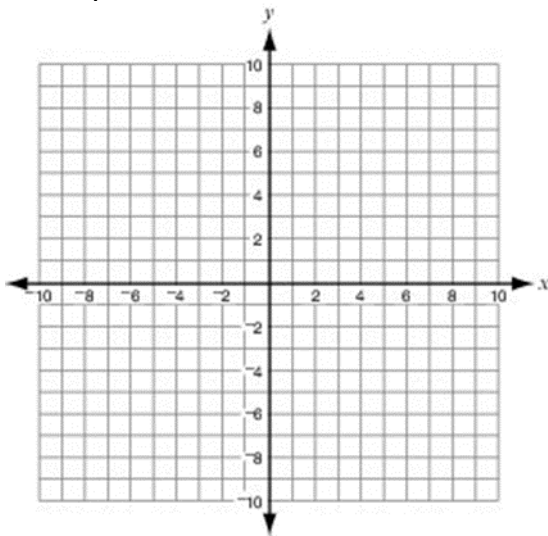
- One out of the two answers is correct
OR
 - All steps in proof are correctly shown but reasons are incorrect OR calculation errors are made in part 2.
OR equivalent work
- Response is irrelevant, inappropriate, or not provided.

11. If the radius of the base of a cylinder is twice that of a cone and its height is half the height of the cone, how are the volumes of cylinder, V_{cyl} , and cone, V_{cone} , related?

Scoring Instructions:

$$V_{\text{cyl}} = 6V_{\text{cone}} \text{ or equivalent equation}$$

13. Michaela uses straight lines to join points $A(6, 8)$, $B(9, 4)$, $C(1, -2)$, and $D(-2, 2)$ to form a quadrilateral on a coordinate plane.
- Draw quadrilateral ABCD on a coordinate plane like the one shown below. Label each point.



- What is the perimeter of the given quadrilateral? Show your work.
- Michaela says the area of the quadrilateral can be found by multiplying the lengths of the sides. Is she correct? Explain.

Use words and/or numbers to show your work.

Place an "X" in the answer box below.

Answer the question on the Response Document provided.

Click next.

Scoring Instructions:**SCORING EXEMPLAR:**

4 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.

3 Work demonstrates a clear understanding of the mathematical concepts and/or procedures but is not complete. 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 demonstration of the problem.

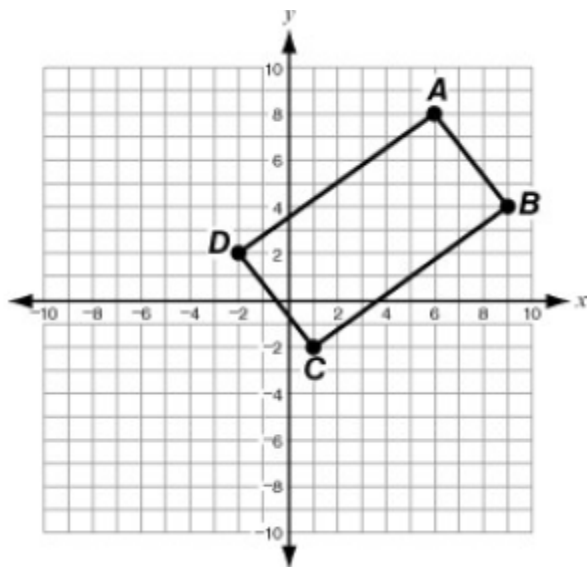
2 Response demonstrates a partial understanding of the mathematical concepts and/or procedures. Appropriate strategy is shown, but explanation or interpretation has minor flaws.

1 Response shows minimal understanding of the mathematical concepts and/or procedures or provides no explanation or interpretation for the solution or shows major flaws.

0 Response is irrelevant, inappropriate, or not provided.

SCORING EXEMPLAR

4 Response is correct. Work indicates a clear and complete understanding of finding the distances between points on a coordinate plane and using them to find the area and perimeter of rectangles.



- The perimeter is 30 units.

$$\text{Length of } AB = \sqrt{(9 - 6)^2 + (4 - 8)^2} = 5 \text{ units}$$

$$\text{Length of } BC = \sqrt{(1 - 9)^2 + (-2 - 4)^2} = 10 \text{ units}$$

$$\text{Length of } CD = \sqrt{(-2 - 1)^2 + (2 + 2)^2} = 5 \text{ units}$$

$$\text{Length of } DA = \sqrt{(-2 - 6)^2 + (2 - 8)^2} = 10 \text{ units}$$

- Yes, Michaela is correct.

$$\text{Slope of } \overline{AB} = \frac{4-8}{9-6} = \frac{-4}{3}$$

$$\text{Slope of } \overline{AD} = \frac{2-8}{-2-6} = \frac{3}{4}$$

$$\text{Slope of } \overline{CD} = \frac{2-(2)}{-2-1} = \frac{4}{-3}$$

$$\text{Slope of } \overline{BC} = \frac{-2-4}{1-9} = \frac{-6}{-8} = \frac{3}{4}$$

Because the slopes of adjacent sides are negative reciprocals to each other, AB and AD are perpendicular to each other. Similarly, DC and CB are perpendicular to each other. Therefore, the given figure is a rectangle. The area of a rectangle is equal to its length times width. The length of the given rectangle is 10 units and its width is 5 units. Its area is given by 5×10 .

or equivalent work

Response is correct. Work indicates a clear understanding of finding the distances between points on a coordinate plane and using them to find the area and perimeter of quadrilaterals. For example:

- Appropriate strategy is shown, but the rectangle drawn on the coordinate grid is incorrect.

3 OR

- Response is incorrect because of calculation errors, such as calculating $2 - 8 = 10$.

OR

- The figure is assumed to be a rectangle; the slopes are not calculated.

Response is incorrect. Work indicates a partial understanding of finding the distances between points on a coordinate plane and using them to find the area and perimeter of rectangles. For example:

2 The distance formula is applied to find the lengths of AC and BD .

The distance formula is written correctly, but multiple calculation errors exist.

1 Response and work are both incorrect. A strategy may be given but shows minimal or no understanding of finding the distances between points on a coordinate plane and using them to find the area and perimeter of rectangles. Only one of the three parts of the question is correct.

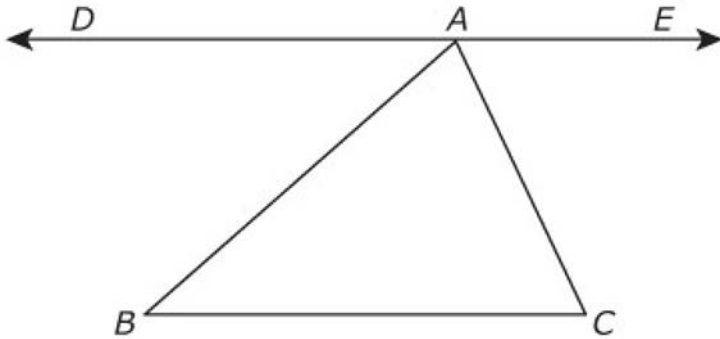
0 Response is irrelevant, inappropriate, or not provided.

17. If $0^\circ \leq a \leq 180^\circ$ and $\cos(a) = \sin(32^\circ)$, what is the value of a ?

Scoring Instructions:

58°

18. Consider $\triangle ABC$ shown below.



Part A

Line DE is drawn through Point A and parallel to segment BC . Prove that the sum of the 3 interior angles of $\triangle ABC$ is 180° .

Part B

Consider the exterior angles of any triangle. What is the sum of the exterior angles of a triangle, one at each vertex? Justify your answer.

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OR
Response is incorrect because of calculation errors. Work and strategy indicate a **clear** demonstration of the problem.
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Sample response:

1 point – identifies pairs of congruent angles

Angle DAB and Angle ABC are congruent because they are alternate interior angles formed by a transversal intersecting parallel lines.

Angle EAC and Angle ACB are congruent because they are alternate interior angles formed by a transversal intersecting parallel lines.

1 point – identifies equation and uses substitution

$m\angle DAB + m\angle BAC + m\angle EAC = 180^\circ$ because they form a line.

Using substitution, $m\angle ABC + m\angle BAC + m\angle ACB = 180^\circ$

or other appropriate response

Part B – 2 points

The student writes and explains that the sum of the exterior angles is 360 degrees.

Sample response:

1 point –

The sum of the exterior angles of any triangle is 360 degrees.

1 point – explains how to get 360 degrees

The sum of the interior angles and exterior angles equals 540 degrees (3 times 180). Subtracting the sum of the interior angles of 180 degrees leaves a sum of 360 degrees.

or other appropriate response