

NWEA Assessment Item Illustrating 8.G.B.8, 8.EE.B

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Domain: Geometry, Equations and Expressions

8.G.B: Understand and apply the Pythagorean Theorem.

8.EE.B: Understand the connections between proportional relationships, lines, and linear equations.

Calculator Availability: Yes

This question has two parts. Use the information to answer Part A and Part B.

The midpoint of a line segment is the point on the segment that is equidistant from its endpoints. The midpoint of segment PQ is located at $(0, 1)$. Point P is located at $(5, 12)$.

Part A
What are the coordinates of point Q ? Enter the answers in the boxes.

(,)

Part B
What is the length of segment PQ ? Round the answer to the nearest whole unit. Enter the answer in the box.

units

Alignment: 8.G.B.8: Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. **8.EE.B:** Understand the connections between proportional relationships, lines, and linear equations.

This item aligns to the standard related to finding distance between two points in the coordinate plane using the Pythagorean Theorem, but it is more reasonably and efficiently solved through understandings developed in the work of 8.EE.B—by reasoning that if the given endpoint is 5 units right and 11 units up from the midpoint, then the other end of the segment must be 5 units left and 11 units down from the same point to be on the same line and equidistant from $(0, 1)$. Items that align to more than one grade-level standard are challenging for organizations that construct assessments because the evidence elicited from the item is not clear (i.e., Which skill did students use to solve the problem?). Organizations typically respond by discarding these rich problems.” While this item may not be appear on a traditional assessment because of alignment concerns, it is included here to reinforce the importance of allowing students the opportunity to apply their knowledge across standards and domains to solve complex problems.

Coherence: Students began work with the horizontal number line in grade 2 and extended that understanding to horizontal and vertical number lines by graphing points in the first quadrant in grade 5.^{5.G.A.1} In grade 6, students learned that there is a number system that includes both positive and negative numbers; therefore, plotting points in all four quadrants is a natural extension of those concepts. In grade 8, students use the Pythagorean Theorem to find the distance between two points. In high school, students will extend these concepts as they “find the point on a directed line segment between two given points that partitions the segment in a given ratio”^{HSG-GPE.6} and as they use the distance formula to compute perimeters and areas of polygons on the coordinate plane.^{HSG-GPE.7} Students in high school also will “use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.”^{HSG-SRT.8}

Rigor: This item attends to conceptual understanding and procedural skill. Students must relate the concept of slope to the distance between two points. Application of the Pythagorean Theorem is a procedure at grade 8.

Answer Key:

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Part A

What are the coordinates of point Q ? Enter the answers in the boxes.

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What is the length of segment PQ ? Round the answer to the nearest whole unit. Enter the answer in the box.

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