

Vertical Progression:

<p>6th Grade</p>	<p>ELG 6.8 Solve real-world and mathematical problems involving area, surface area, and volume.</p> <ul style="list-style-type: none"> ○ 6.G.A.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. ○ 6.G.A.3 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
<p>7th Grade</p>	<p>ELG 7.5 Draw construct, and describe geometrical figures and describe the relationships between them.</p> <ul style="list-style-type: none"> ○ 7.G.A.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. <p>ELG 7.6 Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.</p> <ul style="list-style-type: none"> ○ 7.G.B.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
<p>8th Grade</p>	<p>ELG 8.8 Understand and apply the Pythagorean Theorem.</p> <ul style="list-style-type: none"> ○ 8.G.6 Explain a proof of the Pythagorean Theorem and its converse. ○ 8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. ○ 8.G.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
<p>Geometry</p>	<p>ELG.MA.HS.G.7 Define trigonometric ratios and solve problems involving right triangles</p> <ul style="list-style-type: none"> ○ G-SRT.C.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Students will demonstrate command of the ELG by:

- Explaining a proof of the Pythagorean Theorem and its converse.
- Using the Pythagorean Theorem to find unknown distances in two and three dimensional real-world and mathematical problems.
- Using the Pythagorean Theorem to find unknown unknown side lengths in right triangles.
- Finding the distance between two points in a coordinate system.

Vocabulary:

- distance
- hypotenuse
- leg
- Pythagorean theorem
- right triangle
- square root
- squared

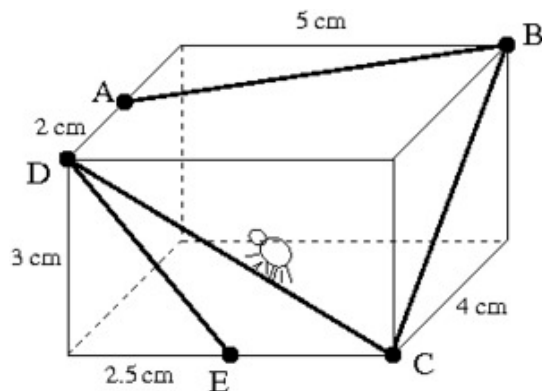
Sample Instructional/Assessment Tasks:

1) Standard(s): 8.G.7

Source: <https://www.illustrativemathematics.org/content-standards/8/G/B/7/tasks/1699>

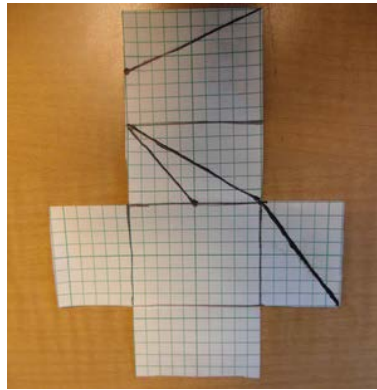
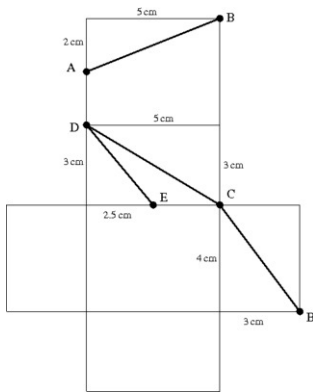
Item Prompt:

A spider walks on the outside of a box from point A to B to C to D and finally to point E as shown in the picture below.



- Draw a net of the box and map out the path of the spider on the net.
- Compare your net with those of some other people.
- Cut out the net and put the box together to see if you are right.
- How long is the path of the spider?

Correct Answer(s):



a. Different students may get different nets since the left and right side of the box can be attached to either the top or the bottom or one to each. There are still other possible ways to attach the 6 faces of the box to each other.



b. The path consists of 4 line segments. Each line segment is the hypotenuse of a different right triangle.

$$\text{length of line segment } AB = \sqrt{2^2 + 5^2} = \sqrt{29} \approx 5.39 \text{ cm}$$

$$\text{length of line segment } BC = \sqrt{3^2 + 4^2} = \sqrt{25} = 5 \text{ cm}$$

$$\text{length of line segment } CD = \sqrt{3^2 + 5^2} = \sqrt{34} \approx 5.83 \text{ cm}$$

$$\text{length of line segment } DE = \sqrt{2.5^2 + 3^2} = \sqrt{15.25} \approx 3.91 \text{ cm}$$

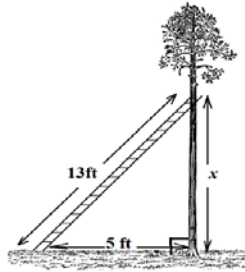
The total length of the spider's path is about 20.13 cm.

2) Standard(s): 8.G.7

Source: Smarter Balanced released item

Item Prompt:

A 13-foot ladder is leaning on a tree. The bottom of the ladder is on the ground at a distance of 5 feet from the base of the tree. The base of the tree and the ground form a right angle as shown:



Find the distance between the ground and the top of the ladder, x , in feet.

Correct Answer(s):

12 feet