Just In Time Quick Check

Standard of Learning (SOL) G.8b

Strand: Triangles

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The student will solve problems, including practical problems, involving right triangles. This will include applying properties of special right triangles.

Grade Level Skills:

- Solve problems, including practical problems, using right triangle trigonometry and properties of special right triangles.
- Solve for missing lengths in geometric figures, using properties of 45°-45°-90° triangles where rationalizing denominators may be necessary.
- Solve for missing lengths in geometric figures, using properties of 30°-60°-90° triangles where rationalizing denominators may be necessary.

Just in Time Quick Check

Just in Time Quick Check Teacher Notes

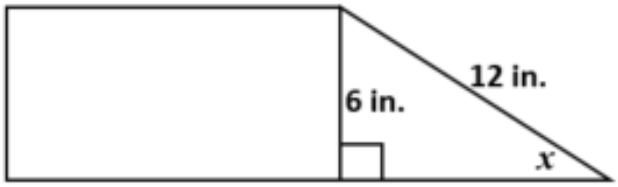
Supporting Resources:

- VDOE Mathematics Instructional Plans (MIPS)
  - G.8bc – Special Right Triangles and Right Triangle Trigonometry (Word) / PDF Version
- VDOE Word Wall Cards: Geometry (Word)|(PDF)
  - Classifying Triangles by Sides
  - Classifying Triangles by Angles
  - Pythagorean Theorem
  - 30°-60°-90° Triangle Theorem
  - 45°-45°-90° Triangle Theorem
- VDOE Rich Mathematical Tasks: Take Me Out to the Ball Game Task
  - G.8 Take Me Out to the Ball Game (Word) / PDF Version
- Other VDOE Resources
  - Geometry, Module 7, Topic 3 – 45-45-90 Degree Special Right Triangle [eMediaVA]
  - Geometry, Module 7, Topic 4 – 30-60-90 Degree Special Right Triangle [eMediaVA]
- Desmos Activities
  - Special Right Triangles

Supporting and Prerequisite SOL: G.8a, A.3a, 8.3b, 8.9a, 8.9b

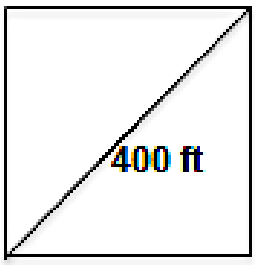
SOL G.8b - Just In Time Quick Check

1. A figure is shown.



What is the angle measure of *x*?

2. Mr. Grant has a tree farm in the shape of a square. Half the farm has trees that he uses to make pencils and the other half are maple trees that he uses to make maple syrup. The farm is divided into two equal sections along a 400-foot diagonal as shown. What is the length of one side of the tree farm? Represent your answer in simplest radical form and provide the decimal form to the nearest tenth.



Simplest radical form: _____

Decimal form to the nearest tenth: _____

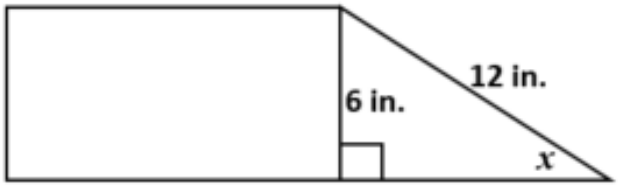
3. If the hypotenuse of a 30°-60°-90° triangle is 8 cm, what is the measure of the longer leg of the triangle?

4. ΔABC is an equilateral triangle with a side length 12 inches. What is the height of ΔABC? Provide your answer in simplest radical form.

SOL G.8b - Just in Time Quick Check Teacher Notes

Common Errors/Misconceptions and their Possible Indications

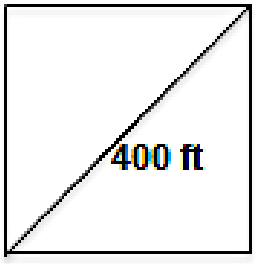
1. A figure is shown.



What is the angle measure of *x*?

A common misconception some students may have is to state the angle measure of x as 45 degrees. This may indicate that a student has mistakenly associated the relationship of leg to hypotenuse as 1:2 instead of 1:$\sqrt{2}$. Teachers are encouraged to facilitate a class discussion to determine an angle measure when given the side lengths of a triangle using either inverse trigonometric functions or identifying the characteristics of special right triangles.

2. Mr. Grant has a tree farm in the shape of a square. Half the farm has trees that he uses to make pencils and the other half are maple trees that he uses to make maple syrup. The farm is divided into two equal sections along a 400-foot diagonal as shown. What is the length of one side of the tree farm? Represent your answer in simplest radical form and provide the decimal form to the nearest tenth.



Simplest radical form: _____

Decimal form to the nearest tenth: _____

A common misconception some students may have is that they do not realize that the diagonal bisects the vertices to form two 45°degree angles, hence producing a 45°-45°-90° triangle. This may indicate that some students are not able to visualize why the diagonal of a square becomes the hypotenuse of a right triangle and the other two sides of a square become the two sides (base and opposite) of a right triangle. Teachers may wish to demonstrate how two congruent 45°-45°-90° triangles are formed when a diagonal is drawn in a square.

If students do not recognize the ratio relationships between the sides of the special right triangle, then teachers are encouraged to have students separate the figure into two triangles and label each side as x since it is given that the tree farm is in the shape of a square. Next, teachers may model for students that the Pythagorean Theorem can be applied by setting up the equation $x^2 + x^2 = 400^2$. Teachers should guide students to discover the 45°-45°-90° triangle pattern using the Pythagorean Theorem and a square with any side length, instead of having students simply memorize the 45°-45°-90° Triangle Theorem.

3. If the hypotenuse of a 30°-60°-90° triangle is 8 cm, what is the measure of the longer leg of the triangle?

A common error in this problem is that students may want to find the longer leg length without first finding the shorter leg. This is particularly true when no figure is given. Students should be encouraged to draw a figure and label it with the given information. Some students will remember that the square root of 3 is part of the answer to finding the longer leg, but they may try to divide 8 by the square root of three to get their answer.

A common misconception some students may have is to incorrectly apply the ratios for the side lengths of the 30°-60°-90° special right triangle. While some students may recognize that the hypotenuse is the longest side in a right triangle, they may not recognize that the ratio of the shorter leg to the hypotenuse is $1:2$ *and the ratio of the longer leg to hypotenuse is* $\sqrt{3}:2$*. Teachers may model for students the angle-side relationships in a triangle (the longest side is opposite the greatest angle and the shortest side is opposite the smallest angle) when working with the 30°-60°-90° special right triangle, however teachers should bring to the students' attention that* $2 > \sqrt{3}$*. Additionally, teachers are encouraged to model the ratio of the sides as short leg: long leg: hypotenuse (i.e., x : x*$\sqrt{3}$ *: 2x).*

4. ΔABC is an equilateral triangle with a side length of 12 inches. What is the height of ΔABC? Provide your answer in simplest radical form.

A common misconception some students may have is that they do not realize the height of an equilateral triangle is also the perpendicular bisector. This may indicate that some students are not aware that the altitude (height) of the triangle creates a right triangle within triangle ABC. Alternatively, students may not recall that an equilateral triangle is also equiangular; therefore, each angle measures 60°. Teachers are encouraged to provide learning opportunities for students to explore the 30°-60°-90° pattern created by equilateral triangles and their heights with the Pythagorean Theorem, instead of having students simply memorize the 30°-60°-90° Triangle Theorem.