

Placing a New Fire Pit in Existing Patio

Title: Finding the Area of Shaded Region

MM2G1. Students will identify and use special right triangles.

b. Determine the lengths of sides of 45° - 45° - 90° triangles.

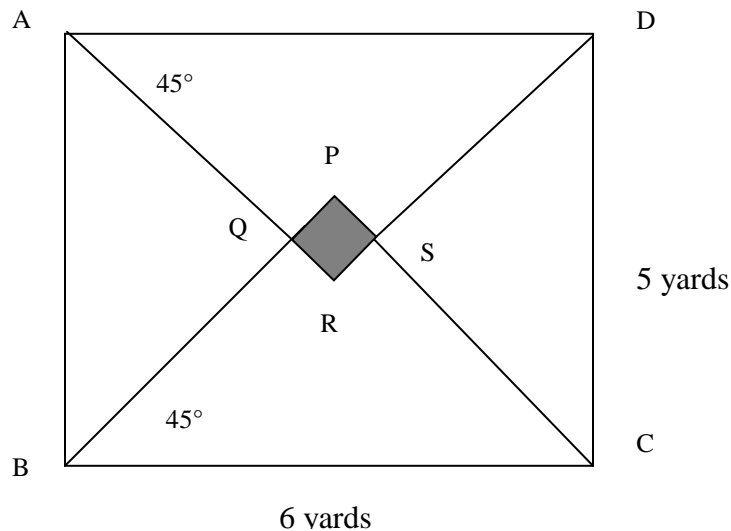
MM1G3. Students will discover, prove, and apply properties of triangles, quadrilaterals, and other polygons.

d. Understand, use, and prove properties of and relationships among special quadrilaterals: parallelogram, rectangle, rhombus, square, trapezoid, and kite.

MM2P2. Students will reason and evaluate mathematical arguments.

d. Select and use various types of reasoning and methods of proof.

Problem: Gary wanted to redo his back yard rectangular patio. He wanted to place a square fire pit where the shaded region is in the drawing above. What will be the size of the fire pit in square yards?



Solution: Let's begin by looking at $\triangle AQB$ and find the height with AB the base.

We know that XQ has the same length as AX which is 2.5 yards because $\triangle AXQ$ is an isosceles triangle. Similarly, the height of $\triangle CDS$ with CD as base is 2.5 yards.

Thus $QS = [6 - 2(2.5)]$ yards = 1 yard

Then $PQ^2 + PS^2 = QS^2$ and since PQ and PS are equal sides of a square then PQ must be $\sqrt{2}/2$.
Area = $\sqrt{2}/2 \times \sqrt{2}/2 = 1/2$ yards square.

