Math 8 Unit 11 worksheet: The Pythagorean theorem

Name _____ Date _____ Period _____

1. Each right triangle has legs a and b and hypotenuse c. Two of the three sides are given. Find the missing side, exactly, and to the nearest hundredth when it is not a whole number.

(a) $a = 12,\ b = 35$

(b) $b = 45,\ c = 53$

(c) $a = 2,\ b = 5$

(d) $a = 6,\ c = 11$

(e) $a = 0.9,\ b = 1.2$

(f) $a = 0.9,\ c = 4.1$

2. Do not use a calculator.

(a) A right triangle has legs 4 and 9. Its hypotenuse lies between which two whole numbers? Which of the two is it nearer?

(b) A right triangle has hypotenuse 12 and one leg 5. The other leg lies between which two whole numbers? Which of the two is it nearer?

3. A right triangle has a hypotenuse of 20 and one leg of 12. A student finds the other leg like this:

$$b^2 = 20^2 + 12^2 = 544, \qquad b = \sqrt{544} \approx 23.3$$

(a) Without working out the correct answer, explain how you can tell that 23.3 is wrong.

(b) Find the correct length of the other leg.

4. (a) Can a right triangle have a hypotenuse of 10 and two legs that are both 7.5? Explain using the Pythagorean theorem.

(b) A right triangle has a hypotenuse of 10 and one leg of 7.5. Find the other leg, exactly and to the nearest hundredth.

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5. No figure is given. Use the letters to decide which side is the hypotenuse, then find the side asked for. Give exact answers, and a decimal to the nearest hundredth when the answer is not a whole number.

(a) In $\triangle DEF$, $\angle E = 90°$, $DE = 16$ and $DF = 20$. Find EF.

(b) In $\triangle RST$, $\angle R = 90°$, $RS = 11$ and $ST = 61$. Find RT.

(c) In $\triangle PQR$, $\angle P = 90°$, $PQ = 6$ and $QR = 9$. Find PR.

6. A family is moving a thin round tabletop into a room. The doorway is a rectangle 35 inches wide and 84 inches tall. The tabletop is too wide to carry through upright, so it will be tilted to pass along the diagonal of the doorway. Ignoring the thickness of the top, what is the widest tabletop that can pass through this way?

7. A framed picture is to hang from a single nail. A wire will be fixed to the back of the frame at two points 48 cm apart, level with each other, and passed over the nail so that its two pieces, pulled straight, are the same length. The nail must end up 10 cm above the fixing points, directly above the point halfway between them, so a vertical line from the nail meets the line between the fixing points at a right angle. How long must the whole wire be?

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