Accelerated 7 · Unit 8 Worksheet

Pythagorean Theorem and Irrational Numbers

Name: _____ Date: _____

Part A · Squares, Areas, and Side Lengths

1. A square has area 49 square units. Its side length is _____ units. A square has area 30 square units. Its side length is _____ units (exact answer using a radical).

2. On grid paper, draw a square with each given area. State its side length.

a. Area = 16

b. Area = 5 (hint: tilted square)

c. Area = 25

Part B · The Pythagorean Theorem

3. Find the missing side. Give exact and approximate values where useful.

a. Legs 6 and 8. Hypotenuse = _____

b. Hypotenuse 13, one leg 5. Other leg = _____

c. Right triangle with legs 1 and 1. Hypotenuse = _____ (exact)

4. A 10-foot ladder leans against a wall. Its base is 6 feet from the wall. How high up the wall does the top reach?

Draw and label the right triangle:

Height = _____ feet

Part C · Pythagorean Theorem in 3D and on a Coordinate Plane

5. Find the distance between (1, 2) and (7, 10) in the coordinate plane.

Draw the right triangle (using the segment as hypotenuse):

Distance = _____

6. A rectangular box has dimensions 3 cm * 4 cm * 12 cm. Find the length of the longest diagonal (corner to opposite corner). Show your work.

Part D · Rational and Irrational Numbers

7. Classify each number as rational or irrational. Justify.

a. sqrt(16) = _____ Rational or Irrational? Why?

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b. sqrt(2) = _____ (approx) Rational or Irrational? Why?

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c. 0.333… (repeating) Rational or Irrational? Why?

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d. pi Rational or Irrational? Why?

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e. 0.1010010001… (no pattern) Rational or Irrational? Why?

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8. Approximate sqrt(20) between two CONSECUTIVE INTEGERS, then between two consecutive tenths. Show your reasoning (no calculator).

Part E · Thinking Deeply

9. A 5-12-13 right triangle and a 9-40-41 right triangle. Without computing, what's special about both? Prove each really has a right angle using the Pythagorean Theorem.

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10. Han says: "Any number you can write as a decimal is rational." Is he right? Explain carefully, using examples.

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11. Triangle PQR has sides 5, 7, and 9. Is it a right triangle? Show how the converse of the Pythagorean Theorem decides this.

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12. Sketch what sqrt(2)*sqrt(2) equals. Then explain why (sqrt(2))^2 = 2 must be true, using either area or algebra.

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13. Mia says: "All right triangles satisfy a^2 + b^2 = c^2. So any three numbers satisfying that equation must be sides of a right triangle." Is she right? What's the technical name for that second statement?
