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Ms. Kresovic
Adv Geo – period ___
Monday 11 March 2013

9.6: Families of Right Triangles

Objectives

After studying this section, you will be able to

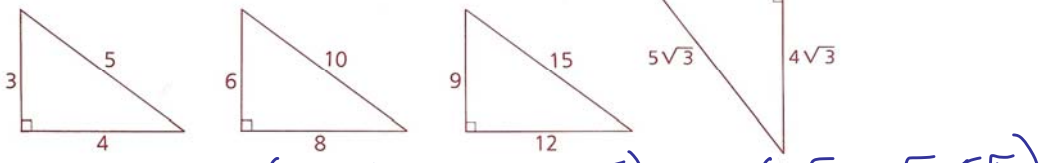
- Recognize groups of whole numbers known as Pythagorean triples
- Apply the Principle of the Reduced Triangle

Definition Any three (whole numbers) that satisfy the equation $a^2 + b^2 = c^2$ form a ***Pythagorean triple.***

In rt Δ, $leg^2 + leg^2 = hyp^2$

Below is a set of right triangles you have encountered many times in this chapter. Do you see how the triangles are related? All (3,4,5) family

(leg, leg, hyp)



(3,4,5) (6,8,10) (9,12,15) $(3\sqrt{3}, 4\sqrt{3}, 5\sqrt{3})$

2(3,4,5) 3(3,4,5) $\sqrt{3}$(3,4,5)

↑ scalar ↑ ↑

Other common families are

3 (5, 12, 13), of which (15, 36, 39) is another member

(7, 24, 25), of which (14, 48, 50) is another member

$\frac{1}{2}$ (8, 15, 17), of which $\left(4, 7\frac{1}{2}, 8\frac{1}{2}\right)$ is another member

There are infinitely many families, including (9, 40, 41), (11, 60, 61), (20, 21, 29), and (12, 35, 37), but most are not used very often.

Principle of the Reduced Triangle

1. Reduce the difficulty of the problem by multiplying or dividing the three lengths by the same number to obtain a similar, but simpler, triangle in the same family.
2. Solve for the missing side of this easier triangle.
3. Convert back to the original problem.

FACTOR

SOLVE

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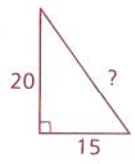
9.6: Families of Right Triangles Homework

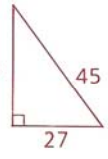
In problems 1–5, find the missing side in each triangle.

1 (3, 4, 5)

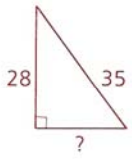
a



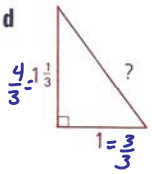
b



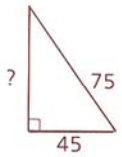
c



d



e



1a (15, 20, ?) → 5(3, 4, 5) → 25

1b (27, ?, 45) → 9(3, 4, 5) → 36

1c (?, 28, 35) → 7(3, 4, 5) → 21

1d (3/3, 4/3, ?) → 1/3(3, 4, 5) → 5/3

1e (45, ?, 75) → 15(3, 4, 5) → 60

2a (?, 24, 24) → 2(5, 12, 13) → 10

2b (30, 72, ?) → 6(5, 12, 13) → 78

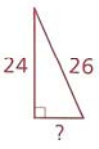
2c (15, ?, 39) → 3(5, 12, 13) → 36

2d (25, 60, ?) → 5(5, 12, 13) → 65

2e (5/2, 12/2, ?) → 1/2(5, 12, 13) → 13/2

2 (5, 12, 13)

a



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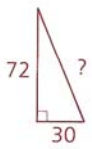

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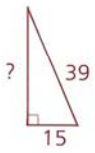

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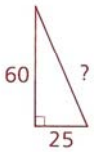
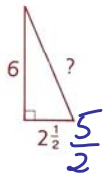


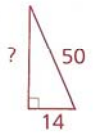
e



3 (7, 24, 25)

a

b



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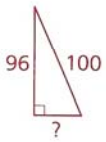
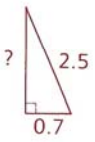


d



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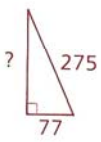


3a _____

3b _____

3c _____

3d _____

3e _____

4a _____

4b _____

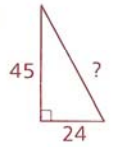
4c _____

4d _____

4e _____

4 (8, 15, 17)

a



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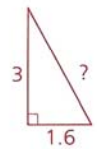

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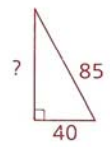

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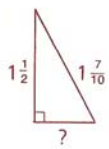
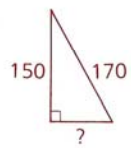
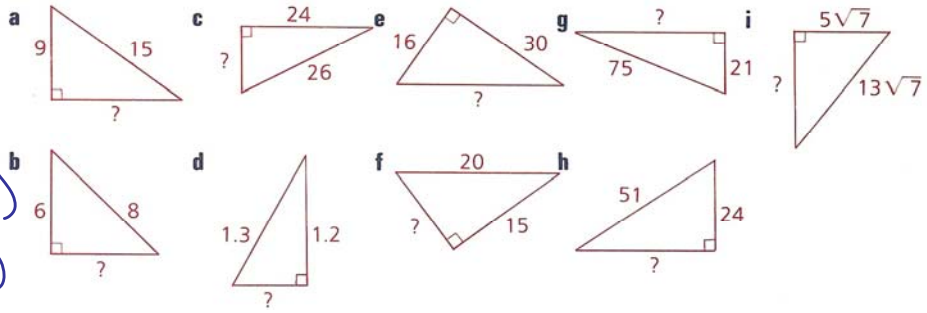


e



5 Mixed



5f: $5(x^2+3^2=4^2)$
$5(x^2=7)$
$5(x=\sqrt{7})$

2 $(x+3^2=4^2)$
$2(x^2=7)$
$2(x=\sqrt{7})$

5a $(9,?,15) \to 3(3,4,5) \to 12$

5b $(?,6,8) \to 2(?,3,4) \to 2(x^2+3^2=4^2) \to 2(x^2=7) \to 2(x=7) \to 2\sqrt{7}$

5c $(?,24,26) \to 2(5,12,13) \to 10$

5d $(?,1.2,1.3) \to .1(5,12,13) \to .5$

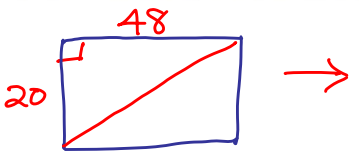
5e $(16,30,?) \to 2(8,15,17) \to 34$

5f $(?,15,20) \to 5(?,3,4) \to 5\sqrt{7}$

5h

5i

6 Find the diagonal of a rectangle whose sides are 20 and 48.



$\to (20,48,?) \to 4(5,12,13) \to 52$

7 Find the perimeter of an isosceles triangle whose base is 16 dm and whose height is 15 dm.

8 Find the length of the upper base of the isosceles trapezoid.