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9.6: Families of Right Triangles

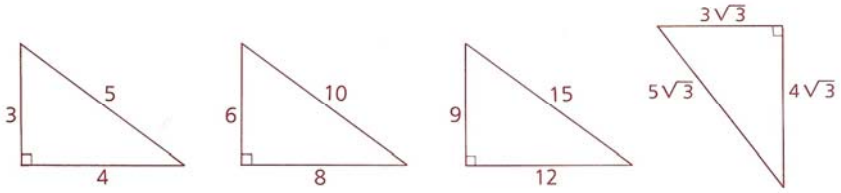
Objectives

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.***

Below is a set of right triangles you have encountered many times in this chapter. Do you see how the triangles are related?



Other common families are

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

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

(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.

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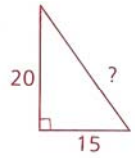
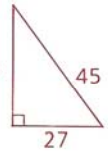
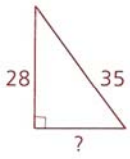
9.6: Families of Right Triangles Homework

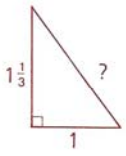
In problems 1–5, find the missing side in each triangle.

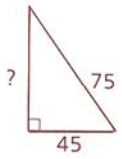
1 (3, 4, 5)

a 

b 

c 

d 

e 

1a _____ 2a _____

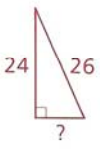
1b _____ 2b _____

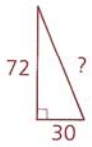
1c _____ 2c _____

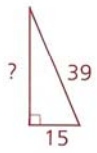
1d _____ 2d _____

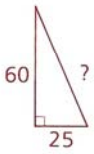
1e _____ 2e _____

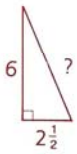
2 (5, 12, 13)

a 

b 

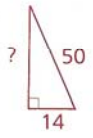
c 

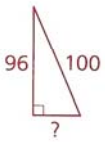
d 

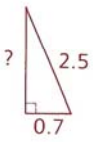
e 

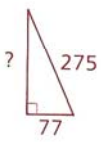
3 (7, 24, 25)

a 

b 

c 

d 

e 

3a _____ 4a _____

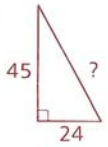
3b _____ 4b _____

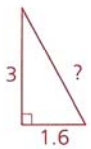
3c _____ 4c _____

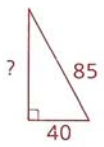
3d _____ 4d _____

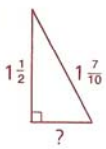
3e _____ 4e _____

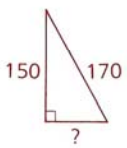
4 (8, 15, 17)

a 

b 

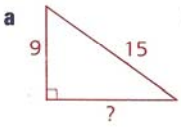
c 

d 

e 

5 Mixed

a



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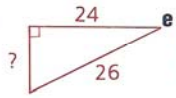

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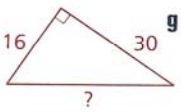

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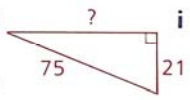

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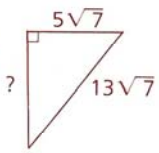

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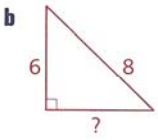

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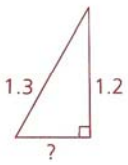

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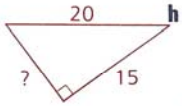

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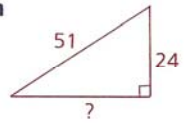

5a _____

5b _____

5c _____

5d _____

5e _____

5f _____

5h _____

5i _____

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

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.