2.3 NOTES: Pythagorean Theorem

Pythagorean Theorem
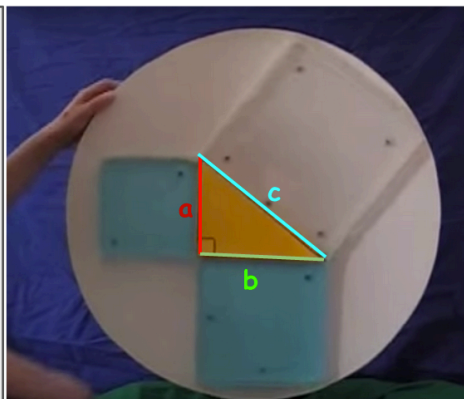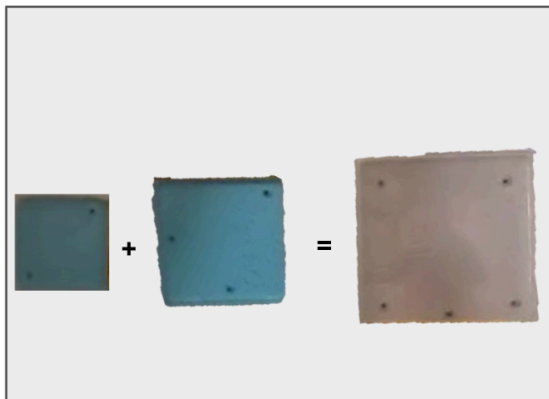
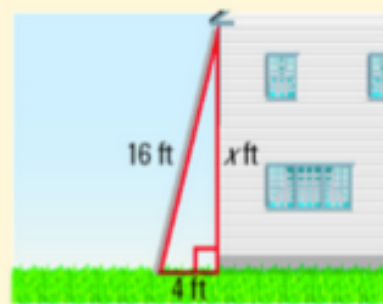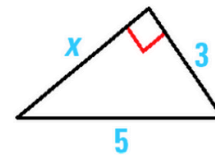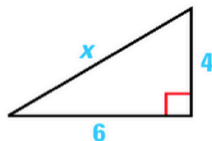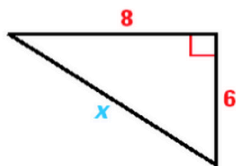A 16 foot ladder rests against the side of the house, and the base of the ladder is 4 feet away. Approximately how high above the ground is the top of the ladder?
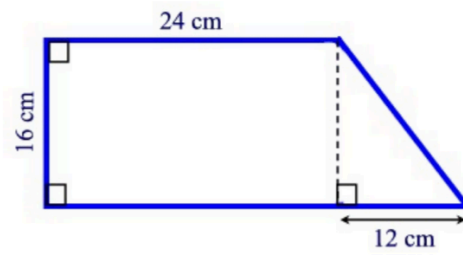
16 ft x ft

4 ft

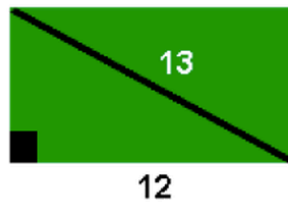**Find the missing side of the right triangle. Write your answer in simplest radical form and decimal form.**

8

x

6

x 4

6

x 3

5

Find the perimeter of the irregular object below.

24 cm

16 cm

12 cm

Using the pythagorean theorem to find the perimeter.
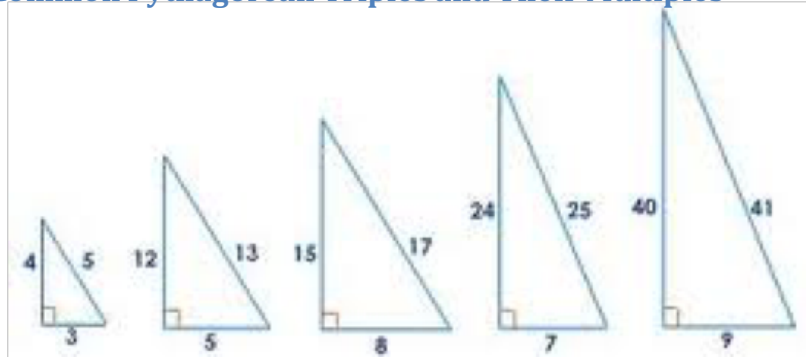
13

12

Pythagorean Triples

A Pythagorean triple is a set of three positive integers a, b, and c

that satisfy the equation _____ .

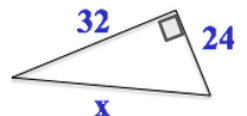### The Most Common Pythagorean Triples and Their Multiples

Example

Find the length of a hypotenuse of a right using two methods.

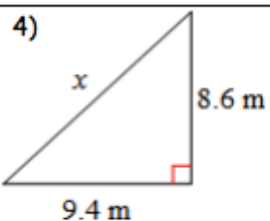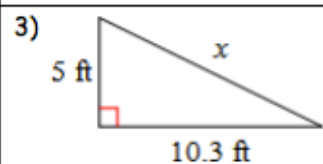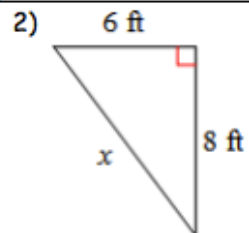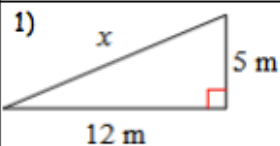**Method 1**   **Method 2**

Summarize your notes:

Practice Problems

Directions: Find the missing side of each triangle. Round your answers to the nearest tenth if necessary.

1)

x

5 m

12 m

2)   6 ft

x 8 ft

3)

5 ft

x

10.3 ft

4)

x 8.6 m

9.4 m

Directions: Find the missing side of each triangle. Leave your answers in simplest radical form.

5)

9 mi   11 mi

x

6)

11 in x

16 in

7)

16 in

9 in x

8)

10   7

x

9)

4   x

6

10)

5   x

$x+1$
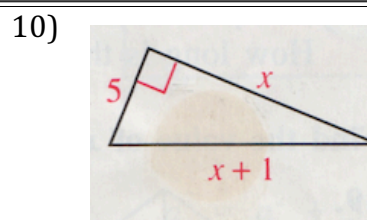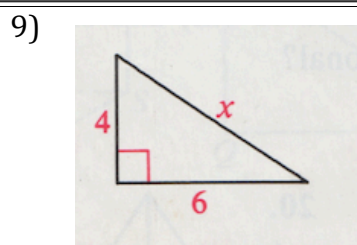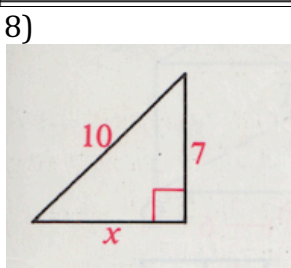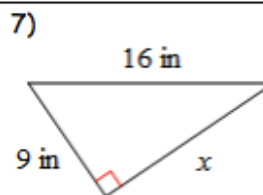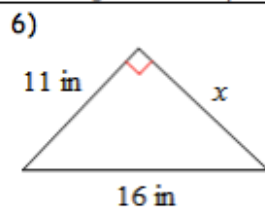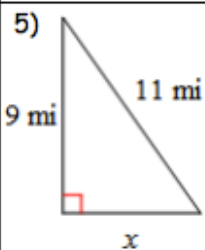
3 ACT Math ACTIVITY → Taco Cart

Act 1

Act 2

Act 3

Doug is a dog, and his friend Bert is a bird. They live in Salt Lake City, where the streets are 1/16 miles apart and arranged in a square grid. They ar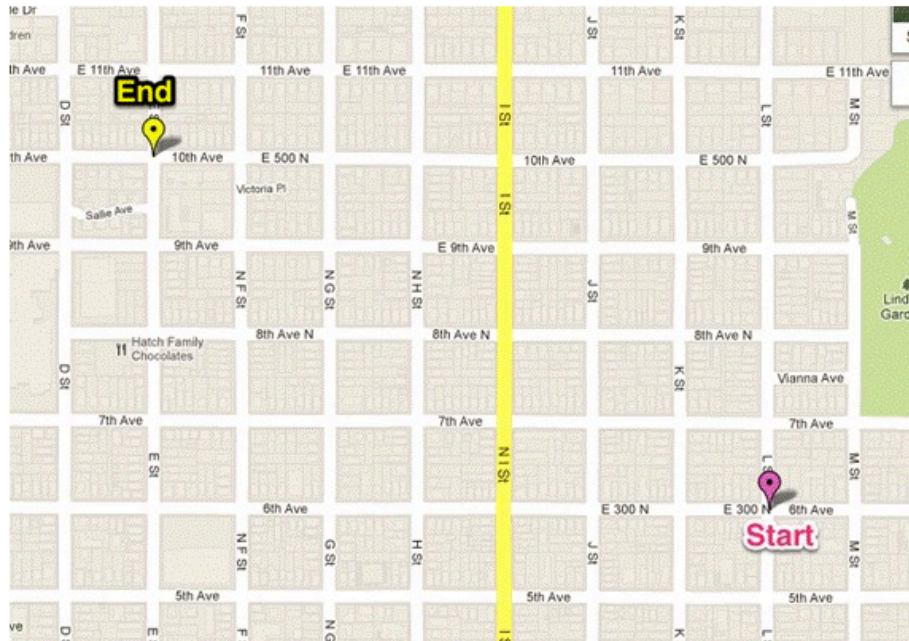e both standing at 6th and L. Doug can run at an average speed of 30 mi/hr through the streets of Salt Lake, and Bert can fly at an average speed of 20 mi/hr. They are about to race to 10th and E.
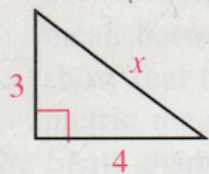

a. Who do you predict will win, and why?

b. Draw the likely paths that Doug and Bert will travel.

c. What will you need to compare, in order to determine the winner?

d. Devise a plan to calculate these, without measuring anything.
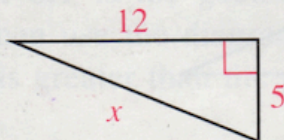
e. Who will win the race?

For the following problems, note if there are any **Pythagorean triples.**
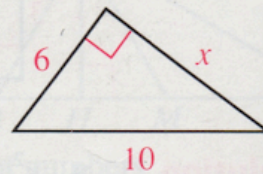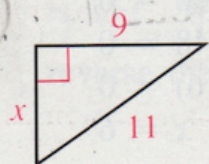
Find the value of x.

1.

2.   12

5

3.

6   x

10

Pythagorean Triple?
YES or NO

Pythagorean Triple?
YES or NO

Pythagorean Triple?
YES or NO

4.   9

x   11

5.

10   20

x

6.   12
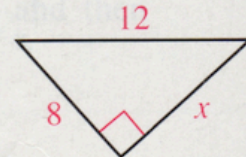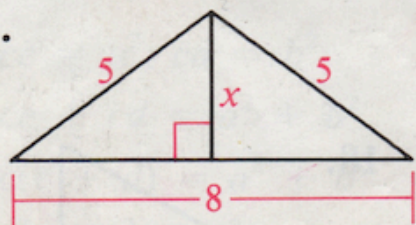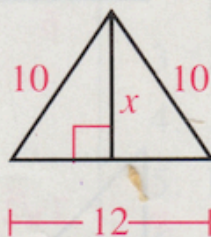

8   x
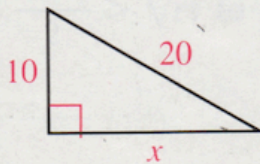
Pythagorean Triple?
YES or NO

Pythagorean Triple?
YES or NO

Pythagorean Triple?
YES or NO

Find the value of x.

19.

20.
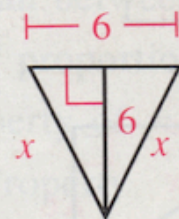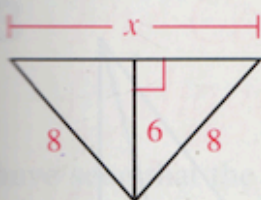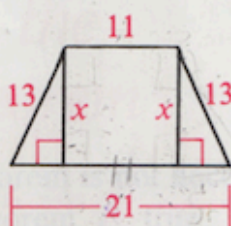

21.

Find the value of x.
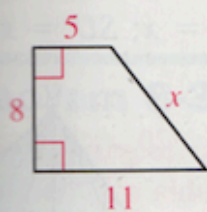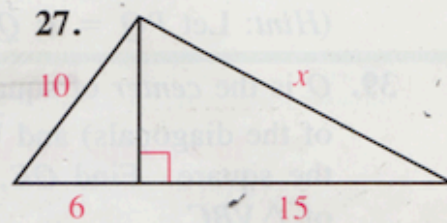
22.
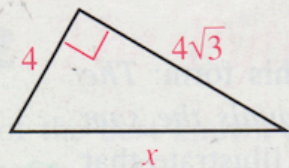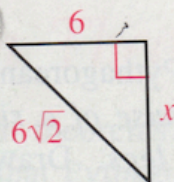

23.

24.

25.
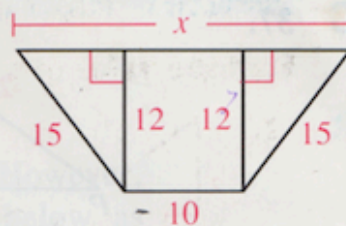
26.

27.

State an equation you could use to find the value of *x*. Then find the value of *x* in simplest radical form.

7.

4   $4\sqrt{3}$

x

8.

6

$6\sqrt{2}$ *x*

9.

24

7   *x*

10.

12

15

x

11.

8

x   8

11.

x

6

9

12.

x $7\sqrt{2}$

x

13.

2*x*   *x*
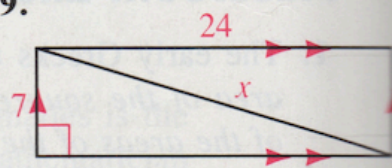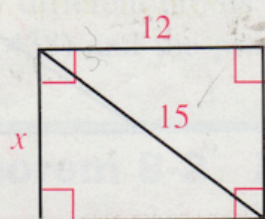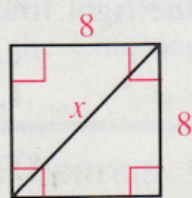
$5\sqrt{3}$

For the following problems below make sure to include a picture.

Example:

13. A rectangle has length 2.4 and width 1.8. Find the length of a diagonal.

14. A rectangle has a diagonal of 2 and length of $\sqrt{3}$. Find its width.

15. Find the length of a diagonal of a square with perimeter 16.

16. Find the length of a side of a square with a diagonal of length 12.

Pythagorean Theorem Application Problems

1. What inch screen in this?

2. Find x.

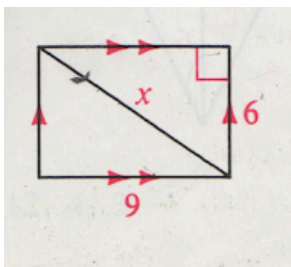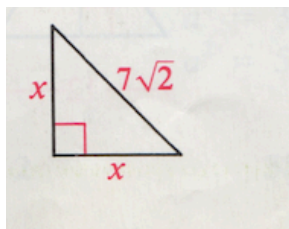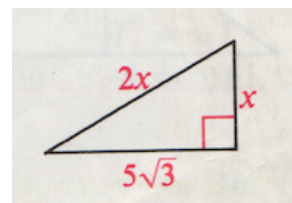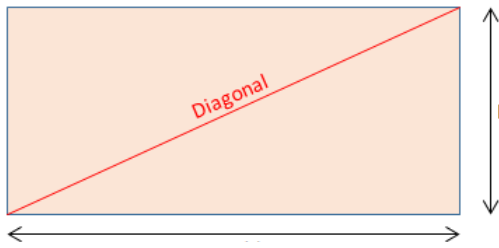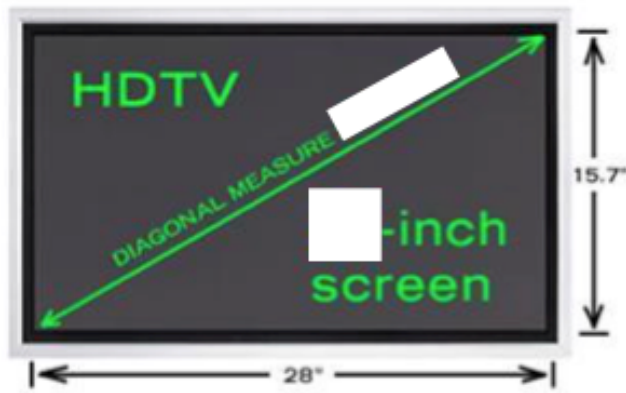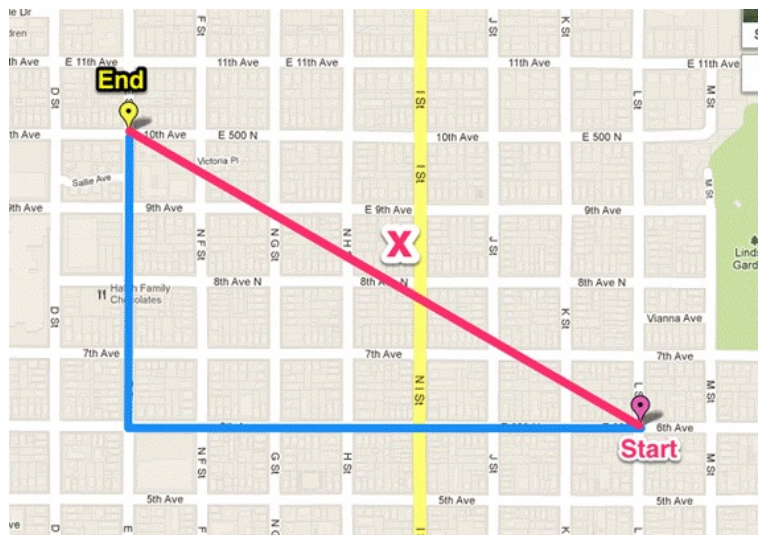3. A rectangle is 2 cm longer than it is wide. The diagonal of the rectangle is 10 cm long. Find the perimeter.

3) The Algebros Softball team had tryouts last weekend and Mr. Brust wanted to play catcher. Mr. Kelly started laughing and said that there is no way Mr. Brust could throw the ball from home to 2nd base to catch someone stealing. If a baseball diamond is a square and the length of the sides is 90 feet, then how far does Mr. Brust need to be able to throw the ball?
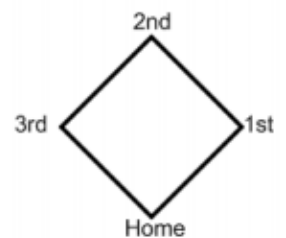
4) Mr. Kelly has a huge wall that is 16 feet tall built around his entire back yard. One day he locks himself out and realizes he has to clear the wal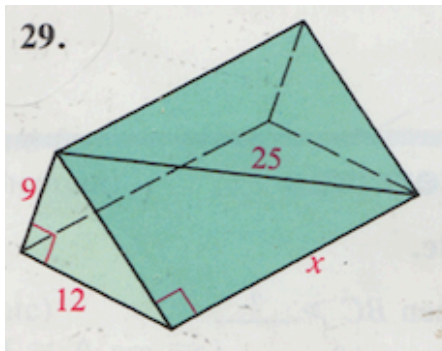l. He has a 17 foot tall ladder so he feels as though it should be a piece of cake. When he takes the ladder over he realizes that the closest he can get the ladder is 10 feet from the wall because of some shrubs.
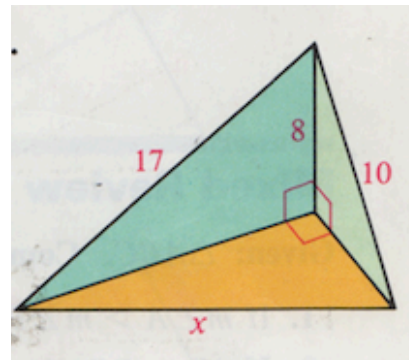
        a) Draw a picture of the situation.

        b) Will the ladder reach the top of the wall? If not how many feet short is it?

Find x.

5)

29.

25

9

12

x

6)

8

17

10

x

7)   The dimension of a right, rectangular prism are 4 in x 12 x 2 ft. What is the diagonal distance of the prism?

Pythagorean Theorem Circle Application Problems

What is a **tangent** to a circle?

A tangent is a line that intersects the circle at exactly one point.
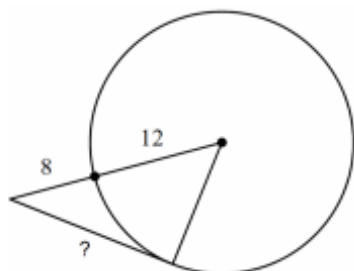
Tangent Theorem #1:

If a line is perpendicular to a circle's radius at the point of tangency, that line must be tangent to the circle.

(Converse of Theorem #1):

If a line is tangent to a circle, the line is perpendicular to the radius at the point of tangency.
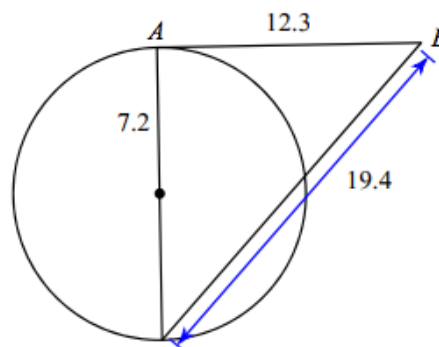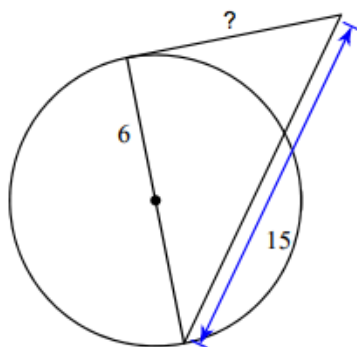
Find the missing segment lengths:

1)

Determine if line **AB** is tangent to the circle.
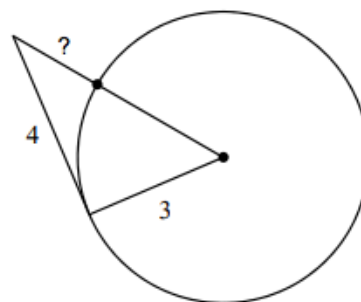
2)

A   12.3   B

7.2

19.4

Find the segment length indicated. Assume that lines which appear to be tangent a

3)

?

6

15

4)

?

4

3

5)

17.8

7.8

?

6)

7.8

5.2

?

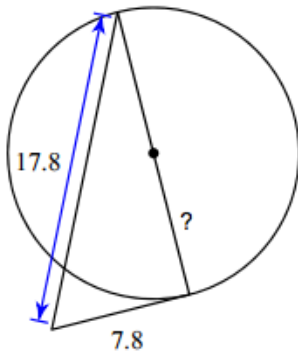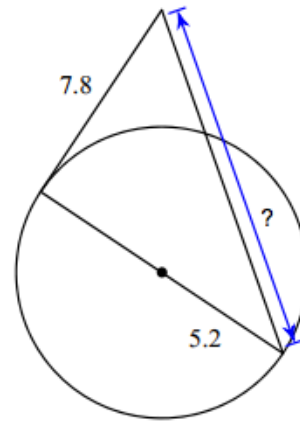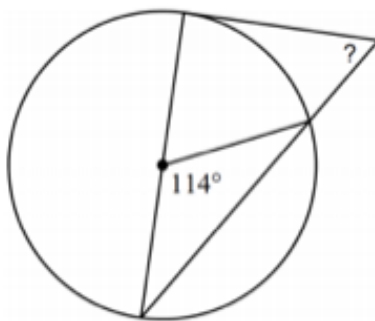**Examples of Tangent Theorem #1 using the Isosceles Triangles:**

7)

Find the missing angle measure.

?

114°

8)

50°

?