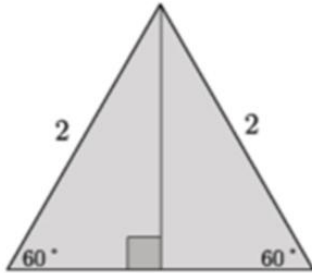Name:_____   Date:_____ Period:____

Chapter 8: Right Triangles
## Topic 8: Special Right Triangles

Do Now:
An equilateral triangle has sides of length 2 and angle measures of 60, as shown below. The altitude from one vertex to the opposite side divides the triangle into two right triangles.

a. Are the two triangle congruent? Explain.

b. What is the length of the shorter leg of each of the right triangles? Explain.

c. Use the Pythagorean Theorem to determine the length of the altitude.

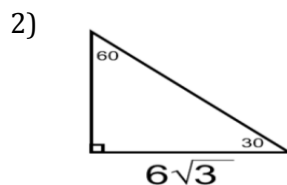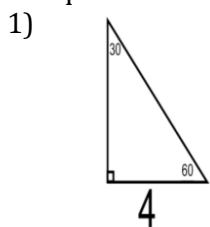### $30° - 60° - 90°$ Special Right Triangle
A $30° - 60° - 90°$ is another type of special right triangle. The lengths of the sides of a $30° - 60° - 90°$ triangle are in the ratio: $1: \sqrt{3}: 2$
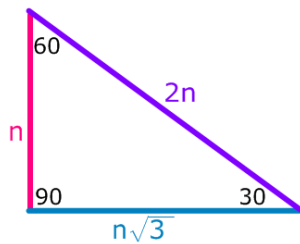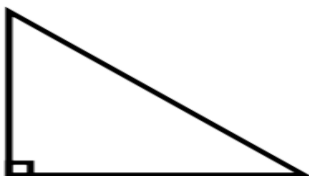
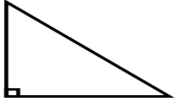Side 1: Side 2: Hypotenuse = $n: n\sqrt{3}: 2n$

Examples:
For questions 1 and 2, find the length of the missing sides.

1)

2)

$6\sqrt{3}$

3) Find the length of the hypotenuse of a right triangle, if the lengths of the two sides are 4 inches and $4\sqrt{3}$ inches.

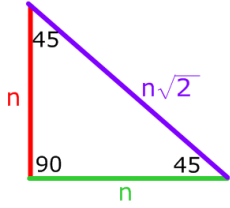4) Find the length of the legs of a 30-60-90 triangle if the hypotenuse is 12 inches.

5) If a 30-60-90 triangle has a short leg length of 5, what are the lengths of the other leg and the hypotenuse?

6) If a 30-60-90 triangle has a hypotenuse of length 16, what are the lengths of the legs?

45° − 45° − 90° Special Right Triangle

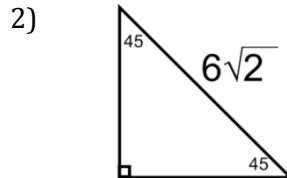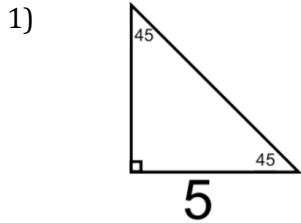A 45° − 45° − 90° is an *isosceles right* triangle. The lengths of the sides of the triangle are in the ratio: 1: 1: $\sqrt{2}$
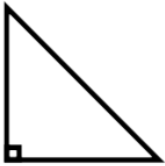
Side 1: Side 2: Hypotenuse = $n: n: n\sqrt{2}$
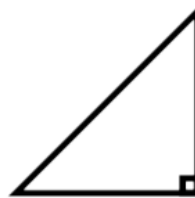

Examples:

For questions 1 and 2, find the lengths of the missing sides.

1)

2)

3) In an isosceles right triangle, the legs measure 3 inches. Find the length of the hypotenuse.
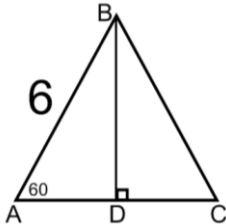
4) Find the length of the leg of a right triangle if one angle measures 45° and the hypotenuse is 8 inches.
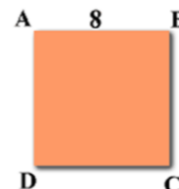
Mixed Examples:

1) a. Find the perimeter of triangle ABD.
   b. Find the perimeter of triangle ABC.

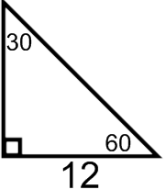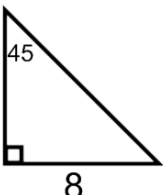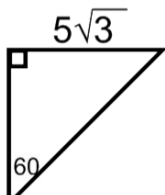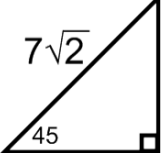2) In the figure below, ABCD is a square whose side is 8 units. Find the length of the diagonal AC.
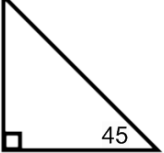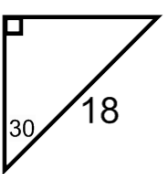
Name:_____   Date:_____ Period:____

Special Right Triangles Homework

Directions: *Find all of the missing sides in the diagrams below.* **Note: Triangles no drawn to scale!!!**

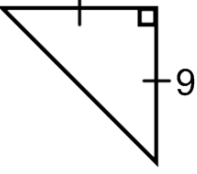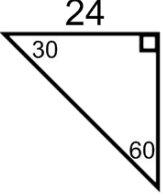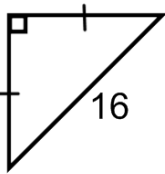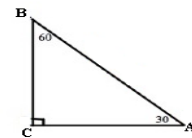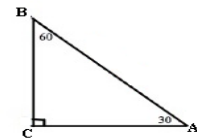|		
1) 30 60 12	2) 45 8	3) $5\sqrt{3}$ 60
4) $7\sqrt{2}$ 45	5) 10 45	6) 30 18
7) 9	8) 24 30 60	9) 16

10) Triangle ABC is a 30° − 60° − 90° triangle. AB=14. Find the lengths of the other two sides. Leave any non-integer answer in simplest radical form.

B
60
30
C   A

(11) Triangle ABC is a 30° − 60° − 90° triangle. AC=$7\sqrt{3}$. Find the lengths of the other two sides. Leave any non-integer answer in simplest radical form.

B
60
30
C   A
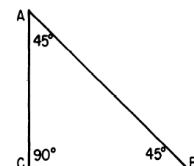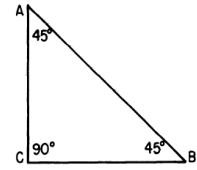
12) Triangle ABC is a 45° − 45° − 90° triangle. BC=4. Find the lengths of the other two sides. Leave any non-integer answer in simplest radical form.

A
45°
90°   45°
C   B
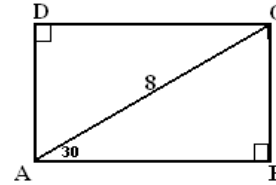
13) (Use classwork question #4 from the 45-45-90 section to help you) Triangle ABC is a 45° − 45° − 90° triangle. AB=12. Find the lengths of the other two sides. Leave any non-integer answer in simplest radical form.

14) The diagonal of a rectangle is 8 and the smaller acute angle of the triangle formed is 30°.
   (a) Find the dimensions of the rectangle.
   (b) Find the area of the rectangle.

15) Albert is standing at point A. He takes a sighting to the top of a cliff, (point C). The angle of elevation is 30 degrees. Becky is standing at point B and takes a sighting to the top of the same cliff, (point C). The angle of elevation is 45 degrees. If the cliff is 100 feet high, find the exact distance between Albert and Becky.
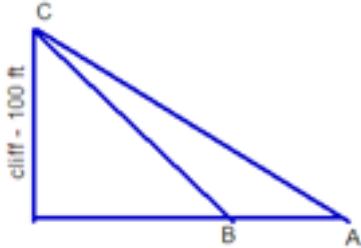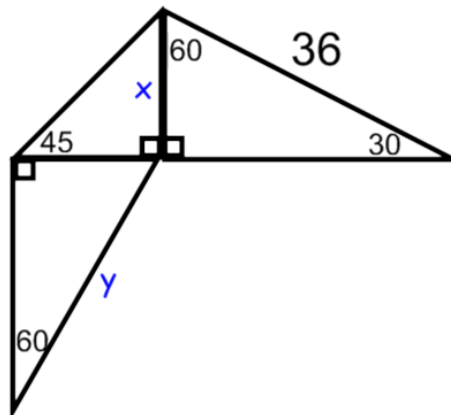
16) A root is short and steep on one side, and longer and more gradual on the other side. (See diagram below).
   a. Calculate the number of linear feet of roofing required, (from A to B to C).

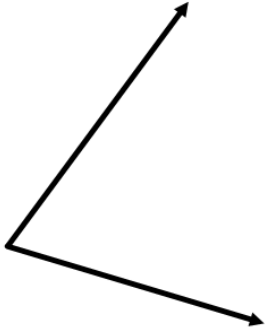   b. Find the length of the longest building the roof would cover, (from A to point C).
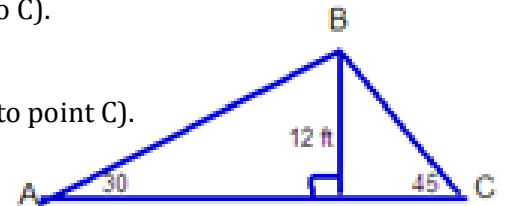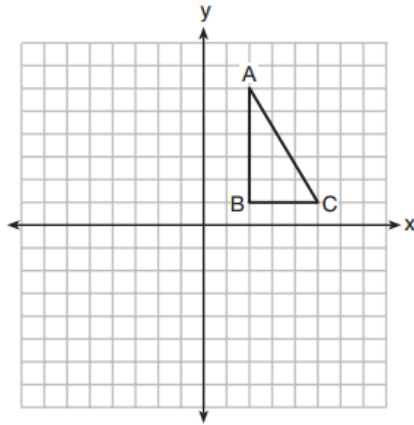
17) Find the value of x and y.

18) Construct an angle bisector.

19) Find the slope of a line parallel to
$2y - 10x = 24$.

20) Right triangle ABC is shown in the graph below.

21) Which set of numbers could represent the lengths of the sides of a right triangle?

(1) {2, 3, 4}　　　　　　　　(3) {7, 7, 12}

(2) {5, 9, 13}　　　　　　　　(4) {8, 15, 17}

After a reflection over the y-axis, the image of $\triangle ABC$ is $\triangle A'B'C'$.
Which statement is *not* true?

(1) $\overline{BC} \cong \overline{B'C'}$　　　　　　(3) $AB = A'B'$

(2) $\overline{A'B'} \perp \overline{B'C'}$　　　　　　(4) $\overline{AC} \parallel \overline{A'C'}$