CHAPTER 13 – RIGHT TRIANGLES AND TRIGONOMETRY

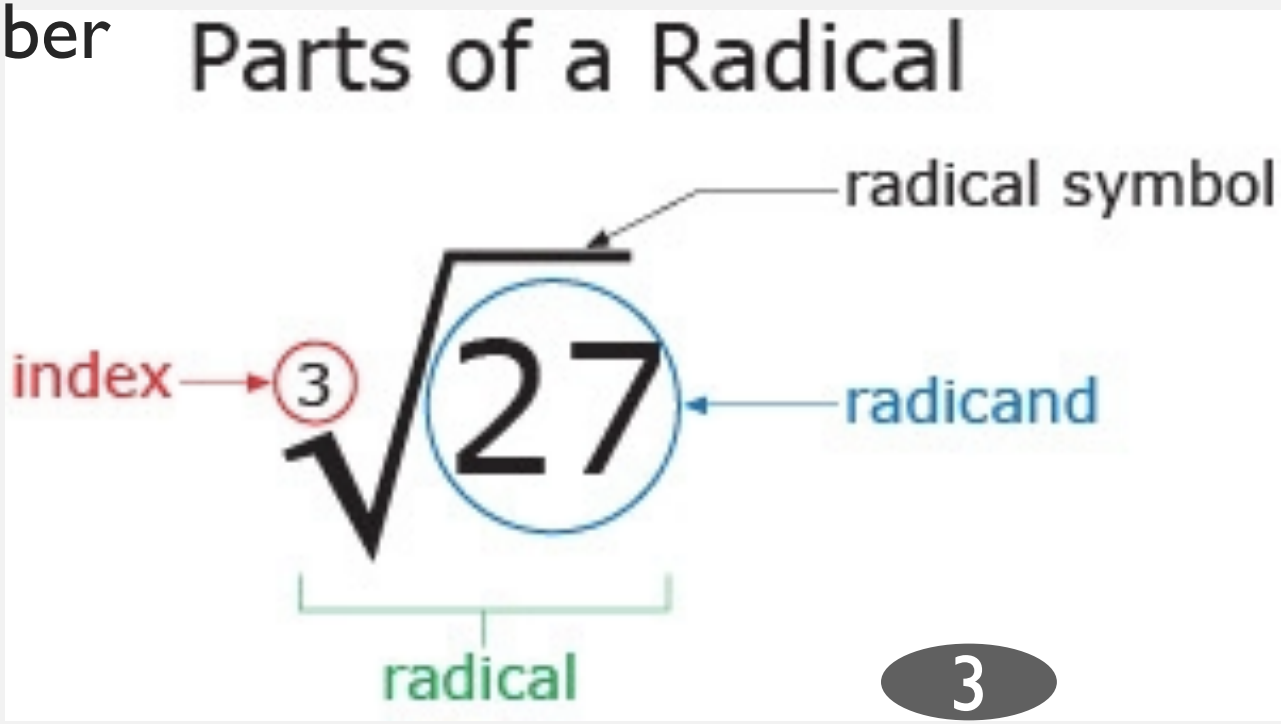
13.1 – SIMPLIFYING SQUARE ROOTS

DEFINITION: SQUARE ROOTS

Square roots are the inverse of squaring.

They answer the question "what number squared gives ___?"

Ex: $\sqrt{4} = 2$ because $2^2 = 4$



Simplify each expression.

1 $\sqrt{49}$

2 $\sqrt{64}$

a. $\sqrt{25}$

b. $\sqrt{144}$

SIMPLIFYING SQUARE ROOTS

- 1. There are no perfect square factors other than 1 in the radicand.
- 2. The radicand is not a fraction.
- 3. The denominator does not contain a radical expression.

PULLING OUT PERFECT SQUARES

- 1) Break down the number into its prime factors.
- 2) Remove any numbers that appear twice, write them once in front of the radical.
- Ex: Simplify $\sqrt{12}$

c. $\sqrt{8}$ d. $\sqrt{75}$ e. $\sqrt{20}$

PROPERTIES OF SQUARE ROOTS

- Product property: $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$

  Ex: $\sqrt{6} = \sqrt{2} \cdot \sqrt{3}$

- Quotient property: $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

  Ex: $\sqrt{\frac{5}{2}} = \frac{\sqrt{5}}{\sqrt{2}}$

Simplify $\sqrt{3} \cdot \sqrt{6}$.

f. $\sqrt{5} \cdot \sqrt{10}$

g. $\sqrt{3} \cdot \sqrt{15}$

Simplify each expression.

5 $\dfrac{\sqrt{16}}{\sqrt{8}}$

6 $\sqrt{\dfrac{9}{4}}$

i. $\dfrac{\sqrt{81}}{\sqrt{100}}$

j. $\sqrt{\dfrac{49}{64}}$

RADICALS IN THE DENOMINATOR

- When radicals are present in the denominator, rationalizing the denominator is necessary.

Ex: **Simplify** $\frac{\sqrt{3}}{\sqrt{5}}$.

Simplify $\frac{2}{\sqrt{3}}$.

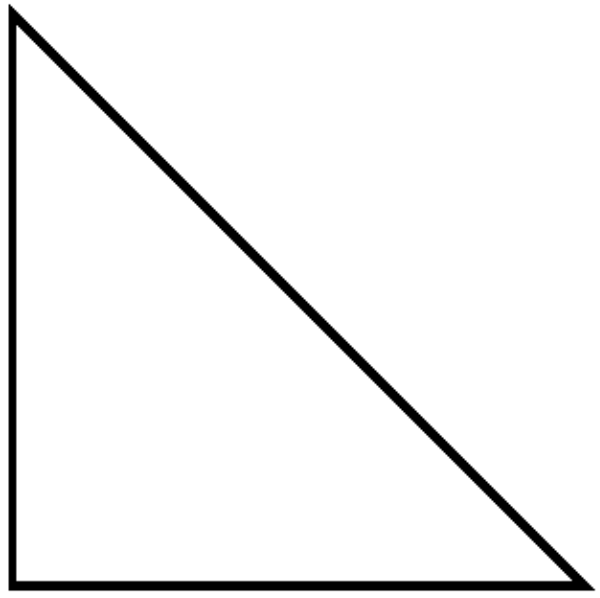
k. $\frac{\sqrt{7}}{\sqrt{2}}$

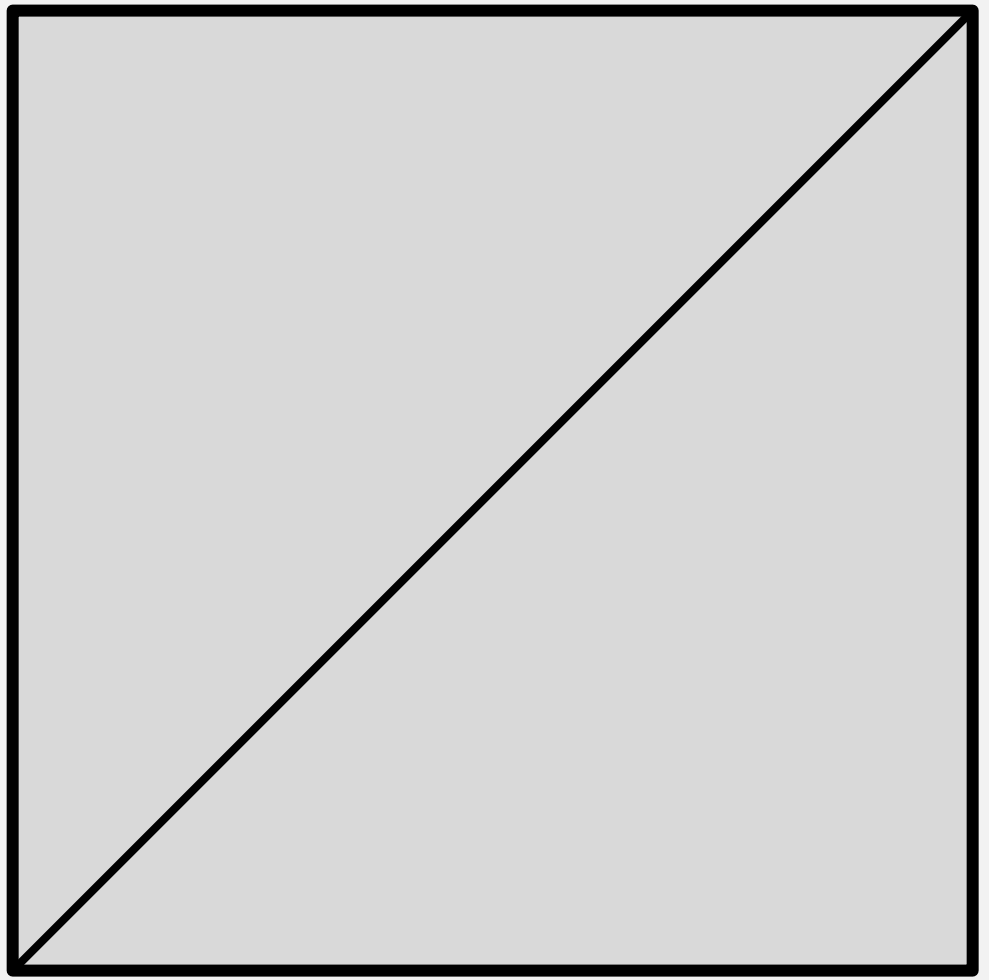
l. $\frac{4}{\sqrt{3}}$

13.2 – 45-45-90 TRIANGLES

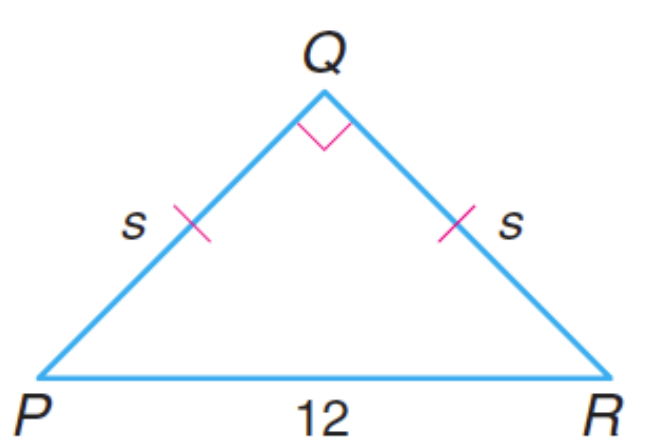
Special Right Triangle

Angle Measures		
Side Measures		



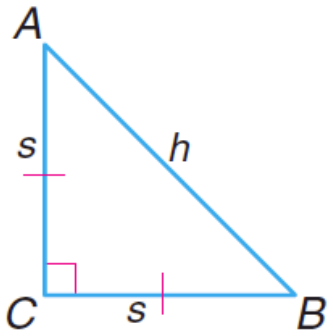


2 If $\triangle PQR$ is an isosceles right triangle and the measure of the hypotenuse is 12, find s. Write the answer in simplest form.

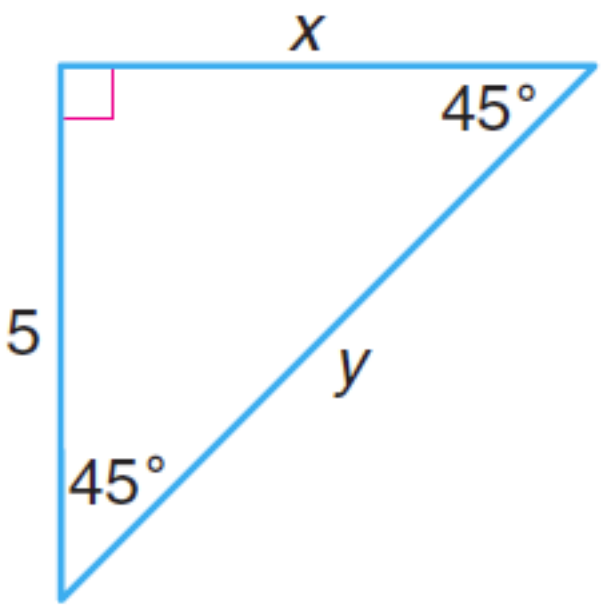


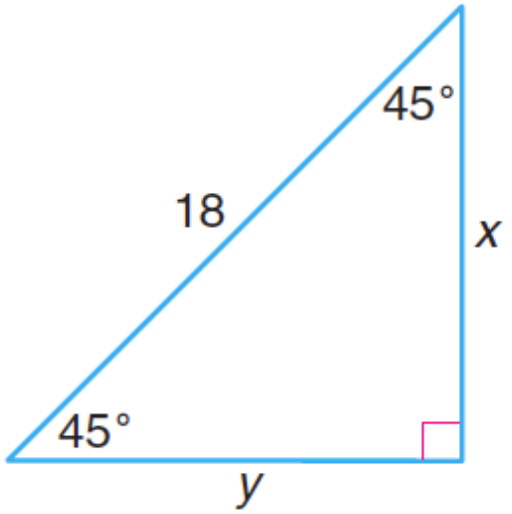
$\triangle ABC$ is an isosceles right triangle. Find s for each value of h.

a. 4 b. 5 c. $3\sqrt{2}$



Find the missing measures. Write all radicals in simplest form.

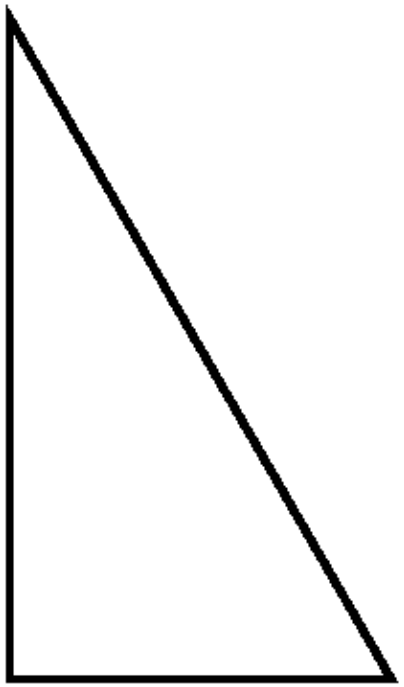


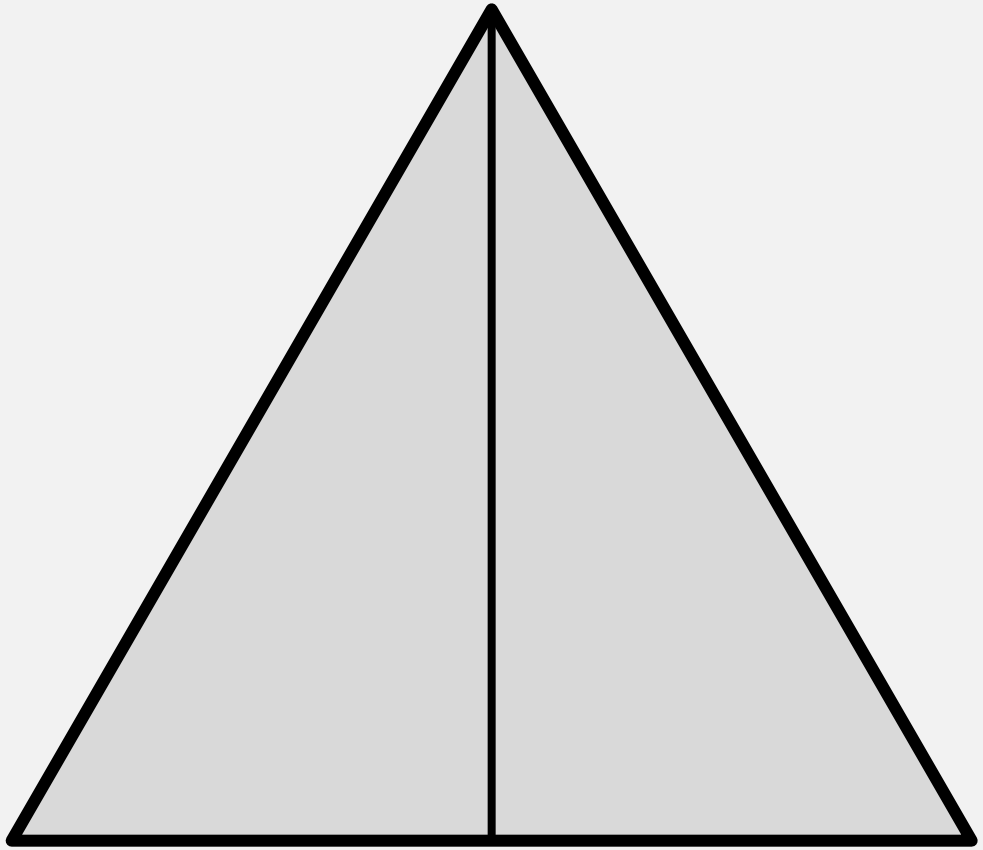


13.3 – 30-60-90 TRIANGLES

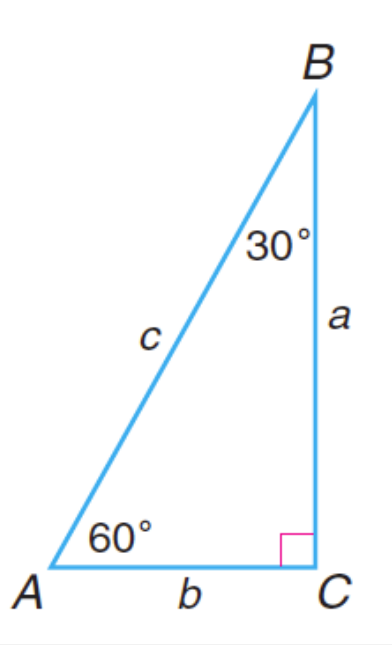
Special Right Triangle

Angle Measures		
Side Measures		

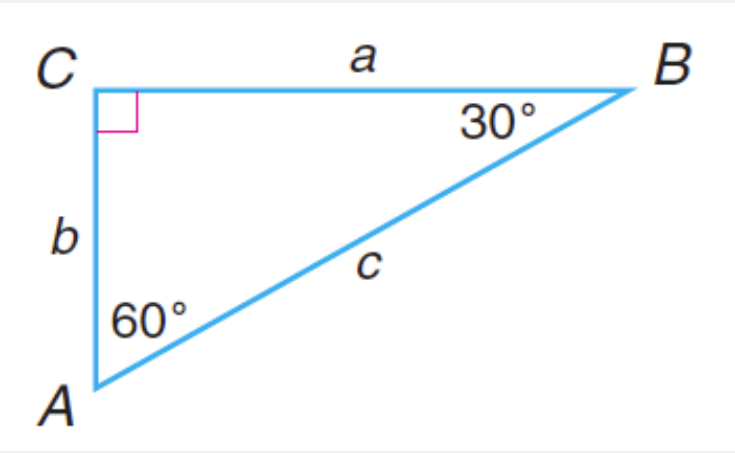




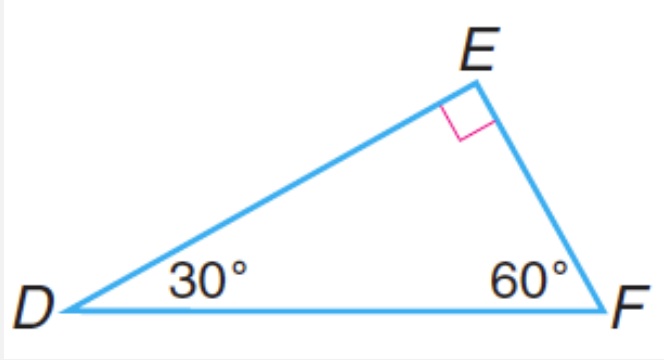
1 In $\triangle ABC$, $b = 7$. Find a and c. Write in simplest form.



2 In $\triangle ABC$, $c = 18$. Find a and b. Write in simplest form.



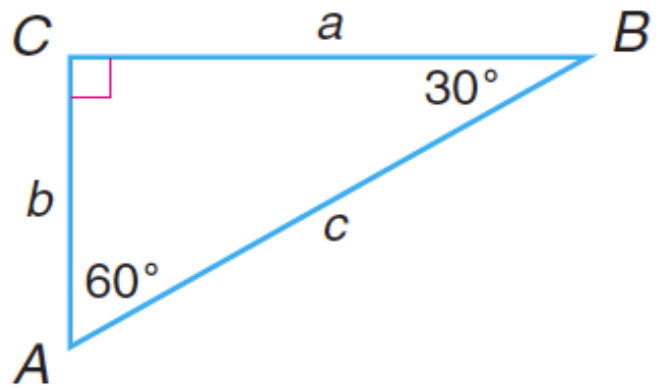
3 In $\triangle DEF$, $DE = 12$. Find EF and DF. Write in simplest form.



c. Refer to $\triangle DEF$ above. If $DE = 8$, find EF and DF.

a. Refer to $\triangle ABC$ above. If $b = 8$, find a and c.

b. Refer to $\triangle ABC$ above. If $c = 10$, find a and b.

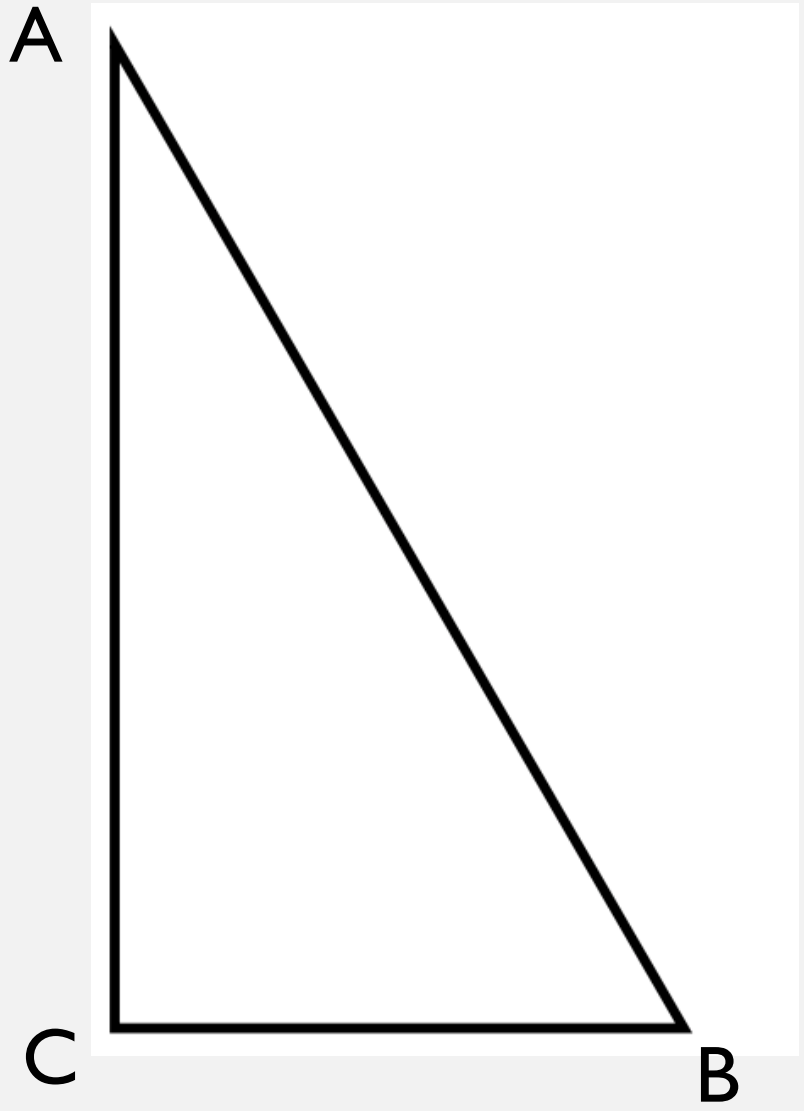


13.4/5 TRIGONOMETRIC RATIOS

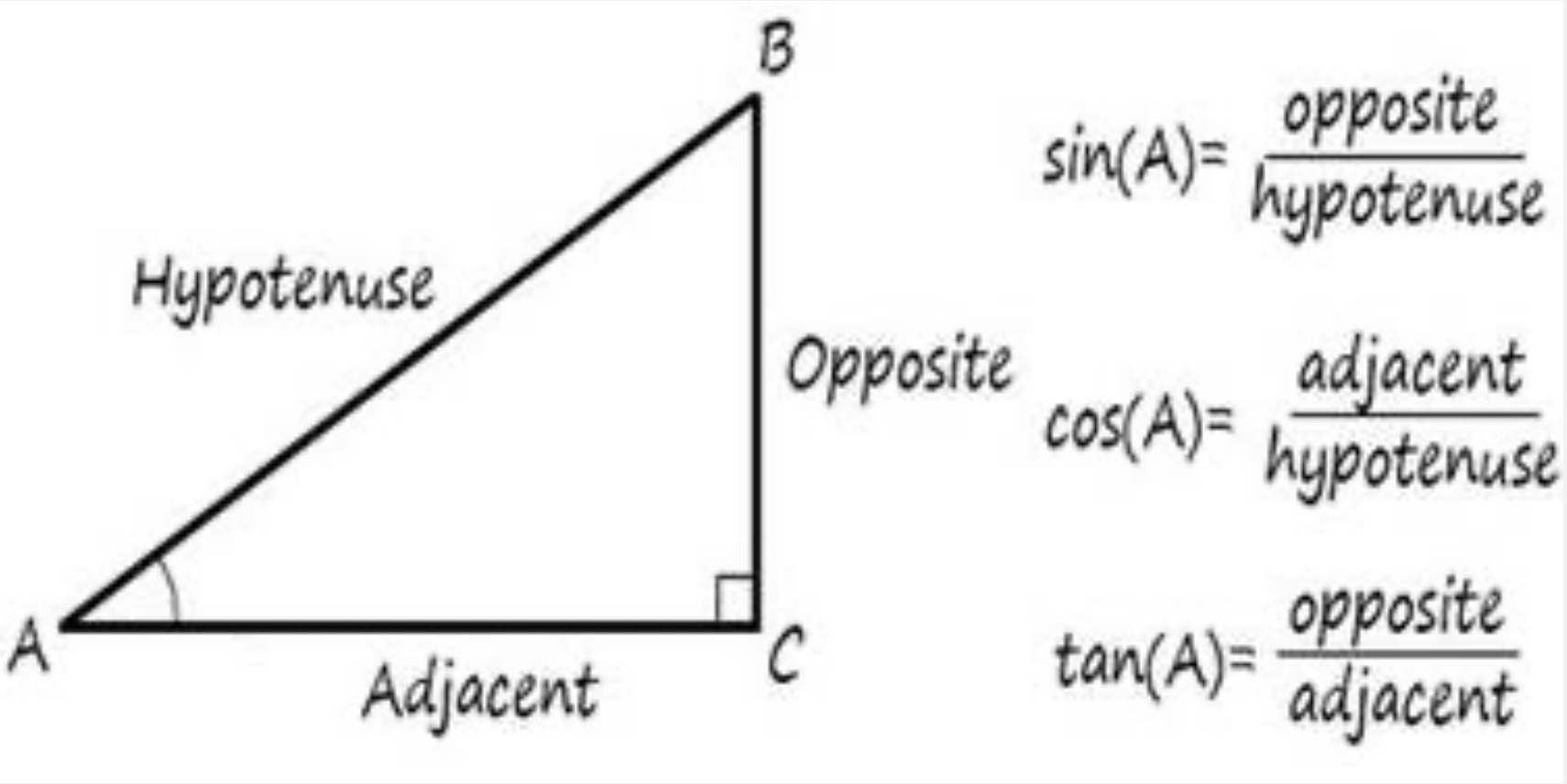
DEFINITIONS

- **Trigonometry** comes from Greek: *trigon* means triangles and *metron* means measure. Trigonometry involves the measure of triangles.
- A **trigonometric ratio** is a ratio of the lengths of two sides of a triangle. Trig ratios are constant for any given angle measure (due to similarity properties).

Labelling Triangles



TRIGONOMETRIC RATIOS



FINDING A RATIO

- 1) Identify the angle you are working with.
- 2) Identify the angles opposite and adjacent sides.
- 3) Write the ratio.

Express each ratio as a fraction and as a decimal to the nearest hundredth.

a. $\sin P$

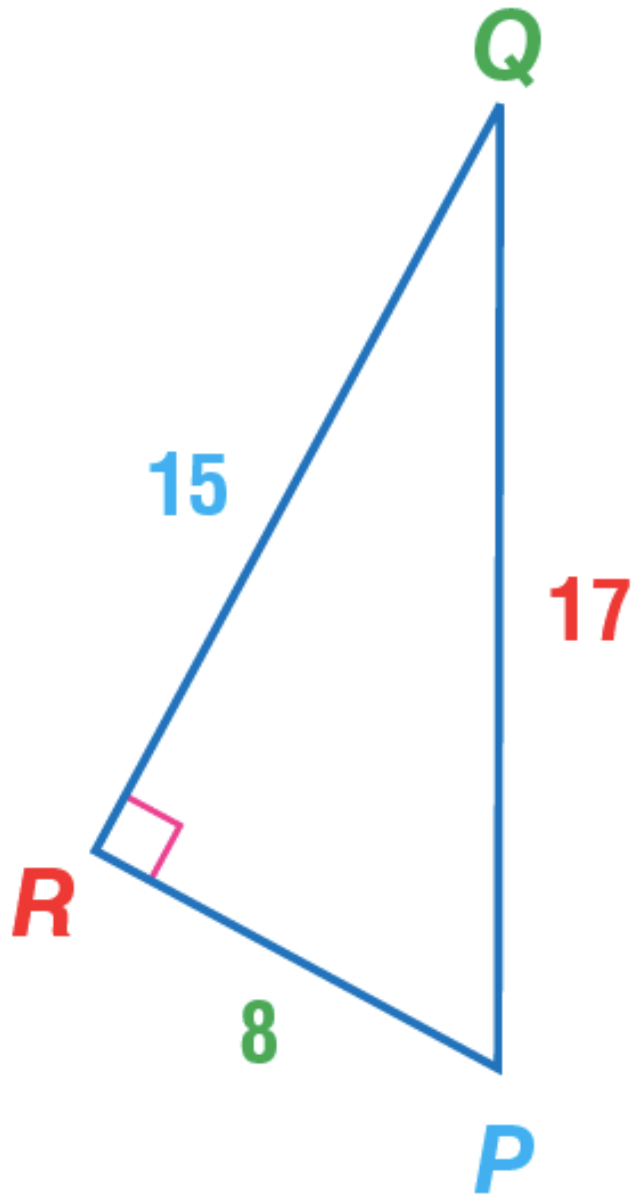
b. $\cos P$

c. $\tan P$

d. $\sin Q$

e. $\cos Q$

f. $\tan Q$



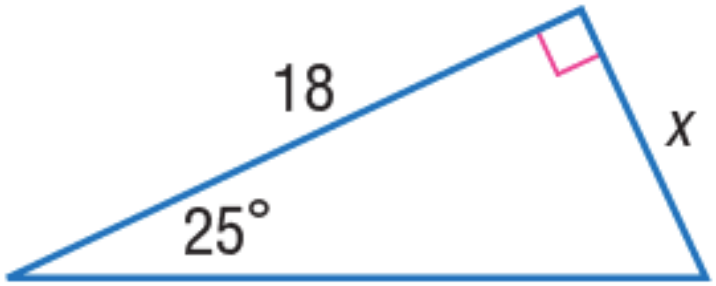
FINDING MISSING MEASURES

- 1) Identify the angle you have or are looking for.
- 2) Identify one side you have, and one you have or are looking for.
- 3) Determine the trigonometric ratio that relates all 3 items.
- 4) Write the ratio and solve it.

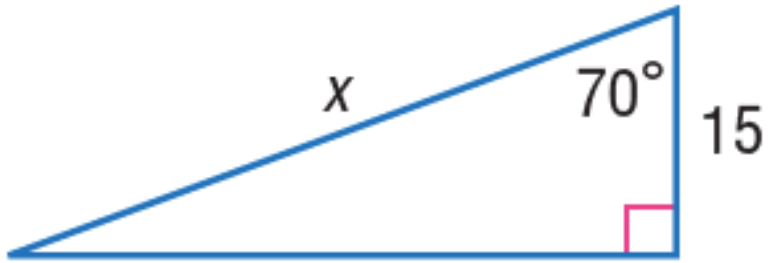
- Note: when looking for an angle, you must use the inverse to find the angle.
- Solving a right triangle means finding all angle and side measures.

Find x to the nearest hundredth.

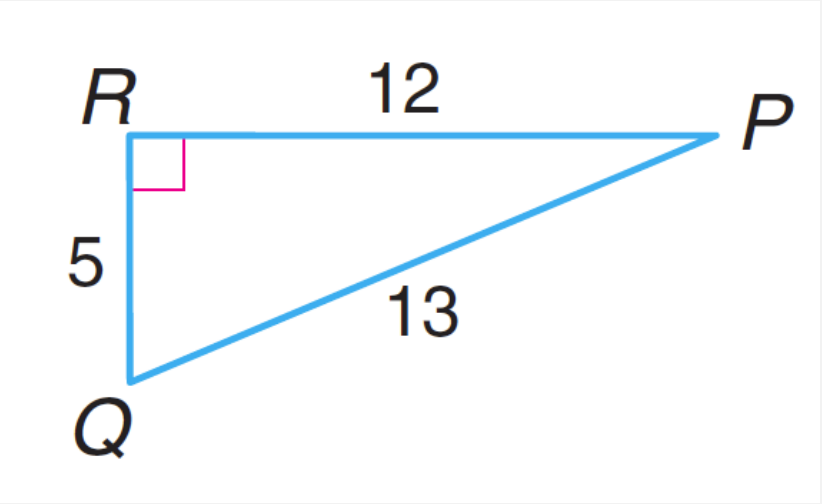
3A.



3B.

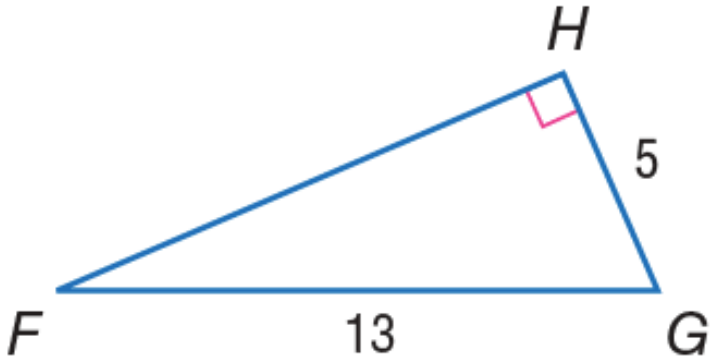


Find the measures of each angle.

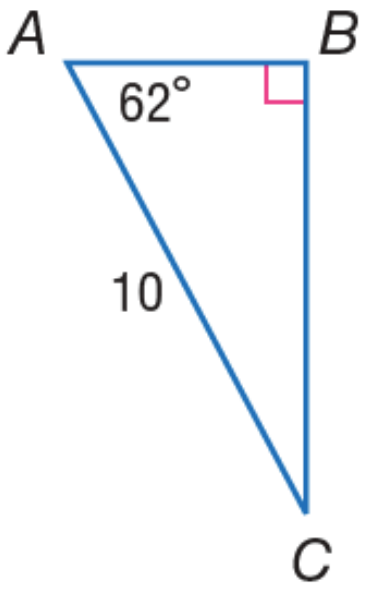


Solve each right triangle. Round side measures to the nearest tenth and angle measures to the nearest degree.

5A.



5B.



5C.