The Law of Cosines:
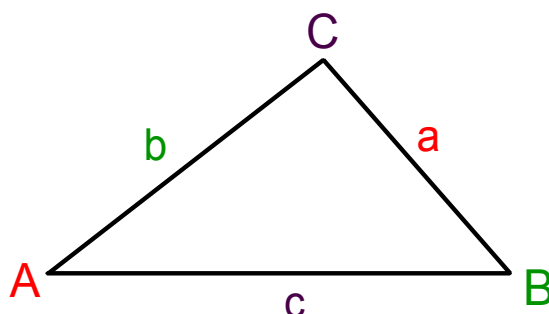
*Used to find missing parts when we are not able to use the Law of Sines.

$$a^2 = b^2 + c^2 - 2bc \, (\cos A)$$
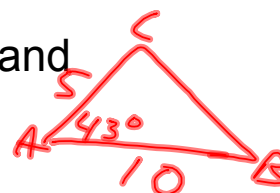$$b^2 = a^2 + c^2 - 2ac \, (\cos B)$$
$$c^2 = a^2 + b^2 - 2ab \, (\cos C)$$

The Law of Cosines can be used to solve a triangle in the following cases:

*You know the measures of two sides and the included angle of a triangle (SAS)

* You know the measure of all three sides (SSS)

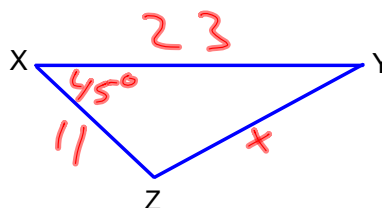The Law of Sines can be used to solve a triangle in the following cases:

* AAS, ASA, or SSA

When solving a triangle you can use any combination of methods.
   *Trig Ratios (sin, cos, tan)
   *Law of Sines
   *Law of Cosines

7-7 The Law of Cosines

Example 1: Find x if y=11, z=23, and m∠X=45° .

Is it a right △? No
Then Law of Sines
or (Law of Cosines)

X —— 23 —— Y
45°
11   x
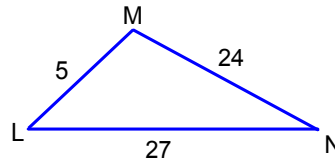Z

$$x^2 = y^2 + z^2 - 2yz\cos X$$
$$x^2 = 11^2 + 23^2 - 2(11)(23)\cos 45°$$
$$x^2 = 121 + 529 - 506\cos 45°$$
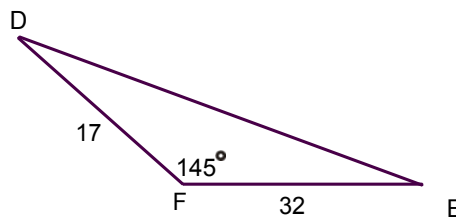$$x^2 = 650 - 506\cos 45°$$
$$x = \sqrt{292.2039687}$$

$$x = 17.1$$

Example 2: Find m∠L.
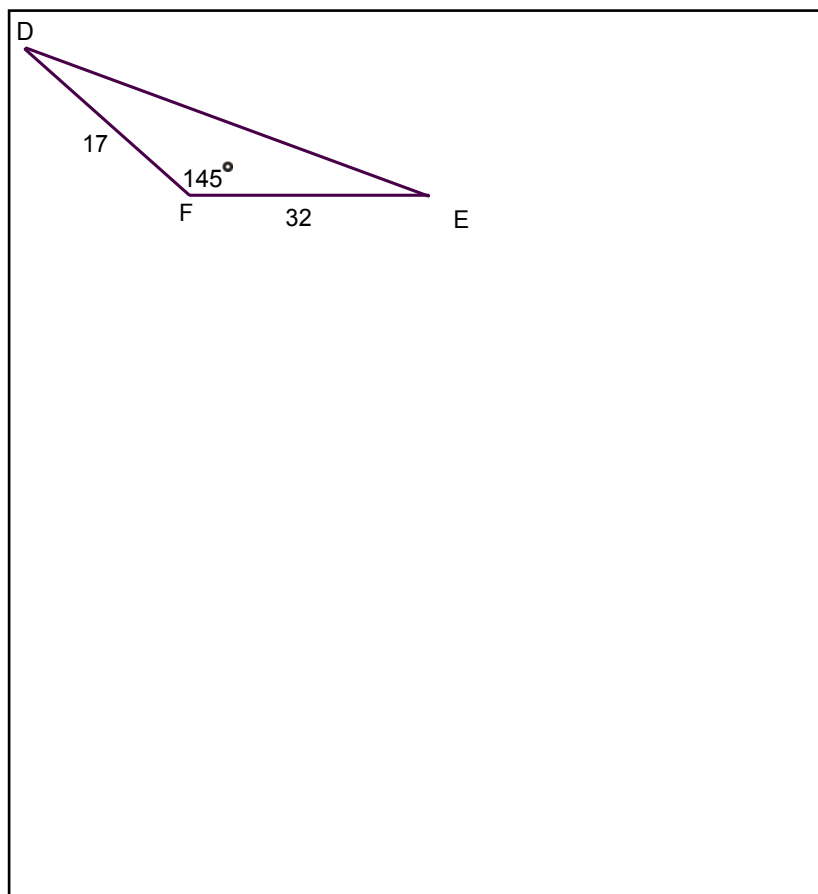
M

5

24

L

27

N

Example 3: Determine whether the Law of
Sines or the Law of Cosines should be used
first to solve △DEF. Then solve △DEF.
Round angle measures to nearest degree and
side measurements to the nearest tenth.

D

17

145°

F

32

E

D

17

145°

F   32   E

<u>Example 4:</u> Find the perimeter of the quadrilateral shown below. Round to the nearest tenth meter.

I

9 m

50°

20 m

H

J

25°

K