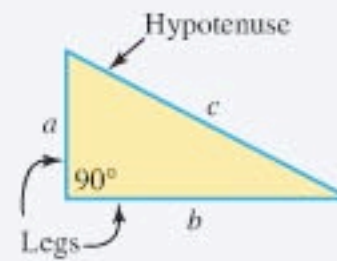


Pythagorean Formula

If c is the length of the longest side of a right triangle and a and b are the lengths of the shorter sides, then

$$c^2 = a^2 + b^2.$$



The longest side is the **hypotenuse**, and the two shorter sides are the **legs**, of the triangle. The hypotenuse is the side opposite the right angle.

OBJECTIVE Use the distance formula.

An important result in algebra is derived from the Pythagorean formula. The *distance formula* allows us to find the distance between two points in the coordinate plane, or the length of the line segment joining those two points.

By the Pythagorean formula, the square of the length of the hypotenuse d of the right triangle in Figure 10 is equal to the sum of the squares of the lengths of the two legs a and b :

$$d^2 = a^2 + b^2.$$

This result can be generalized. Figure 11 shows the two points (x_1, y_1) and (x_2, y_2) . Notice that the distance between (x_1, y_1) and (x_2, y_1) is given by

$$a = |x_2 - x_1|,$$

and the distance between (x_2, y_2) and (x_2, y_1) is given by

$$b = |y_2 - y_1|.$$

From the Pythagorean formula,

$$d^2 = a^2 + b^2$$

$$d^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2.$$

Choosing the principal square root gives the **distance formula**.

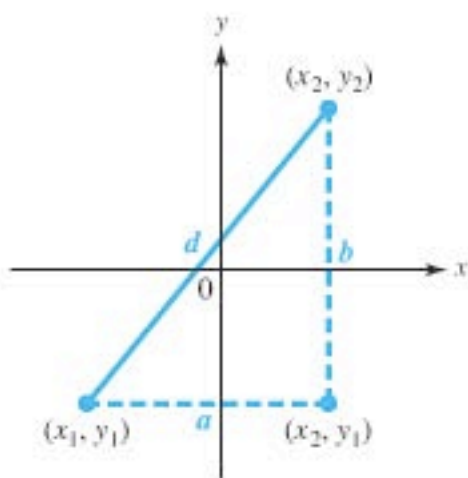


FIGURE 11

Distance Formula

The distance between the points (x_1, y_1) and (x_2, y_2) is

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.$$

Using the Distance Formula

A Sanyo color television, model AVM-2755, has a rectangular screen with a 21.7-in. width. Its height is 16 in. What is the measure of the diagonal of the screen, to the nearest tenth of an inch? (*Source*: Actual measurements of the author's television.)

