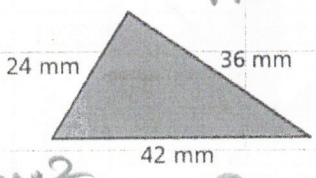
7.5 Using the Pythagorean Theorem

Converse of the Pythagorean Theorem – if the equation $a^2+b^2=c^2$ is true for the side lengths of a triangle, then the triangle is a right triangle.

Tell whether each triangle is a right triangle:

A. not right △

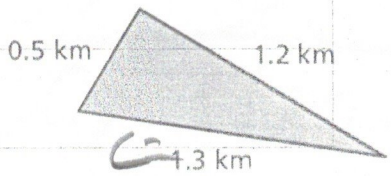


$24^2+36^2=42^2$

$576+1296=1764$

$1872 \neq 1764$

B.



$0.5^2+1.2^2=1.3^2$

$.25+1.44=1.69$

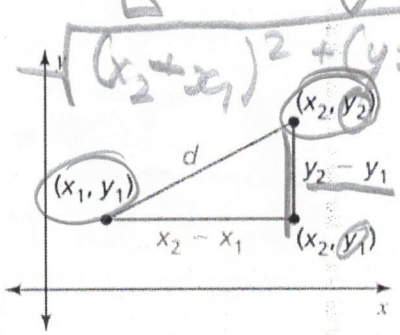
$1.69=1.69$

yes, its a right △

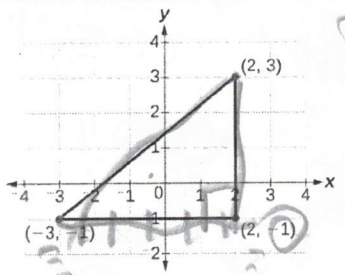
Distance Formula:

The distance between any two points (x_1, y_1) and (x_2, y_2) is given by the formula:

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



C. Find the distance between the points (2, 3) and (-3, -1).



$3-(-1)=4$

$-3-2$ or $2-(-3)$

$|-5|$

$d=\sqrt{41}$ units

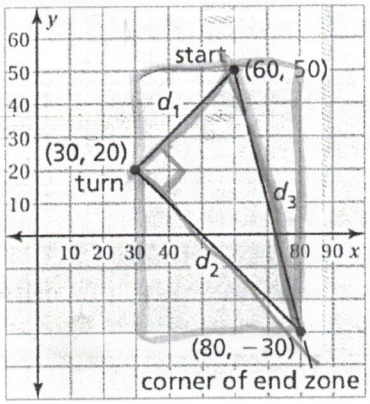
$d=\sqrt{(y_2-y_1)^2+(x_2-x_1)^2}$

$d=\sqrt{(-1-3)^2+(-3-2)^2}$

$d=\sqrt{(-4)^2+(-5)^2}$

$d=\sqrt{16+25}$

D. You design a football play in which a player runs down the field, makes a 90° turn, and runs to the corner of the end zone. Your friend runs the play as shown. Did your friend make a 90° turn? Each unit on the grid represents 10 feet.



d_1: (60, 50), (30, 20)

$d_1 = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$

$d_1 = \sqrt{(20-50)^2 + (30-60)^2}$

$-30 \qquad -30$

$d_1 = \sqrt{900 + 900}$

$d_1 = \sqrt{1,800}$

d_2: (30, 20) (80, −30)

$d_2 = \sqrt{(80-30)^2 + (-30-20)^2}$

$d_2 = \sqrt{(50)^2 + (50)^2}$

$d_2 = \sqrt{(50)^2 + (50)^2}$

$d_2 = \sqrt{2,500 + 2,500}$

$d_2 = \sqrt{5,000}$

d_3: (60, 50) (80, −30)

$d_3 = \sqrt{(80-60)^2 + (-30-50)^2}$

$d_3 = \sqrt{20^2 + 80^2}$

$d_3 = \sqrt{400 + 6400}$

$d_3 = \sqrt{6,800}$

$(\sqrt{1,800})^2 + (\sqrt{5,000})^2 = (\sqrt{6,800})^2$

$1,800 + 5,000 = 6,800$

$6,800 = 6,800$