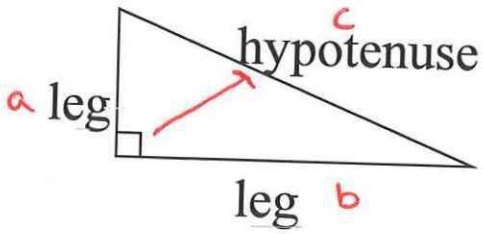
4-4 The Pythagorean Theorem and the Distance Formula

Objective: Use the Pythagorean and the Distance Formula

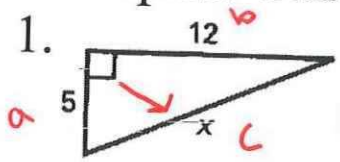


Pythagorean Theorem : $c^2 = a^2 + b^2$

$(\text{hypotenuse})^2 = (\text{leg})^2 + (\text{leg})^2$

Examples: Find the missing side of the right triangle

1.



$a = 5$, $b = 12$, $c = x$

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

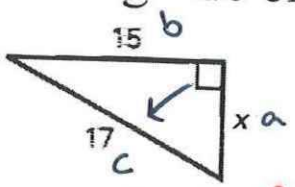
$x^2 = 5^2 + 12^2$

$x^2 = 25 + 144$

$\sqrt{x^2} = \sqrt{169}$

$x = 13$

2.



$a = x$, $b = 15$, $c = 17$

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

$17^2 = x^2 + 15^2$

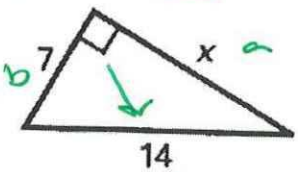
$289 = x^2 + 225$

$-225 \quad -225$

$64 = x^2$

$x = 8$

3.



$a = x$, $b = 7$, $c = 14$

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

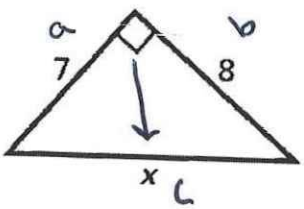
$14^2 = x^2 + 7^2$

$196 = x^2 + 49$

$147 = x^2$

$x = 12.1$

4.



$a = 7$, $b = 8$, $c = x$

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

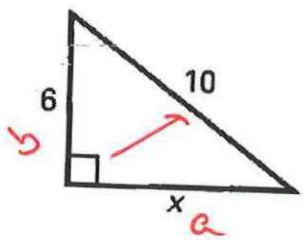
$x^2 = 7^2 + 8^2$

$x^2 = 49 + 64$

$\sqrt{x^2} = \sqrt{113}$

$x = 10.6$

5.



$a = x$, $b = 6$, $c = 10$

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

$10^2 = x^2 + 6^2$

$100 = x^2 + 36$

$-36 \quad -36$

$\sqrt{64} = \sqrt{x^2}$

$x = 8$

Distance formula – $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

6. Find the distance between (-4,1) and (5,3)

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

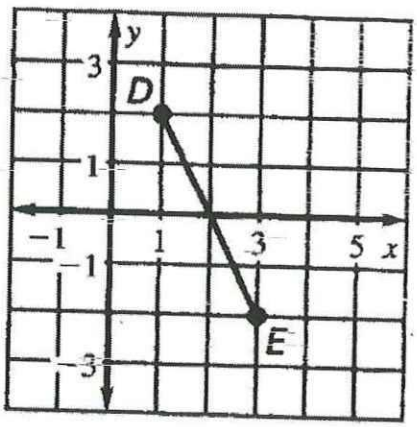
$\sqrt{(5 - -4)^2 + (3 - 1)^2}$

$\sqrt{(9)^2 + (2)^2}$

$\sqrt{81 + 4}$

$\sqrt{85}$ or 9.2

7. Find the distance between D(1,2) and E (3, -2)



$x_1\ y_1 \quad x_2\ y_2$

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

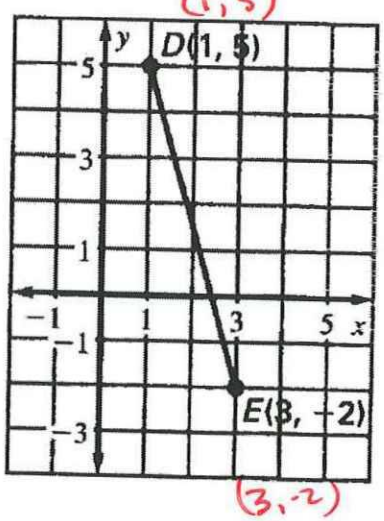
$= \sqrt{(3-1)^2 + (-2-2)^2}$

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

$= \sqrt{4 + 16}$

$= \sqrt{20}$ or 4.5

8. Find the distance



(1, 5) (3, −2)

$x_1\ y_1 \quad x_2\ y_2$

$= \sqrt{(3-1)^2 + (-2-5)^2}$

$= \sqrt{(2)^2 + (-7)^2}$

$= \sqrt{4 + 49}$

$= \sqrt{53}$ or 7.3

p195 # 1-29 odd *sep sheet*