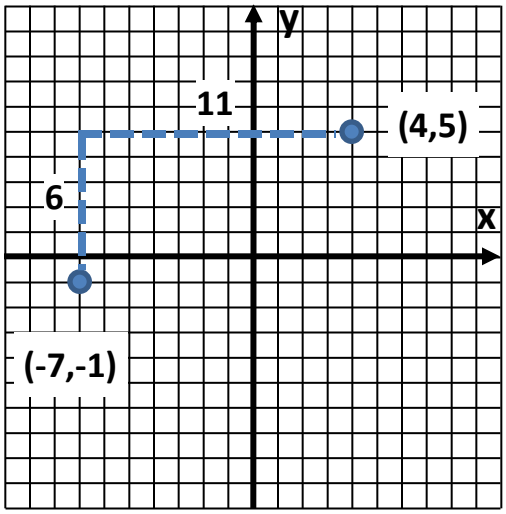
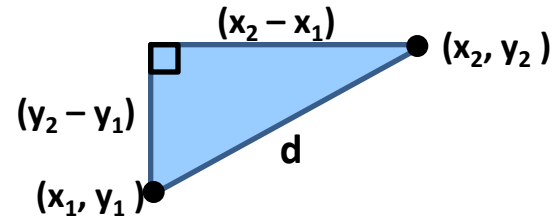
Distance Formula and Concept

Distance formula: Distance between (x_1, y_1) and (x_2, y_2) $\quad d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Distance concept: Length of the line segment connecting those two points

Another form of Pythagorean theorem





$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
$= \sqrt{(4-(-7))^2 + (5-(-1))^2}$

$= \sqrt{(11)^2 + (6)^2}$
$= \sqrt{121 + 36} \quad = \sqrt{157} \quad = 12.53$

Pythagorean:
$d^2 = (11)^2 + (6)^2$
$= 121 + 36$

$d \quad = \sqrt{157}$
$= 12.53$

Common problems: a) Given two points find the distance between them
b) Use distance formula to find length of geometric item
1) Length of radius or diameter
2) Length of a side of a polygon

Typical SOL Distance Problems

The distance between the points $(-2, -4)$ and $(3, 8)$ is —

A $\sqrt{17}$
B 13
C 17
D 169

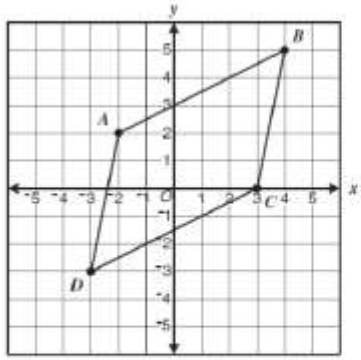
SSM:
- plot points on graph paper
- measure distance with scratch paper
- use graph paper to estimate distance
- Answers A & D wrong

Pythagorean Theorem
$5^2 + 12^2 = AC^2$
$25 + 144 = AC^2$
$169 = AC^2$
$13 = AC$

or

Distance formula
$\sqrt{(-2-3)^2 + (-4-8)^2}$
$\sqrt{(-5)^2 + (-12)^2}$
$\sqrt{(25 + 144)}$
$\sqrt{169} = 13$

Parallelogram *ABCD* is placed on a coordinate grid as shown.



What is the approximate length of diagonal $\overline{AC}$?

A 3.0 units
B 5.4 units
C 9.0 units
D 10.6 units

SSM:
- measure AC on scratch paper
- lay out on graph and estimate the distance

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

$\sqrt{(-2-3)^2 + (2-0)^2}$

$\sqrt{(-5)^2 + 2^2} \quad = \sqrt{29}$

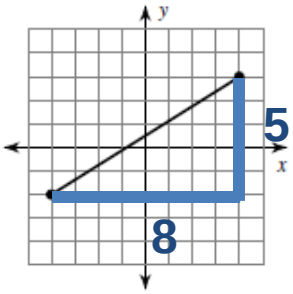
Note: as other material is presented more types of distance problems will appear, but the concept is still the same.

Distance Worksheet (50points)

Name: _____

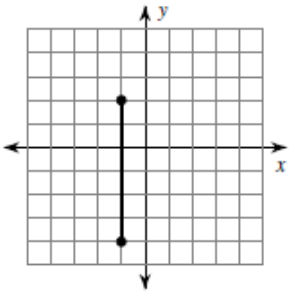
Find the distance between the points

1)

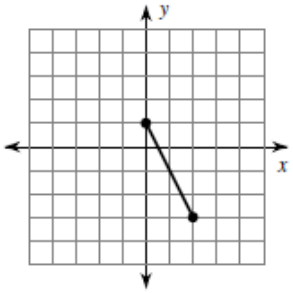


$d = \sqrt{(run)^2 + (rise)^2}$
$= \sqrt{(8)^2 + (5)^2}$
$= \sqrt{64 + 25}$
$= \sqrt{89} = 9.43$

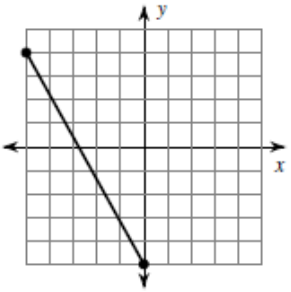
2)



3)



4)



5) (-1, 2), (2, -4)

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
$= \sqrt{(-1-2)^2 + (2-(-4))^2}$
$= \sqrt{(-3)^2 + (6)^2}$
$= \sqrt{9 + 36} = \sqrt{45} = 6.71$

6) (4,3), (-3, 4)

7) (0, 4), (2, 3)

8) (4, 0), (-4, 1)

9) (5, -10), (-5, 4)

10) (5, 5), (-6, 4)

11) (12, 12), (-3, 1)

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
$= \sqrt{(12-(-3))^2 + (12-1)^2}$
$= \sqrt{(15)^2 + (11)^2}$
$= \sqrt{225 + 121} = \sqrt{346} = 18.60$

12) (1, -9), (6, -6)