# L1 Distance notes

Wednesday, November 2, 2022 11:11 AM

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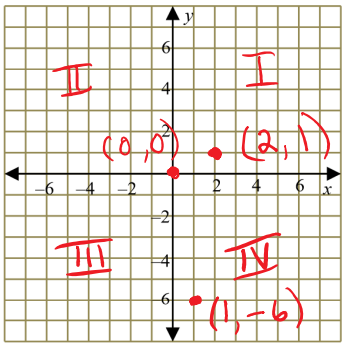
# Lesson 1 Distance

## Terminology

**Quadrants**:




**Cartesian Plane**: flat, 2-D surface divided into 4 quadrants

(x,y) **Ordered Pair**: values describing a specific point on the Cartesian plane

(0,0) **Origin**: point where x- and y-axes meet

$P(x_1, y_1)$

**Distance Formula**

For any points $P(x_1, y_1)$ and $Q(x_2, y_2)$ the distance PQ is:

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

**Example 1**

Determine the distance between A $(-5, 3)$ and B $(4, 1)$ to one decimal place.

$x_1, y_1$ $x_2, y_2$

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

$$d = \sqrt{9^2 + (-2)^2}$$

$$d = \sqrt{81 + 4}$$

$$d = \sqrt{85}$$ ← exact value

Simplify all complex radicals

ie $\sqrt{40}$

$\sqrt{4 \cdot 10}$

$\sqrt{4} \cdot \sqrt{10}$

$2\sqrt{10}$

Order of operations (BEDMAS)

Brackets

Exponents

Division, Multiplication } any order

Addition, Subtraction } any order

**Example 2 – Classifying Triangles**

1. **Scalene** – all sides and angles are different
2. **Equilateral** – all sides equal, all angles are 60°
3. **Isosceles** – 2 sides are equal, 2 angles are equal

**Note: Use simplified radicals for your solutions – No Calculators!**

Classify the triangle with vertices A(–4, 3), B(–2, –4), C(3, 5) as scalene, isosceles, or equilateral.

$x_1, y_1$ $x_2, y_2$ $x_3, y_3$

$AB = \sqrt{(-2-(-4))^2 + (-4-3)^2}$

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

$= \sqrt{4+49}$

$= \sqrt{53}$

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

$= \sqrt{49+4}$

$= \sqrt{53}$

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

$= \sqrt{5^2 + 9^2}$

$= \sqrt{25+81}$

$= \sqrt{106}$

$\therefore$ isosceles

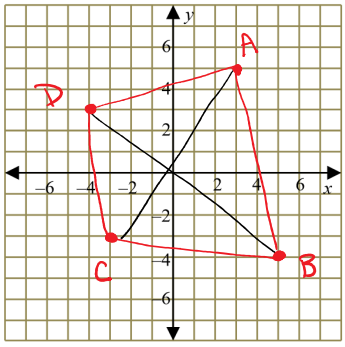
Assign worksheet # 1-3

**Example 3 – Diagonals of a Quadrilateral**

Given quadrilateral ABCD where A (3, 5), B (5, –4), C (–3, –3), and D (–4, 3), determine the length of its diagonals.

$x_1, y_1$ $x_2, y_2$ $x_3, y_3$ $x_4, y_4$

*Sketch first to know which are the diagonals.




↳ AC and BD

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

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

$= \sqrt{36+64}$

$= \sqrt{100}$

$= 10$

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

$= \sqrt{81+49}$

$= \sqrt{130}$