Solutions

THEORETICAL PART:

Definition:

An **ordered pair** (a, b) consists of two real numbers a and b. Unlike sets, the order of the elements in an ordered pair matters; that is, (a, b) is not equal to (b, a) unless $a = b$. In a given ordered pair (a, b), the number a is called the **first coordinate** and the number b is called the **second coordinate**.

Definition.

The **Cartesian coordinate system (Cartesian plane)** consists of two perpendicular real number lines (axis) intersecting at 0 point of each line. The point of intersection is called the **origin** of the system, and the four quarters defined by two lines are called the **quadrants**.

Definition.

We refer to the horizontal number line as the x**-axis**, the vertical number line as the y-axis, and the two coordinates of the ordered pair (a, b) as the x**-coordinate** and the y**-coordinate**.

The graph of an equation is a plot in the Cartesian plane of all of the ordered pairs that make up the solution set of the equation.

Formula (Distance Formula). The **distance** between two points (x_1, y_1) and (x_2, y_2) in the Cartesian plane is given by the following formula

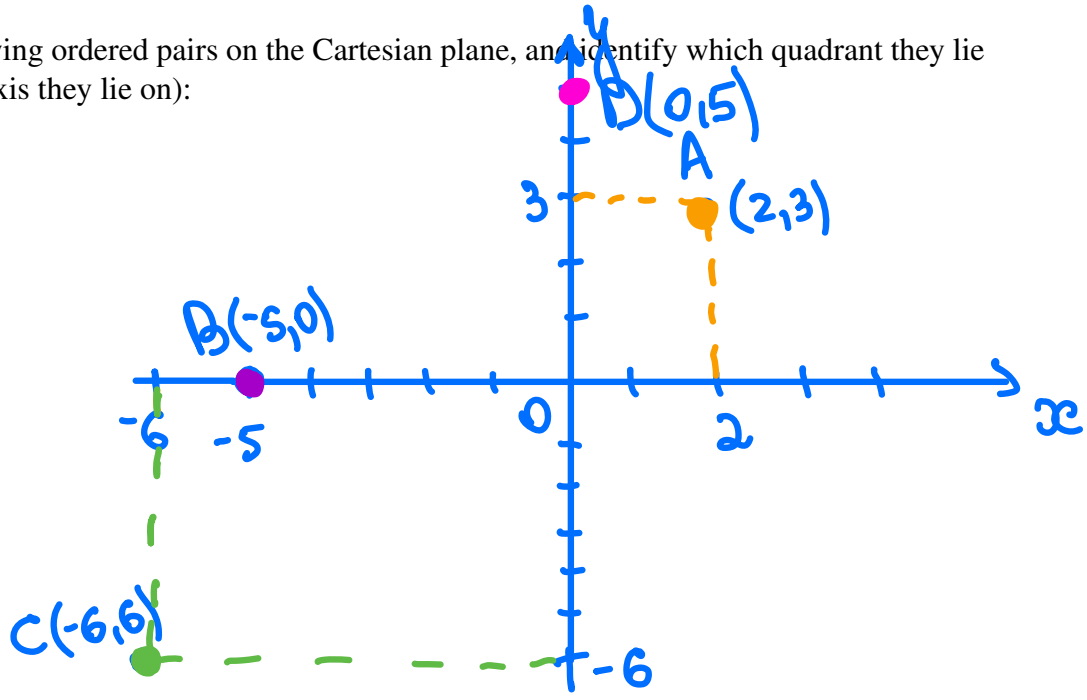
$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.$$

Formula (Midpoint Formula). The **midpoint** between two points (x_1, y_1) and (x_2, y_2) in the Cartesian plane has the following coordinates:

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right).$$

PRACTICAL PART:

1. Plot the following ordered pairs on the Cartesian plane, and identify which quadrant they lie in (or which axis they lie on):
   (a) $(2, 3)$
   (b) $(-5, 0)$
   (c) $(-6, -6)$
   (d) $(0, 5)$



2. Sketch graphs of the following equations by plotting points:

   (a) $2x - 5y = 10$

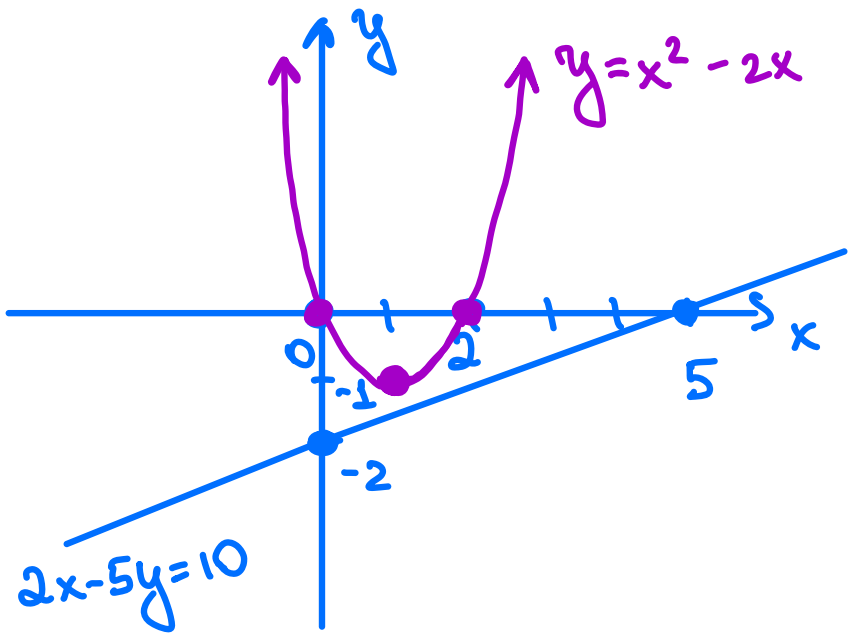
   (b) $y = x^2 - 2x$

$2x-5y=10$

x	y
0	-2
5	0

$y=x^2-2x$

x	y
0	0
2	0
1	-1



3. Calculate the distance between the following pairs of points:
   - $(-4, -2)$ and $(-7, 2)$

$x_1\ y_1\ x_2\ y_2$

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

$$d = \sqrt{(-7+4)^2 + (2+2)^2} = \sqrt{3^2 + 4^2} = \sqrt{25} = 5 \text{ (cm)}$$

4. Calculate the midpoint of the line connecting the pair of points:
   - $(5, 1)$ and $(-1, 3)$

$x_1\ y_1\ x_2\ y_2$

midpoint $M\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$$\left(\frac{5-1}{2}, \frac{1+3}{2}\right) = \left(\frac{4}{2}, \frac{4}{2}\right) = (2,2)$$

$M(2,2)$ is a midpoint