Math 4a. Classwork 10.

Warm up.

Simplify:

$-(+10); \quad +(-20); \quad +(+30); \quad -(-40); \quad -(+7); \quad -(-15); \quad -(-(-20));$

Evaluate:

$-5 + 25; \qquad 8 - 16; \qquad 6 + (-14); \qquad 1 - (-11);$

$-7 - 11; \qquad -18 + 9; \qquad -2 - (-6); \qquad 15 + (-8);$

$-6 + 6; \qquad -10 - 10; \qquad -5 + (-7); \qquad -20 - (-2);$

Coordinates.

Coordinates are a set of values that show an exact position. How many values do we need to show the exact position of a point on the number line? How many values do we need to find our place in a theater? In a plane? What we can use as values?
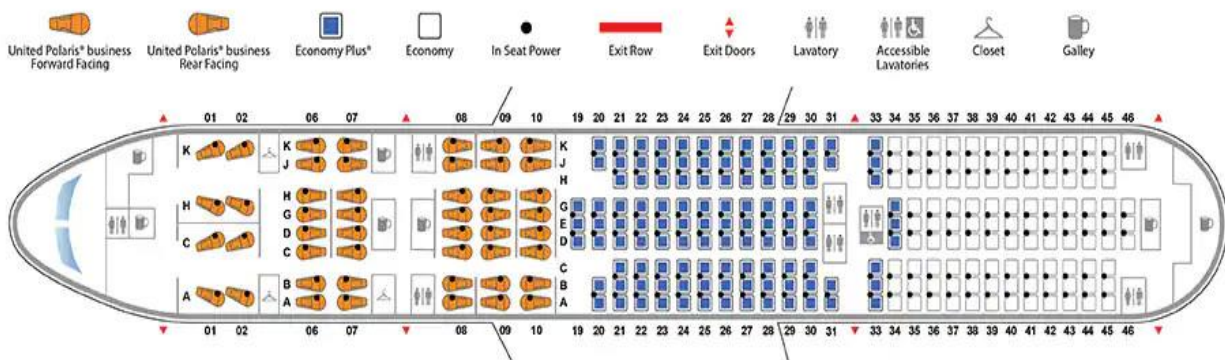

On a number line each point represents a number and each number is linked to a point if an origin (point at 0), a unit segment, and the positive direction are defined. This number is a coordinate of a point on the line in the defined system, the absolute value of this number tells us how many unit segments are between this

point and the origin, and the sign tells us on which side of the origin this point is located.

Exercise 1.

Find the coordinates of points A, B, C, D, E, F, G, and H on the number line below:
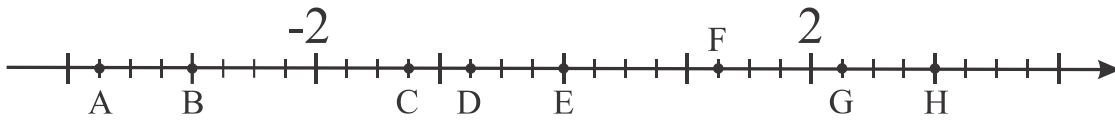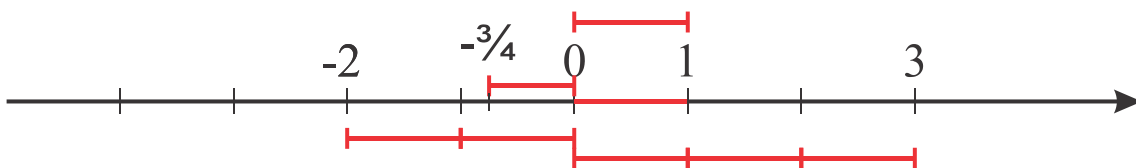

Exercise 2.

Mark the points $A(0)$, $B(1)$, $C\left(-1\frac{1}{2}\right)$, $D(5)$, $E(-5)$, $F(-3)$, $G(3)$

Is there anything in common between points F and G, D and E?

Each number has a property "absolute value", it shows how far this number is from 0, origin of coordinate line. The formal definition of absolute value of any number is:

$$\begin{cases} |a| = a, & if\ a \geq 0 \\ |a| = -a, & if\ a\ < 0 \end{cases}$$

On a plane each point corresponds to a unique ordered pair of numbers. To define these pairs, 2 perpendicular number lines are usually used. These two number lines intersect at the point called origin, associated with pair (0,0), have the same unit segment, and are called axis, usually *x* and *y* axis.

In this particular coordinate system, the two numbers allied with each point of the plane describe the distance from the point to both axes, and the signs of these numbers represent a quadrant where the point lies (quadrants I, II, III, and IV in the image above). Such a pair of numbers is an ordered pair, so the pair (n, m) and the pair (m, n) are linked to 2 different points. The absolute value of the first number in the pair is the distance to the *y* axis. Absolute value of the second one is the distance to the *x* axis.
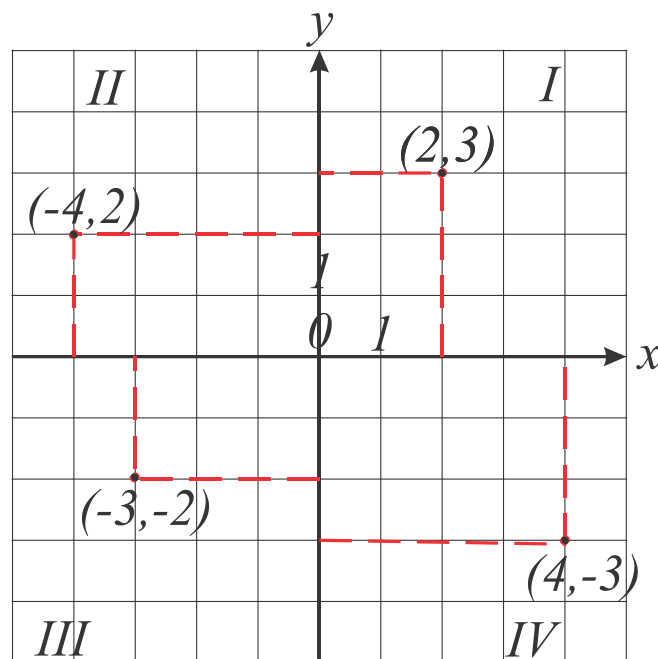
Exercise 3. Using the following coordinates mark the points and connect them:

(1; -4)→(0; -4) → (1; -3) → (1; -6) → (3; -6) → (2; -5) → (3; -1) → (2; 2) → (4;

3) → (5; 4) → (3; 4) → (2; 5) → (1; 5) → (0; 6) → (0; 5) → (-1; 3) → (0; 0) → (-

2; -1) → (-3; -4) → (-3; -5) →

(-4; -5) → (-5; -4) → (-6; -3) → (-5; -5) → (-3; -6) → (1; -6) eye (2; 4).
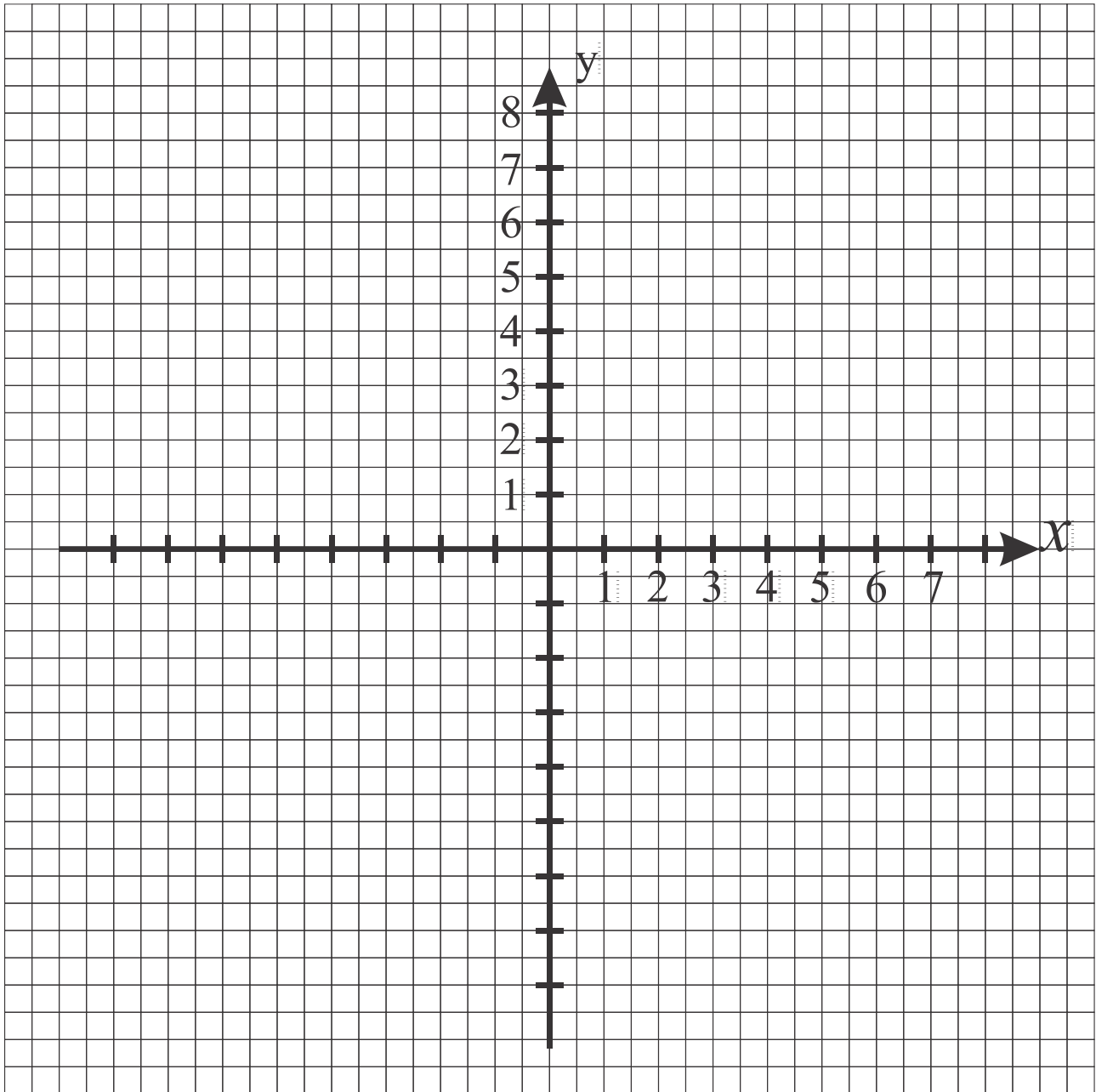
Exercise 4.

Find coordinates of points A, B, C, D in two different coordinate systems: