Math 4d. Class work 17.

Algebra.

Warm up:

$(4.43 + 3.753) + 5.57 =$

$8.375 \cdot 6.34 + 3.66 \cdot 8.375 =$

$(2.38 - 1.89) + 7.62 =$

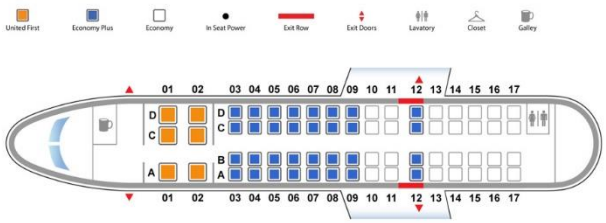
$589.567 : 10 =$ $786 : 10 =$

$654.1 : 1000 =$ $789.564 \cdot 100 =$

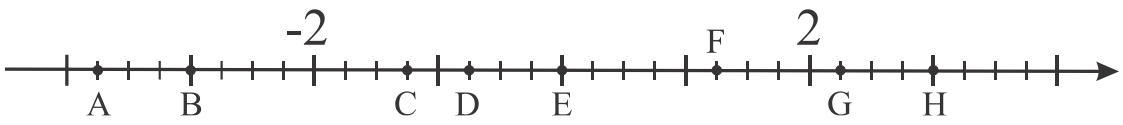
$654.3 \cdot 1000 =$ $0.45 : 1000 =$

Positive and negative numbers. Absolute value of a number.

Coordinates are a set of values that show an exact position. How many values do we need to show the exact position of the 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?



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



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?

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

$|5| =$ $|-5| =$ $|10| =$ $|-10| =$

What does absolute value of a number represent?

Does a fraction have an absolute value?

$$\left|\frac{1}{2}\right| = \qquad \left|-\frac{1}{2}\right| =$$

Can we solve the following equation? How many solutions does it have.

$$|x| = 5$$

To solve an equation means to find all possible values which will give us a true statement when put into the equation instead of a variable.

$|x| = 3$ $|y| = 10$ $|z| = -2$

Now, what about

$|x + 3| = 10$ $|z - 5.2| = 11.4$ $|5x - 0.5| = 8.1$

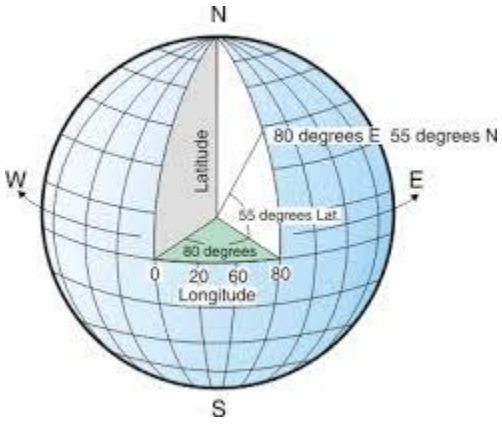
Earth coordinate system:

Earth coordinate system:

A *geographic coordinate system* uses a three-dimensional spherical surface to determine locations on the earth.

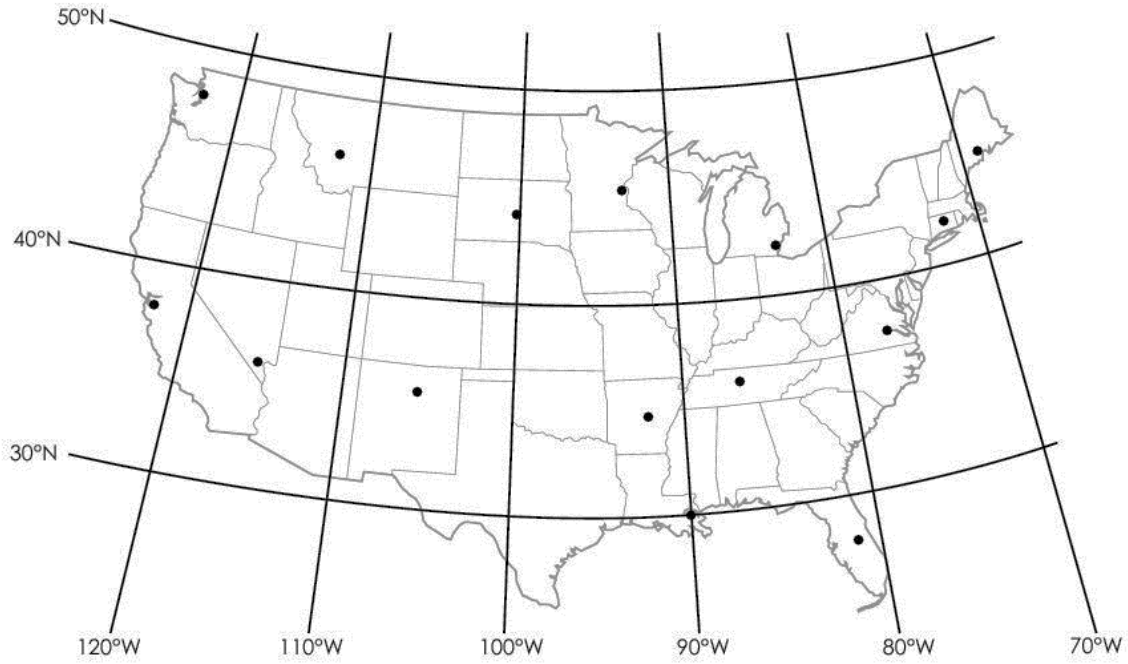
Any location on earth can be referenced by a point with longitude and latitude coordinates. The values for the points can have the following units of measurement:

- Decimal degrees
- Decimal minutes
- Decimal seconds



For example, the following figure shows a geographic coordinate system where a location is represented by the coordinates longitude 80 degree East and latitude 55 degree North

Latitude and Longitude



Using the coordinates listed below, write the name of the city next to its plotted latitude and longitude point on the map.

Detroit, Michigan: 42°N, 83°W

New Orleans, Louisiana: 30°N, 90°W

Orlando, Florida: 28°N, 81°W

Hartford, Connecticut: 42°N, 72°W

Las Vegas, Nevada: 36°N, 115°W

Seattle, Washington: 47°N, 122°W

Augusta, Maine: 44°N, 69°W

Minneapolis, Minnesota: 45°N, 93°W

Richmond, Virginia: 37°N, 77°W

Pierre, South Dakota: 44°N, 100°W

Santa Fe, New Mexico: 35°N, 106°W

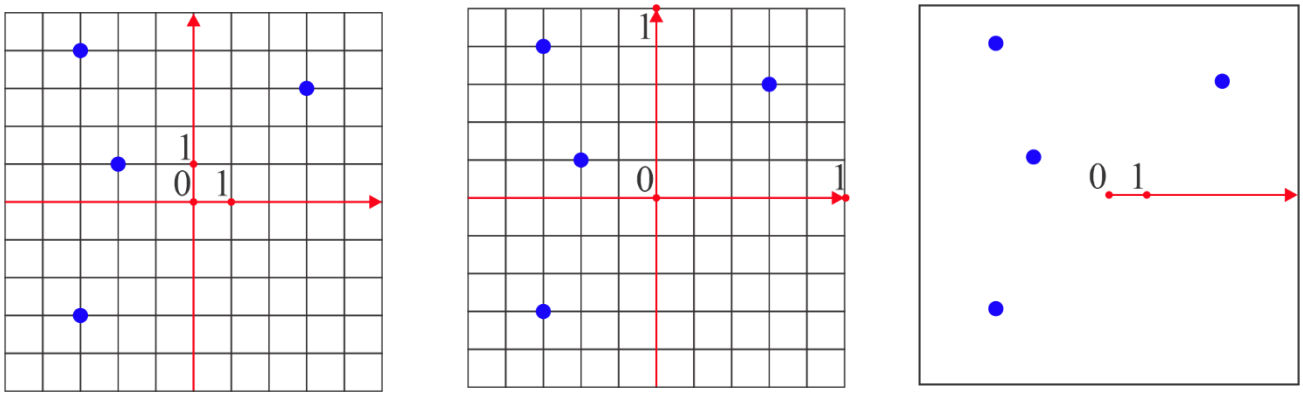
Helena, Montana: 46°N, 112°W

Little Rock, Arkansas: 35°N, 92°W

San Francisco, California: 38°N, 122°W

Nashville, Tennessee: 36°N, 87°W

Decart coordinate system.
A **Cartesian coordinate system** is a coordinate system that specifies each point uniquely in a plane by a set of numerical **coordinates**, which are the signed distances to the point from two fixed perpendicular oriented lines, measured in the same unit of length.



1. Compare (replace … with >, <, or =) if possible, if it is known that a and b are positive numbers and x and y are negative numbers:

$0 \ \ldots \ x$	$a \ \ldots \ 0$	$-b \ \ldots \ 0$	$0 \ \ldots \ -x$
$a \ \ldots \ x$	$y \ \ldots \ b$	$-y \ \ldots \ x$	$-a \ \ldots \ b$
$\lvert x\rvert \ \ldots \ x$	$-\lvert y\rvert \ \ldots \ y$	$a \ \ldots \ \lvert a\rvert$	$\lvert b\rvert \ \ldots \ \lvert -b\rvert$
$\lvert x\rvert \ \ldots \ a$	$\lvert x\rvert \ \ldots \ -x$	$\lvert x\rvert \ \ldots \ -\lvert y\rvert$	$a \ \ldots \ \lvert -b\rvert$

2. Compute:

1) $\frac{1}{2}\cdot\frac{2}{3}\cdot\frac{3}{4}\cdot\frac{4}{5}$;

2) $\frac{6}{7}\cdot\frac{7}{8}\cdot\frac{8}{9}\cdot\frac{9}{10}\cdot\frac{10}{11}$;

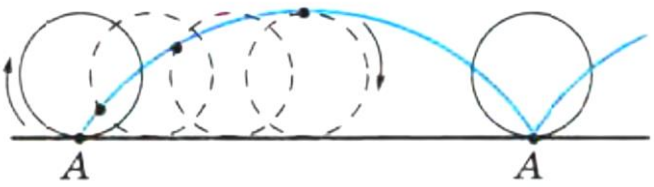
3) $\frac{1}{2}\cdot\frac{2}{3}\cdot\ldots\cdot\frac{23}{24}\cdot\frac{24}{25}$;

4) $1\frac{1}{2}\cdot 1\frac{1}{3}\cdot 1\frac{1}{4}\cdot 1\frac{1}{5}$;

5) $\left(1+\frac{1}{4}\right)\cdot\left(1+\frac{1}{5}\right)\cdot\left(1+\frac{1}{6}\right)\cdot\left(1+\frac{1}{7}\right)\cdot\left(1+\frac{1}{8}\right)$;

6) $\left(1-\frac{1}{2}\right)\cdot\left(1-\frac{1}{3}\right)\cdot\left(1-\frac{1}{4}\right)\cdot\ldots\cdot\left(1-\frac{1}{99}\right)\cdot\left(1-\frac{1}{100}\right)$.

Geometry.



Circle is running along the line. At a starting time point A was the point of contact of the circle and the line. The curve which point A will trace is called cicloide.

What line the center of the circle will trace?

Imagine the “square wheel” – a square which is staying on a road. Draw a line traced by the point A (vertex) in a process of “rolling”? The diagonal intersection?