Geometry Unit 6: Analytic Geometry

Bronx Early College Academy

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7 December 2022 - 13 January 2023

6.1 Midpoint formula 8 December

6.2 Slope-intercept form 9 December

6.3 Functions, standard form 12 December

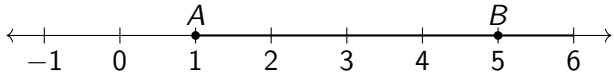
6.4 Parallel and perpendicular slopes 13 December

Learning Target: I can plot a midpoint on the plane

HSG.CO.C.9 Prove theorems about lines and angles 6.1 Thursday 8 December

Do Now

1. Review your Jumprope grades
2. Find the midpoint M of $\overline{AB}$



Lesson: Midpoint and average, classwork practice

Homework: Deltamath midpoint practice (optional extension)

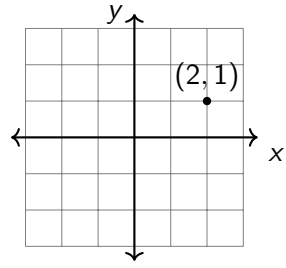
What do you know about the coordinate plane?

Coordinates Values locating a point on a plane (x, y)

Axis The two number lines, x and y-axis

Origin The center of the plane, $(0, 0)$

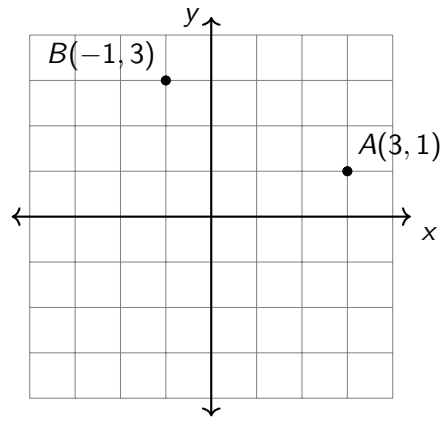
Quadrant The four quarters of the plane



The midpoint formula

Given $A(x_A, y_A)$, $B(x_B, y_B)$, midpoint

$$M = \left(\frac{x_A + x_B}{2}, \frac{y_A + y_B}{2}\right)$$



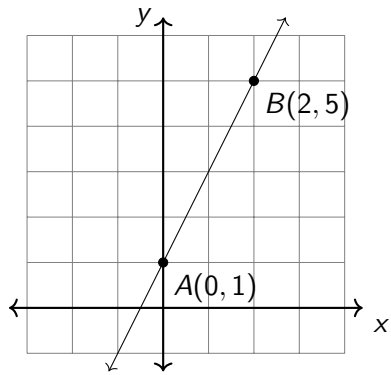
Learning Target: I can use slope-intercept form of linear equations

HSG.CO.C.9 Prove theorems about lines and angles

6.2 Friday 9 December

Do Now: Find the midpoint M of $\overline{AB}$

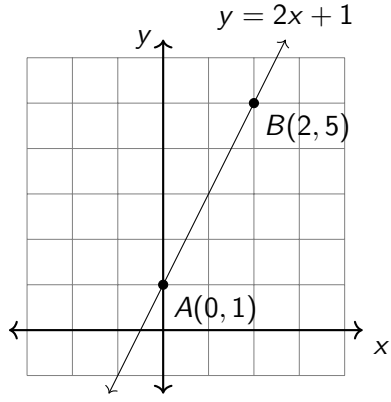
Lesson: Slope, y-intercept, linear equations
Homework: Deltamath graphing practice (optional extension)



Linear equations of the form $y = mx + b$

Linear	Straight, constant rate of change
Intercept	Where the line crosses the axis
b	y-intercept, point $(0, b)$ when $x = 0$
Increasing	Going up. y increases as x increases
Decreasing	Going down. y decreases as x increases
m, slope	How steep the line is

$$m = \frac{rise}{run} = \frac{y_B - y_A}{x_B - x_A}$$



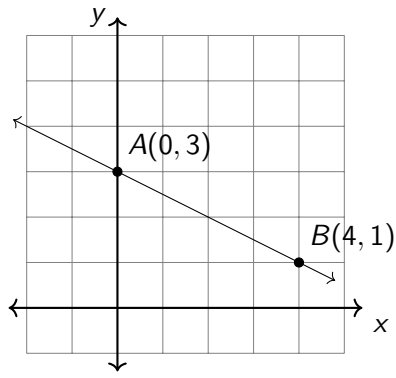
Learning Target: I can use the standard form of linear equations

HSG.CO.C.9 Prove theorems about lines and angles

6.3 Monday 12 December

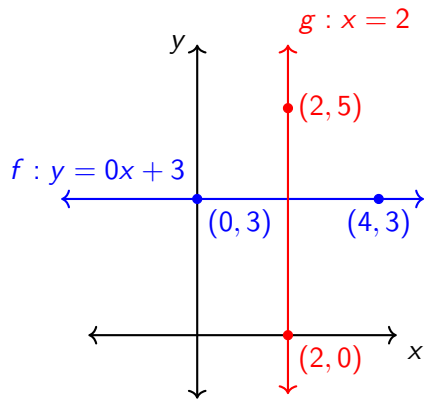
Do Now: Find the equation of $\overleftrightarrow{AB}$

Lesson: Function notation, vertical and horizontal slopes, the standard form of linear equations (GraspableMath practice)
Homework: Handout problem set



Function notation, $f(x) = mx + b$

Function	(x, y) pairs that satisfy a rule, $f(x) = y$
Horizontal	Slope is zero, $m = 0$
Vertical	Slope is undefined, $m = \infty$
Domain	The set of x values that are allowed
Range	The set of y values that are allowed
Real numbers	The set of all numbers, $\mathbb{R}$



Linear equations of the form $ax + by = c$

Standard form A linear equation written in the form $ax + by = c$

Calculator form Casios and other calculators use the form $y = mx + b$

Convert from standard to y-intercept form. Example:

$$x + 2y = 6$$

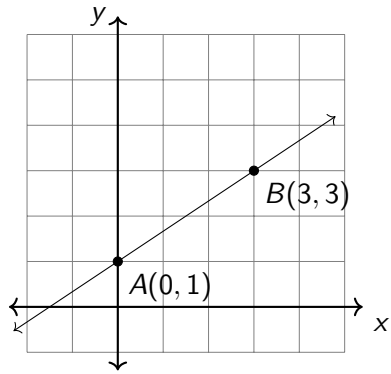
Learning Target: I can find parallel and perpendicular slopes

HSG.CO.C.9 Prove theorems about lines and angles

6.4 Tuesday 13 December

Do Now: Find the equation of $\overleftrightarrow{AB}$
Challenge: find the x-intercept

Lesson: Parallel and perpendicular lines, negative reciprocals
Homework: Deltamath problem set

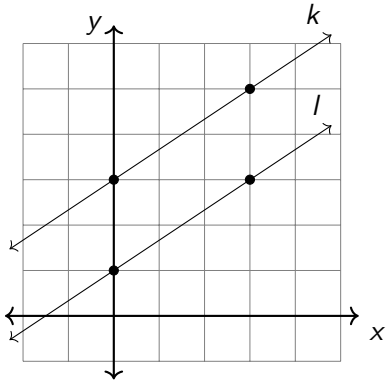


Parallel lines have the same slope

Parallel Lines in the same plane that never intersect

Skew Lines that do not intersect and are not parallel

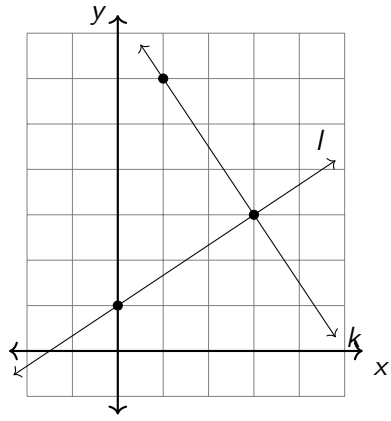
Lines k and l are parallel if and only if $m_k = m_l$, if their slopes are equal.



Perpendicular lines slopes' are negative reciprocals

Perpendicular Lines that intersect at right angles

Reciprocals Two numbers whose product is 1

Quarter turn 90° rotation, reversing the sign of the slope and the x and y coordinates

Lines k and l are perpendicular if and only if $m_k \times m_l = -1$, if their slopes are negative reciprocals.