

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
6.5 Review linear equations	13 December
6.6 Quiz linear equations	16 December
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6.10 Quiz review	9 January

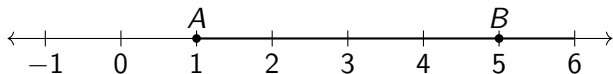
Learning Target: I can plot a midpoint on the plane

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)

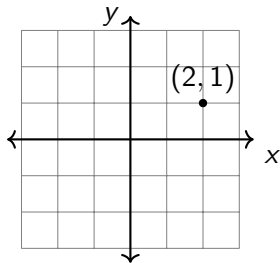
What do you know about the coordinate plane?

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, $(0, 0)$

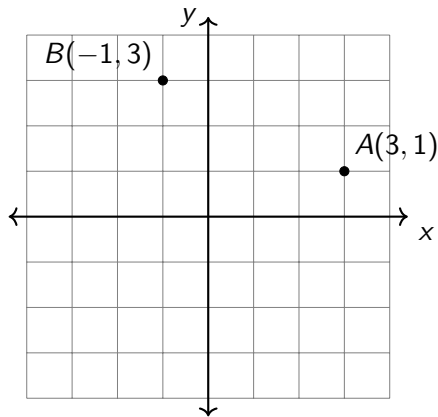
Quadrant The four quarters of the plane



The midpoint formula

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

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



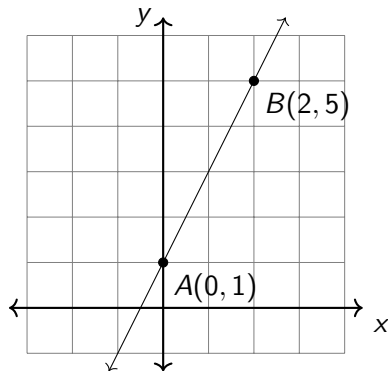
Learning Target: I can use slope-intercept form of linear equations

8.F.A.3 Interpret $y = mx + b$ as a linear function, whose graph is a straight line

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

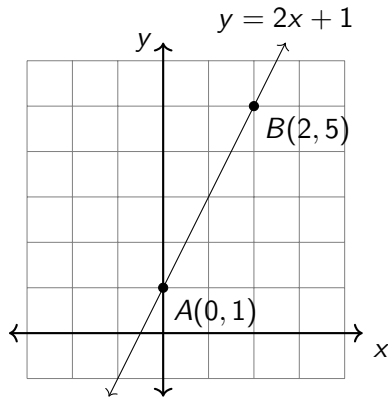
b y-intercept, point $(0, b)$ when $x = 0$

Increasing Going up. y increases as x increases

Decreasing Going down. y decreases as x increases

m , **slope** How steep the line is

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



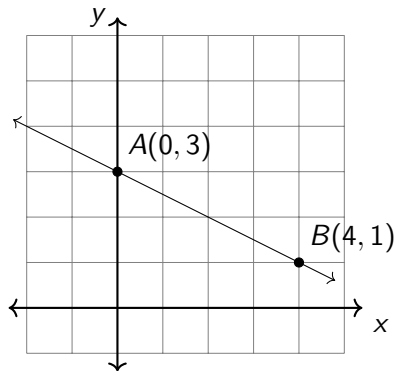
Learning Target: I can use the standard form of linear equations

8.F.A.3 Interpret $y = mx + b$ as a linear function, whose graph is a straight line 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,
 $f(x) = y$

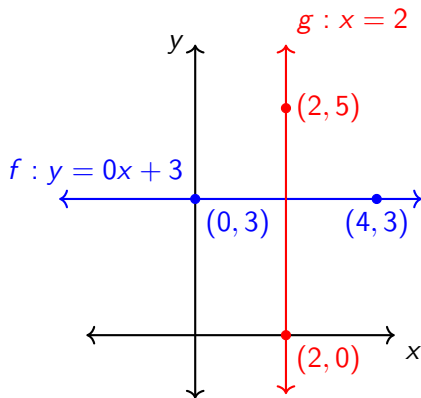
Horizontal Slope is zero, $m = 0$

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:

$$x + 2y = 6$$

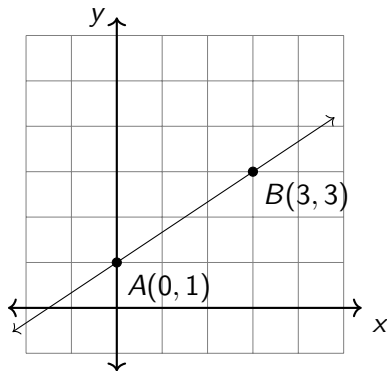
Learning Target: I can find parallel and perpendicular slopes

HSG.GPE.B.5 The slope criteria for parallel and perpendicular lines

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

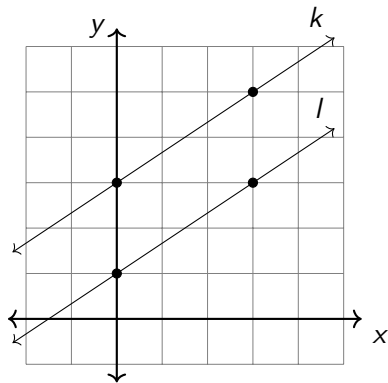


Parallel lines have the same slope

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.



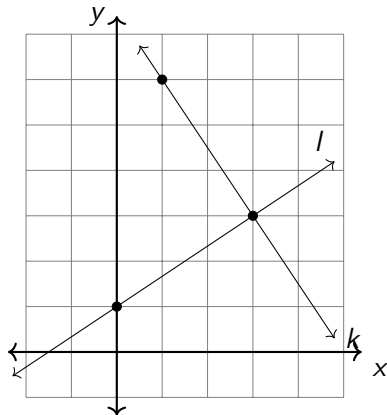
Perpendicular lines slopes' are negative reciprocals

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.



Learning Target: I can graph linear equations

8.F.A.3 Interpret $y = mx + b$ as a linear function, whose graph is a straight line 6.5 Wednesday 14 December

Prequiz roundtable groupwork

Do Now: Organize and complete worksheets

6.5 Prequiz: Review slope-intercept form of linear equations

6.4 Classwork: Parallel and perpendicular slopes

6.3 Homework: Standard form

6.2 Classwork: Linear equations

6.1 Classwork: Midpoints

Lesson: Peer review of linear equations

Homework: Study for quiz on Thursday

Deltamath due Friday

Quiz: Slope and linear equations

6.6 Friday 16 December

8.F.A.3 Interpret $y = mx + b$ as a linear function, whose graph is a straight line

HSG.GPE.B.5 The slope criteria for parallel and perpendicular lines

Do Now: Turn in worksheets (Deltamath due)

Open notebook, calculator allowed

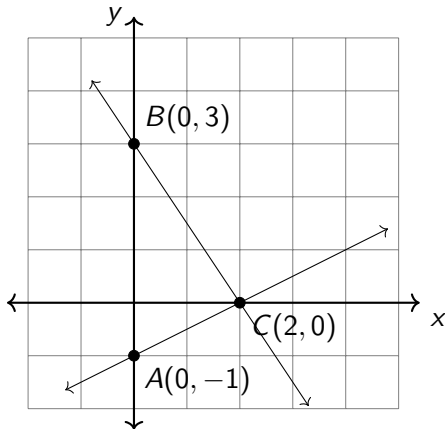
Learning Target: I can solve two equations in two variables

HSG.REI.C.6 Solve systems of linear equations

6.7 Tuesday 3 January

Do Now: Find the equations of \overleftrightarrow{AC} and \overleftrightarrow{BC}
Are they perpendicular?

Lesson: Systems of equations, two
intersecting lines
Homework: Deltamath problem set



Systems of equations

$$\overleftrightarrow{AC} : y = +\frac{1}{2}x - 1$$

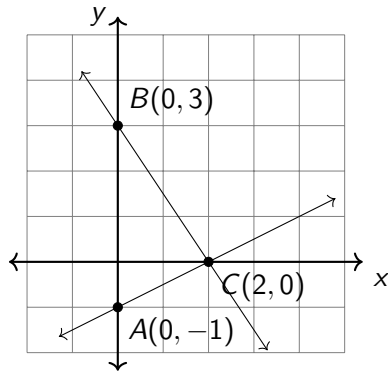
$$\overleftrightarrow{BC} : y = -\frac{3}{2}x + 3$$

Lines are not perpendicular: $\frac{1}{2} \times -\frac{3}{2} \neq -1$ (slopes are not negative reciprocals)

Systems Multiple equations with the same variables

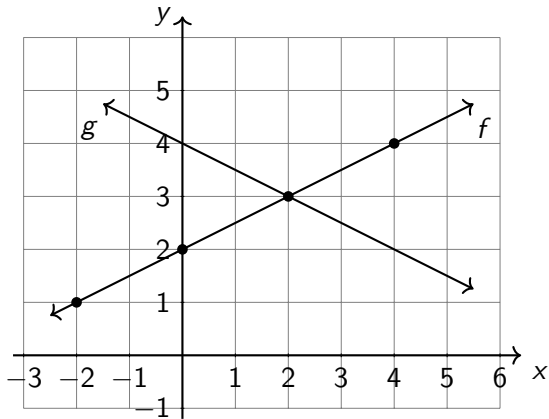
Intersection Point that satisfies both equations

Solution Values (x, y) that satisfy both equations



T-chart list of (x, y) pairs satisfying a equation

$f(x)$	
x	y
-2	
0	
2	
	4



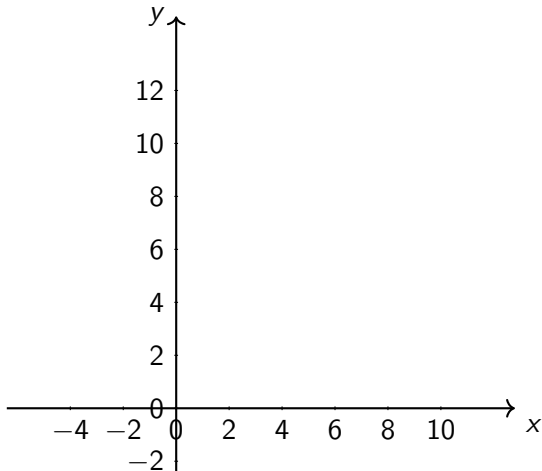
$g(x)$	

Solve the system for its solution, the intersection

[link to Graspable Math calculator](#)

$$f(x) = \frac{2}{3}x + 4$$

x	y



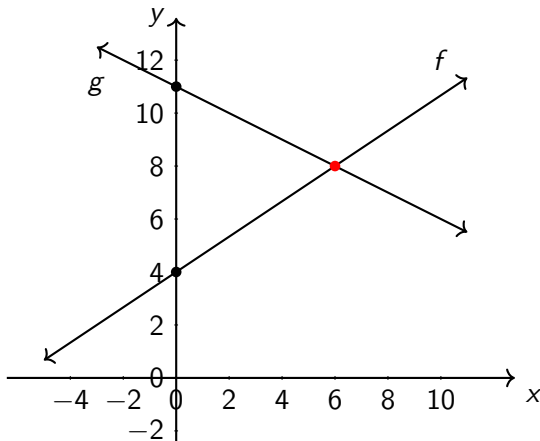
$$g(x) = -\frac{1}{2}x + 11$$

x	y

Solution: the intersection is $(6, 8)$

$$f(x) = \frac{2}{3}x + 4$$

x	y
0	4
6	8



$$g(x) = -\frac{1}{2}x + 11$$

x	y
0	11
6	8

Learning Target: I can solve linear systems in context

HSG.REI.C.6 Solve systems of linear equations

6.8 Wednesday 4 January

Do Now:

- ▶ Laptop check: Raise your hand if your laptop has a 75+ % charge.
- ▶ Notebook check: find these formulas in your notebook

1. Slopes are perpendicular when $m \times m_{\perp} = -1$

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

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

Lesson: Solving word problems with systems of equations (Deltamath)

Learning Target: I can solve linear systems in context

HSG.REI.C.6 Solve systems of linear equations

6.9 Friday 6 January

Do Now: Write two equations that model the following situation

- ▶ The total of two values is 10
- ▶ Twice one value plus five times the other totals 26.

Lesson: Solving word problems with systems of equations Assessment: Pop Quiz 6.9
Graphing Systems of Equations

Solution: Graphing a system of equations to solve a word problem

The total of two values is 10

Twice one value plus five times the other totals 26.

$$x + y = 10$$

$$2x + 5y = 26$$

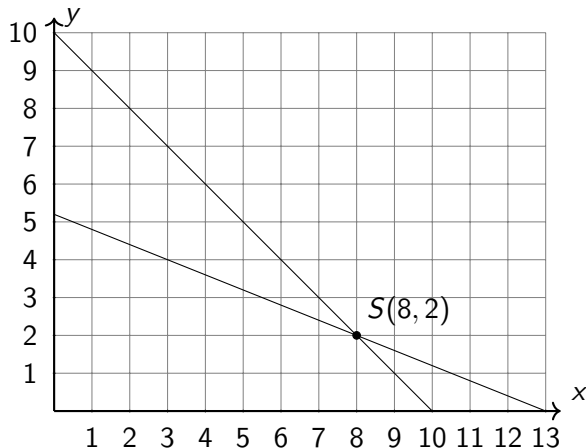
Solution $x = 8, y = 2$

Check:

$$(8) + (2) = 10\checkmark$$

$$2(8) + 5(2) = 26$$

$$16 + 10 = 26\checkmark$$



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

8.F.A.3 Interpret $y = mx + b$ as a linear function, whose graph is a straight line

6.10 Monday 9 January

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

Lesson: Quiz review of linear equations,
midpoint formula, distance calculation

Homework: Deltamath practice problem set

