Geometry Unit 6: Analytic Geometry

Bronx Early College Academy

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7 December 2022 - 13 January 2023

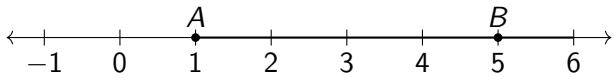
6.1 Midpoint formula	8 December
6.2 Slope-intercept form	9 December
6.3 Functions, standard form	12 December
6.4 Parallel and perpendicular slopes	13 December
6.5 Review linear equations	13 December
6.6 Quiz linear equations	16 December
6.7 Systems	3 January
6.8 Systems word problems	4 January
6.9 Word problems, quiz	6 January
6.10 Quiz review, midpoint application	9 January
6.11 Quiz review, midpoint application	10 January
6.12 Peer review	12 January

Learning Target: I can plot a midpoint on the plane

HSG.GPE.B.6 Partition a line segment 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)

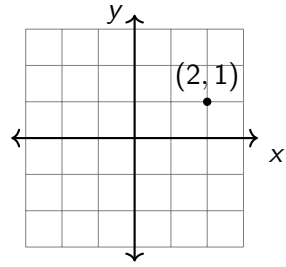
What do you know about the coordinate plane?

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, $(0, 0)$

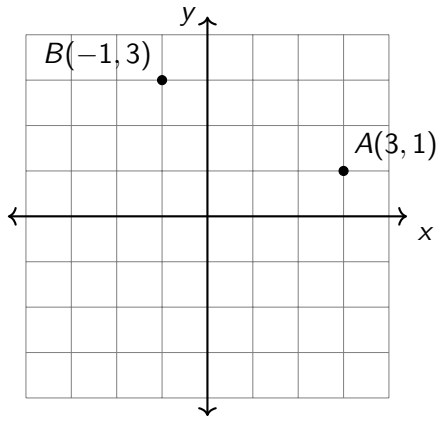
Quadrant The four quarters of the plane



The midpoint formula

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

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

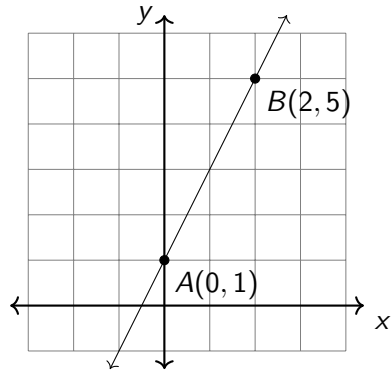


Learning Target: I can use slope-intercept form of linear equations

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 $\overline{AB}$

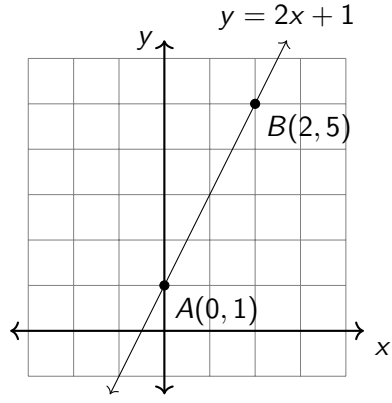
Lesson: Slope, y-intercept, linear equations
Homework: Deltamath graphing practice (optional extension)



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

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

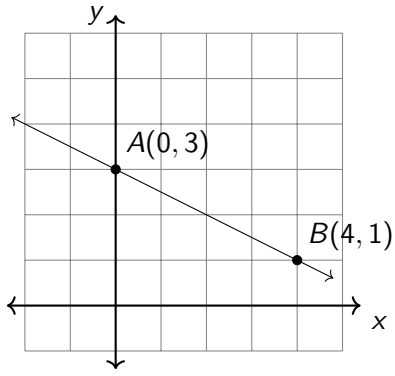


Learning Target: I can use the standard form of linear equations

8.F.A.3 Interpret $y = mx + b$ as a linear function, whose graph is a straight line 6.3 Monday 12 December

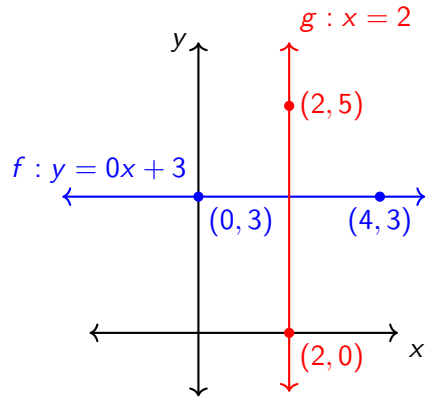
Do Now: Find the equation of $\overleftrightarrow{AB}$

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:

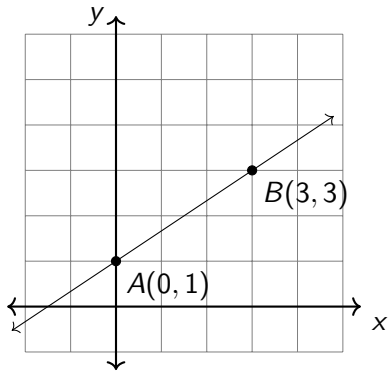
$$x + 2y = 6$$

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

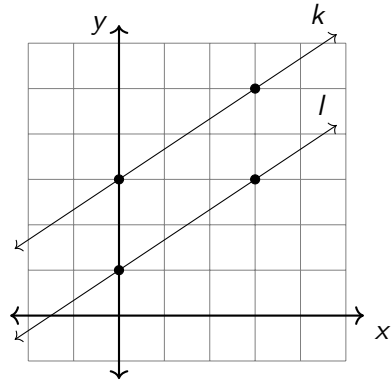


Parallel lines have the same slope

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.



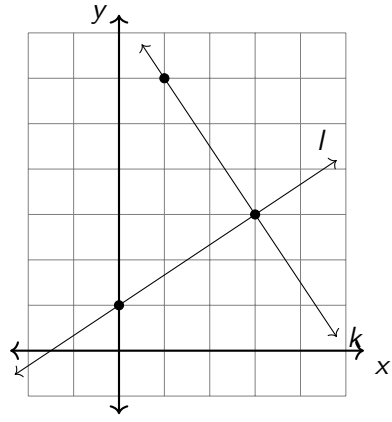
Perpendicular lines slopes' are negative reciprocals

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

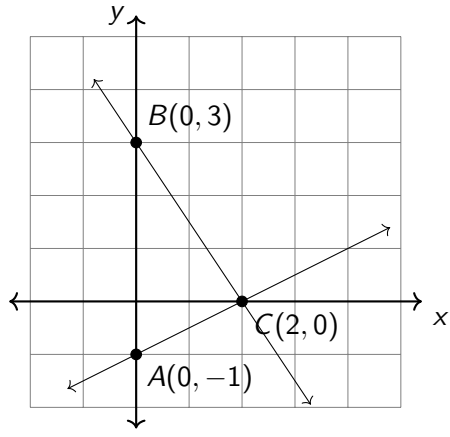
Learning Target: I can solve two equations in two variables

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

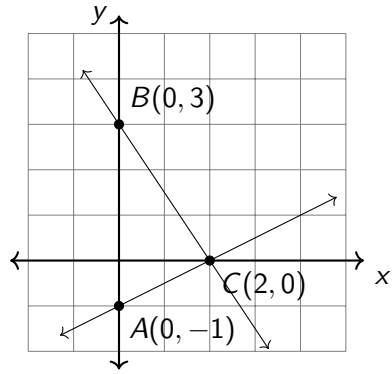
$$\overleftrightarrow{AC} : y = +\frac{1}{2}x - 1$$
$$\overleftrightarrow{BC} : y = -\frac{3}{2}x + 3$$

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

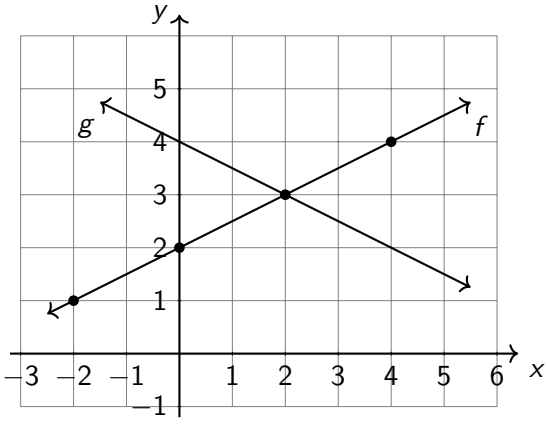
Solution Values (x, y) that satisfy both equations



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

$f(x)$

x	y
-2	
0	
2	
	4



$g(x)$

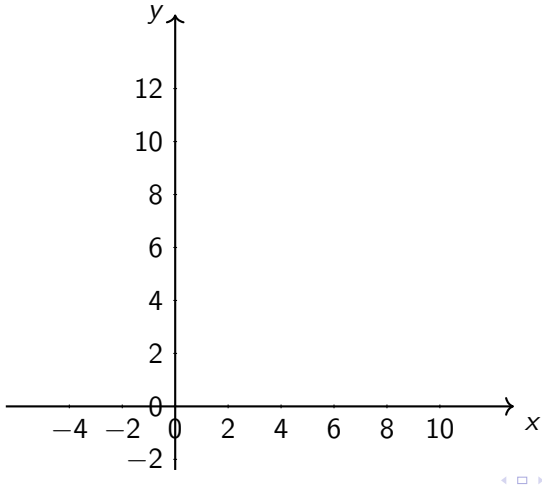
x	y

Solve the system for its solution, the intersection

link to Graspable Math calculator

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

x	y



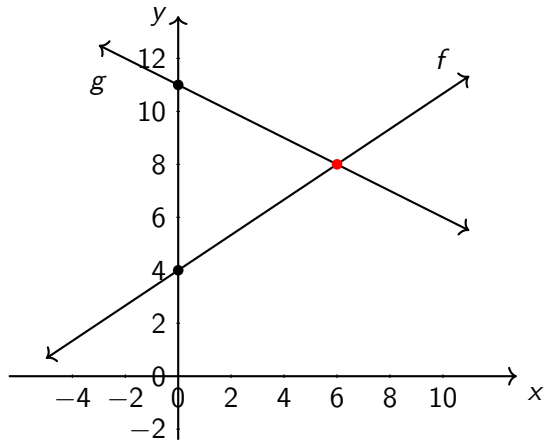
$g(x) = -\frac{1}{2}x + 11$

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 $M = (\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$

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

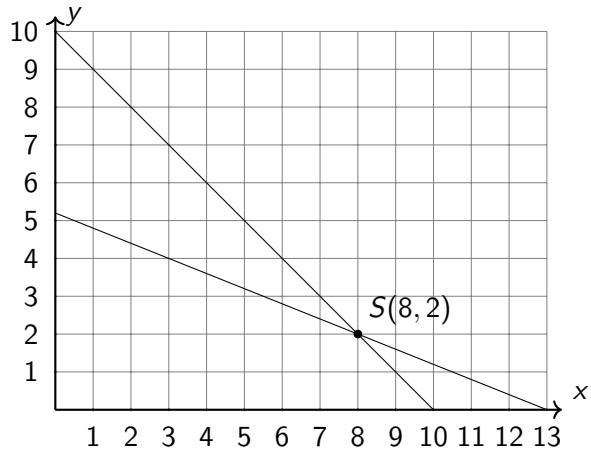
The total of two values is 10
Twice one value plus five times the other totals 26.

$$x + y = 10$$
$$2x + 5y = 26$$

Solution $x = 8, y = 2$

Check:

$$(8) + (2) = 10\checkmark$$
$$2(8) + 5(2) = 26$$
$$16 + 10 = 26\checkmark$$

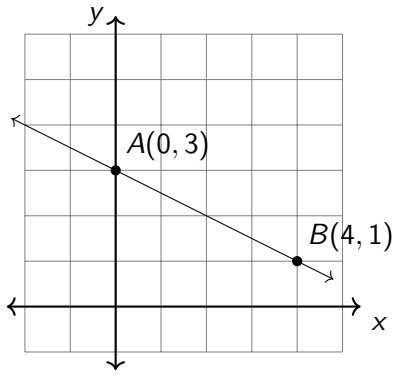


Learning Target: I can apply the midpoint formula

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

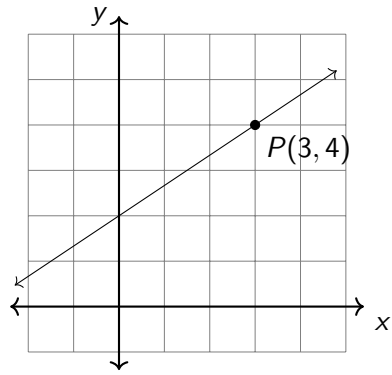


Learning Target: I can use the point-slope form of linear equations

HSG.GPE.B.6 Partition a line segment 6.11 Tuesday 10 January

Do Now: Find the equation of the line through $P(3, 4)$ with slope $m = \frac{2}{3}$

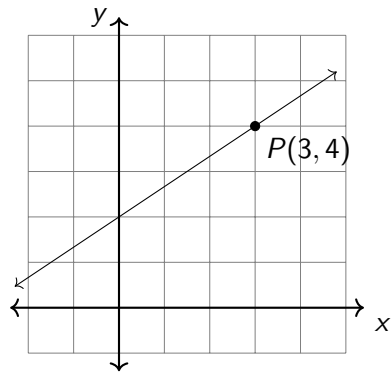
Lesson: Point-slope form
Homework: Deltamath practice problem set
Test Friday



Point-slope form

A line through $P(x_0, y_0)$ with slope m has equation $y - y_0 = m(x - x_0)$

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



Point-slope $y - y_0 = m(x - x_0)$

Standard form $ax + by = c$

Slope-intercept $y = mx + b$

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

HSG.GPE.B.6 Partition a line segment 6.12 Thursday 12 January

Exam review (open notebook), Deltamath and problem sets due Friday

1. 6.6 Quiz: Slope-intercept form of linear equations
2. 6.7 Systems of linear equations
3. 6.9 Classwork: Applications of systems of linear equations
4. 6.9 Pop Quiz: Slope-intercept
5. 6.10 Corrections: Slope-intercept
6. 6.11 Classwork: Point-slope form
7. 6.12 Pre-Test: Analytic geometry

Reminder that BECA's High School Uniform is as follows:

Uniform should be worn at all times throughout the school day.

- Navy Blue Polo with a School Logo
- Navy Blue Pullover with BECA on it
- Khaki bottoms
- Closed shoes

All outerwear that is not stated above must go in your assigned lockers. Lockers should be used during the start and end of the day.

Failure to wear uniform will lead to removal from activities such as CAP, PSAL Sports, clubs, and incentives.