Geometry Unit 6: Analytic Geometry

Bronx Early College Academy

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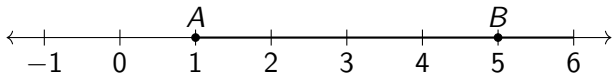
7 December 2022 - 13 January 2023

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)

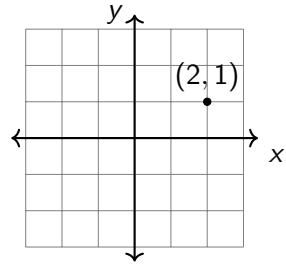
What do you know about the coordinate plane?

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, $(0, 0)$

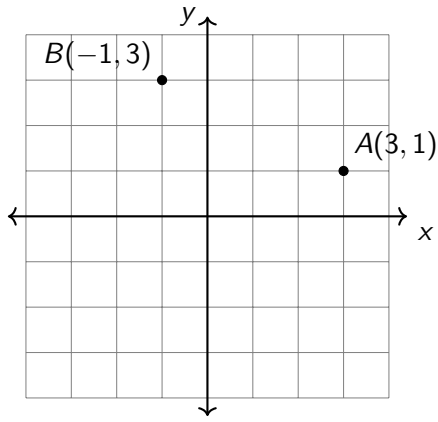
Quadrant The four quarters of the plane



The midpoint formula

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

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

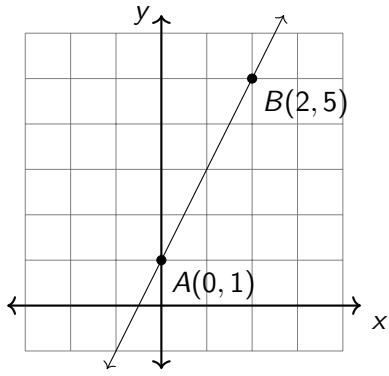


Learning Target: I can use slope-intercept form of linear equations

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

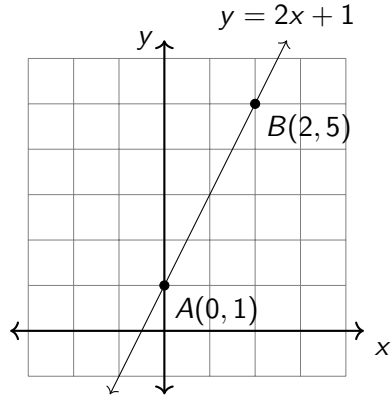
b y-intercept, point $(0, b)$ when $x = 0$

Increasing Going up. y increases as x increases

Decreasing Going down. y decreases as x increases

m, slope How steep the line is

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

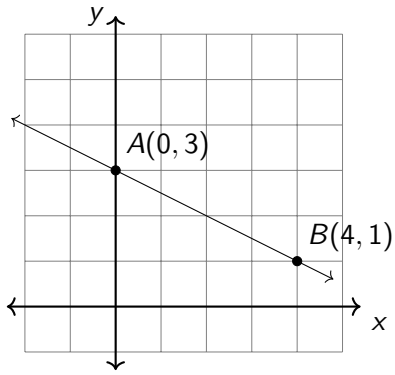


Learning Target: I can use the standard form of linear equations

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

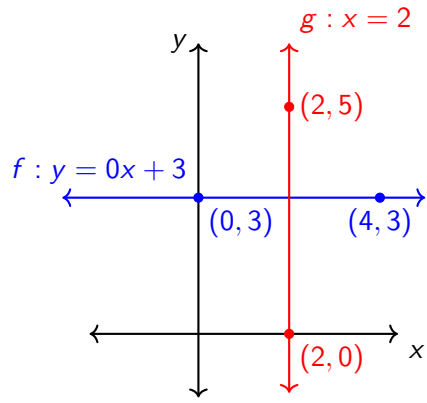
Do Now: Find the equation of $\overleftrightarrow{AB}$

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:

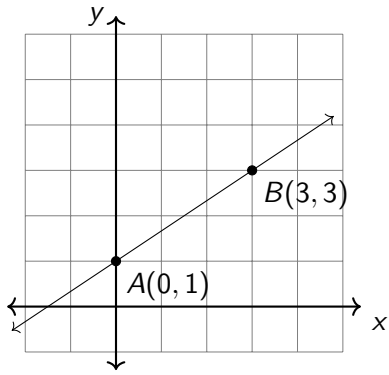
$$x + 2y = 6$$

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

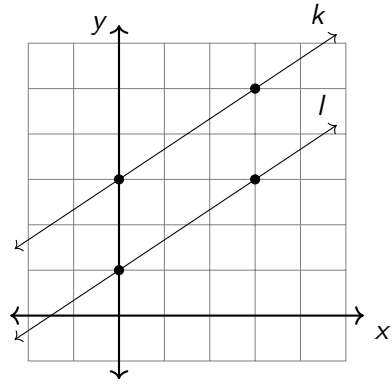


Parallel lines have the same slope

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.



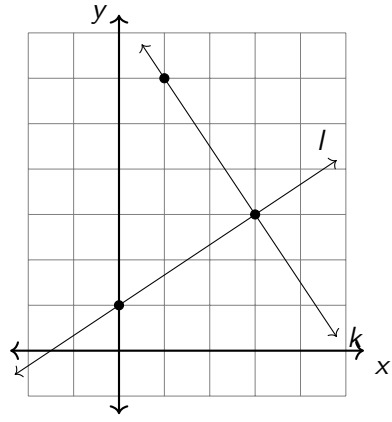
Perpendicular lines slopes' are negative reciprocals

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

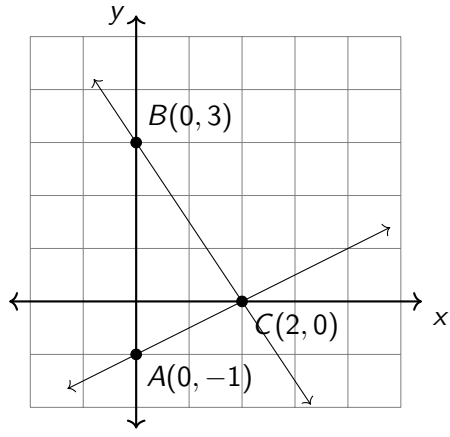
Learning Target: I can solve two equations in two variables

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

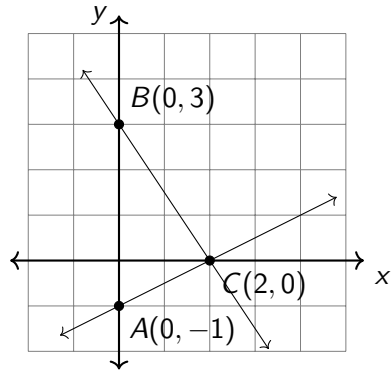
$$\overleftrightarrow{AC} : y = +\frac{1}{2}x - 1$$
$$\overleftrightarrow{BC} : y = -\frac{3}{2}x + 3$$

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

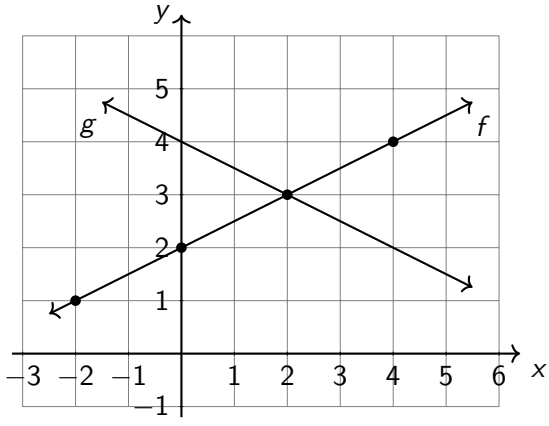
Solution Values (x, y) that satisfy both equations



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

$f(x)$

x	y
-2	
0	
2	
	4



$g(x)$

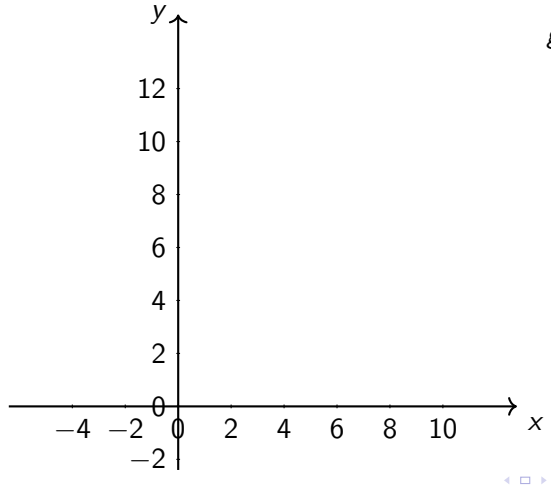
x	y

Solve the system for its solution, the intersection

link to Graspable Math calculator

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

x	y



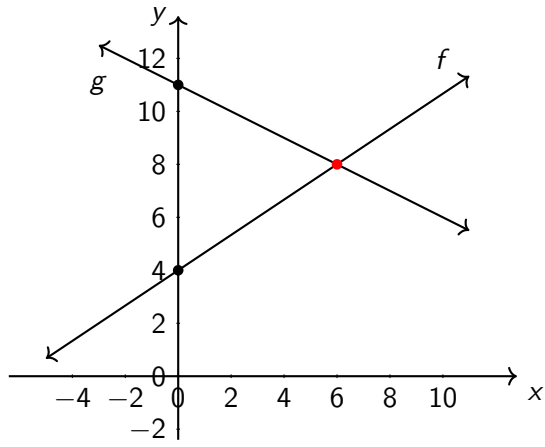
$g(x) = -\frac{1}{2}x + 11$

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

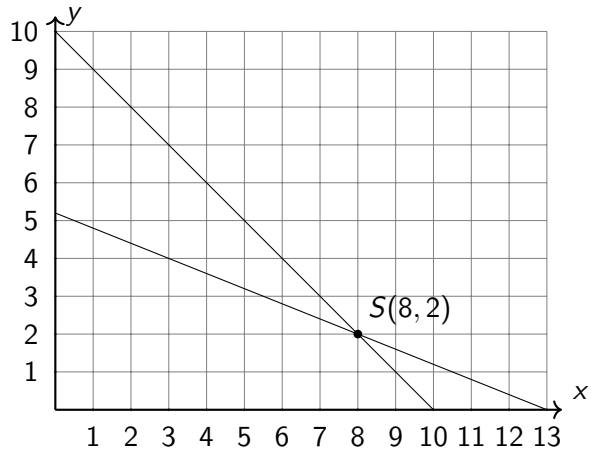
The total of two values is 10
Twice one value plus five times the other totals 26.

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

Solution $x = 8, y = 2$

Check:

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

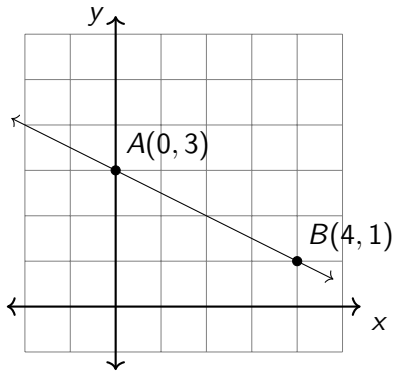


Learning Target: I can apply the midpoint formula

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



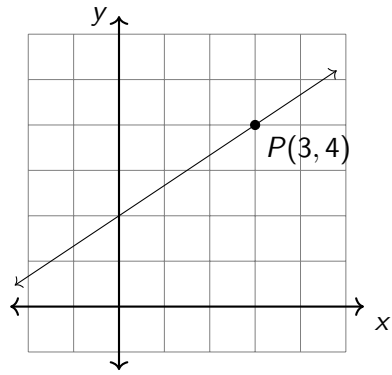
Learning Target: I can use the point-slope form of linear equations

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 $m = \frac{2}{3}$

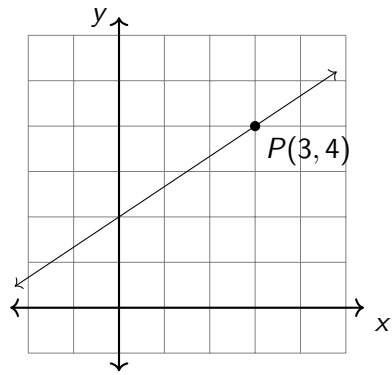
Lesson: Point-slope form
Homework: Deltamath practice problem set
Test Friday



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 6.11 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