

Ecuaciones Lineales

Ecuaciones no-lineales

Ecuaciones Lineales

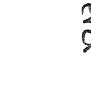
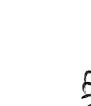
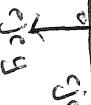
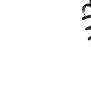
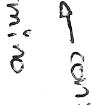
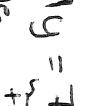
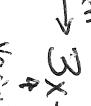
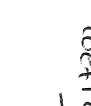
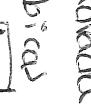
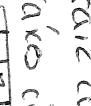
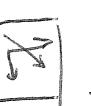
Formas de ecuaciones lineales

- Líneas Rectas
- Variables sencillas

- Exponentes x^2, x^5
- Raíz cuadrada coeficiente

- Raíz cúbica variable
- Constante término

elevación = $\frac{\text{elevación}}{\text{distancia}}$ → pendiente = elevación ↑ →



Soluciones

Marcia y Franklin cada una van de viaje en el carro con su familia. Comparan las 2 situaciones para determinar cuál representa una velocidad mayor.

$$\text{Forma 'Pendiente-Intersección'}$$

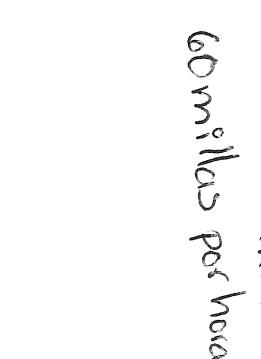
$$y = 2x + 5 \quad y = mx + b$$

$$\begin{aligned} &\text{una solución} & \text{No hay solución} & \text{No tiene solución} \\ & 7x - 3 = 5x + 5 & 7x - 3 = 7x + 5 & 7x - 7x - 3 = 7x - 7x \\ & 2x = 8 & -3 \neq 5 & -3 \neq 5 \\ & x = 4 & & \end{aligned}$$

$$\begin{aligned} & 7x = 5x + 8 \\ & 7x - 5x = 5x - 5x + 8 \\ & 2x = 8 \\ & x = 4 \end{aligned}$$

$$\begin{aligned} & \frac{1}{2}(18x + 26) = 13 + 4x \\ & \frac{8x}{2} + \frac{26}{2} = 13 + 4x \\ & 4x + 13 = 13 + 4x \end{aligned}$$

son iguales



X	y
1	55
2	115
3	165

60 millas por hora

Tabla

$y = 55x$

$x = \text{tiempo (hora)}$

$y = \text{distancia (mi)}$

$$\begin{aligned} & \text{Forma punto-pendiente} \\ & (y - 7) = 2(x - 1) \end{aligned}$$

$$y - 7 = 2(x - 1)$$

$$y = 2x + 5$$

$$y = mx + b$$

$$y = 2x + 5$$

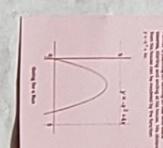
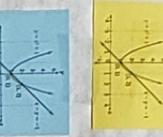
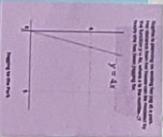
$$y = mx + b$$

$$y = 2x + 5$$

Linear Equations

Non-linear equations

- Straight lines
- Simple y, and x
- Exponents x^2 and x^4
- \sqrt{x} square roots
- Cubed roots
- Variable term
- Constant term



Solutions

One unique solution

$$7x - 3 = 5x + 5$$

$$7x - 3 + 3 = 5x + 5 + 3$$

$$7x = 5x + 8$$

$$7x - 5x = 5x - 5x + 8$$

$$2x = 8$$

infinitely many solutions

$$\frac{1}{2}(8x + 26) = 13 + 4x$$

$$\frac{8x}{2} + \frac{26}{2} = 13 + 4x$$

same

what

Mathematical Standards and Practices

Contextualize situations and critique the reasoning of others.

- 1) We will solve linear equations and justify our solutions to others.
- 2) We will compare proportional relationships using tables, equations, and graphs.

- 3) We will determine the equation of a line given in the coordinate plane by looking for and making use of structure.

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Linear Equations

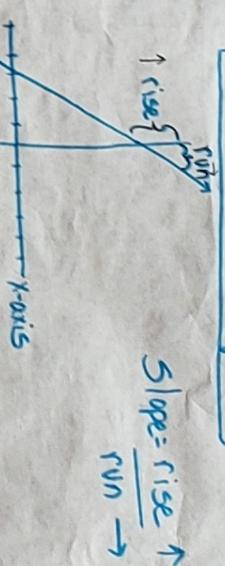
Forms of Linear Equations

not linear equations

- Exponents x^2 and x^4
- \sqrt{x} square roots
- Cubed roots
- Variable term
- Constant term

$$3x - 1 = y$$

rise/run



Slope-intercept form

$$y = mx + b$$

$$-2x + y = 5$$

$$Ax + Bx = C$$

$$\text{Point-slope form } (y - y_1) = m(x - x_1)$$

$$y - y_1 = m(x - x_1)$$

$$\text{Given slope } \& \text{ y-intercept } (0, b)$$

$$y = mx + b$$

$$\text{Given a graph}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$y = mx + b$$

$$\text{Given a point and a slope } (x_1, y_1), m$$

$$y - y_1 = m(x - x_1)$$

$$\text{Given two points } (x_1, y_1), (x_2, y_2)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$y - y_1 = m(x - x_1)$$

$$y = mx + b$$

What we know about...

Inquiry

linear equations

What does do linear equations

for me in general? Linear

equations help us understand things

We know X is a number.

Other letters can be variables too.

What does do linear equations

for me in general? Linear

equations help us understand things

What does do linear equations

for me in general? Linear

We are trying to see what x is.

What is the biggest linear equation?

How big can they get?

How do you use DGEI when solving linear equations?

We know we are trying to get rid of the number with x.

We want to isolate it.

We can use DGEI

to solve linear equations.

What does do linear equations

for me in general? Linear

equations help us understand things

What does do linear equations

for me in general? Linear

Title/ Focus:

Linear Equations

not a line
non-linear equations
(equation for a straight line)

Simple variables
 x y
exponents x^2, x^5

\sqrt{x}
square roots,
cubed roots...

$\boxed{}$
 $\boxed{}$
 $\boxed{}$
 $\boxed{}$

(attach examples from surf)

Comparing Proportional Relationships

— and — are each going on a car trip with their fam. Compare the two scenarios to determine which represents a greater speed.

of equation

unique
one solution

no solution

$$7x - 3 = 7x + 5$$

$$7x - 3 = 7x - 7x + 5$$

$$-3 \neq 5$$

$$7x - 3 + 3 = 5x + 5 + 3$$

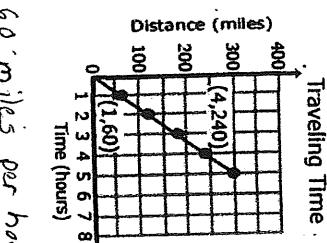
$$7x = 5x + 8$$

$$7x - 5x = 5x + 8 - 5x$$

$$2x = 8$$

$$x = 4$$

infinitely many solutions



Same

Mathematical Standards and Practices

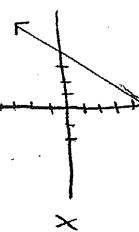
1) We will solve linear equations and justify our solutions to others.

2) We will compare proportional relationships using tables, equations and graphs.

3) We will determine the equation of a line given in the coordinate plane by looking for and making use of structure.

Forms of Linear Equations

rise run
slope = $\frac{\text{rise}}{\text{run}}$



Slope-intercept form

$$y = mx + b$$

$$y = 2x + 5$$

$$y = mx + b$$

$$\text{Point Slope form}$$

$$(y - y_1) = m(x - x_1)$$

$$y - y_1 = m(x - x_1)$$

$$\text{Given slope } \ell$$

$$\text{Given } y \text{ intercept}$$

$$y = \ell x + b$$

$$\text{Given a point and slope}$$

$$(y - y_1) = \ell(x - x_1)$$

$$y = \ell x + b$$

$$\text{Given a point and slope}$$

$$(4, -3) \text{ slope } = -2$$

$$y = mx + b$$

$$-3 = -2(4) + b$$

$$-3 = -8 + b$$

$$b = 5$$

$$y = -2x + 5$$

$$y = -2x + 5$$

Inquiry Chart

What we know about _____?

What we want to learn about _____?

linear equations

UNIT PLANNING TOOL

Planning Focus: Linear Equations 8th grade

CCSSM: 8.EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.

8.EE.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b .

8.EE.7 Solve linear equations in one variable.

1. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).
2. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Mathematical Practices being emphasized:

MP. 3 Construct viable arguments and critique the reasoning of others.

MP. 4 Model with mathematics

MP. 7 Look for and make use of structure

Essential Questions

What careers use linear equations?

How can patterns, relationships and functions be used as tools to explain real-life relationships?

How can the same mathematical idea be represented in a different way? Why would that be useful?

Key Concepts

Determining unit rate

Solving linear equations

Plotting points on a coordinate plane

Attributes of similar figures

Ratios and proportions

Pre and Post Assessments

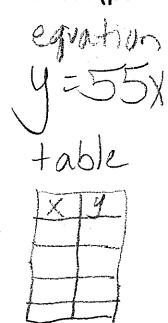
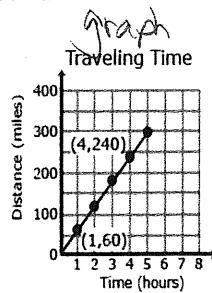
Pre-assessment teacher made (see attached)

Exit slips with lessons

Mid and post assessment from unit

Visual Models/ Algorithms/ Diagrams for Compendium

Linear and non-linear equation sort (put some of the graphs on the Compendium)



Coefficient Variable Constant
 $3x - 1y = 7$

Variable term Term

Forms Slope-Intercept
Standard
Point Slope (Algebra I)
 $\text{Slope} = \frac{\text{rise}}{\text{run}}$

Connections (Real World Applications)

Careers that use linear equations - <https://sciencing.com/careers-use-linear-equations-6060294.html>

Real-life application of linear equations – examples - <https://sciencing.com/linear-equations-used-everyday-life-6022370.html>

Make sure to emphasize examples from daily problems that are set in a real-life context.

Language Functions/Structures

Compare and contrast *Both the linear and the non-linear equations have However, the non-linear equations only have ...*

Describe *A linear equation has (no solution/ one solution/ infinitely many solutions) when ...*
 Explain *To find the slope, I*
I used a (table/graph) because...

Cooperate *Our team worked together by...*
Our team supported each other when...

Vocabulary

Slope	horizontal	vertical	
x-axis	x-intercept	y-axis	y-intercept
coefficient	like terms	variable	
unit rate	solution		
linear equation		linear expression	
proportional relationships		similar triangles	

Focus and Motivation

Careers that use linear equations – see above

Youtube songs – Graph a Linear Equation <https://www.youtube.com/watch?v=dqQb8iZtS4>

Linear equations rap - <https://www.youtube.com/watch?v=tvqPmh6zv3Q>

Comics about solving for X

Visual Thinking Strategy – post pictures of graphs with real-life data, people using linear equations

Equation Riddles - <https://www.quora.com/Think-of-a-number-double-it-add-six-divide-it-in-half-and-subtract-the-number-you-started-with-The-answer-is-three-Why>, <https://www.georgiastandards.org/Georgia-Standards/Frameworks/6th-Math-Unit-3.pdf> (pg. 48)