

Solving Multi-Step Equations

1. Clear parentheses using the distributive property.
2. Combine like terms within each side of the equal sign.
3. Add/subtract terms to both sides of the equation to get the terms with variables on one side and constant terms on the other side.
4. Isolate the variable by multiplying/dividing both sides of the equation by the number with the variable.

Ex: $3(2x - 5) - 3 = 2x + 8 + 6x$

$$6x - 15 - 3 = 2x + 8 + 6x$$

$$6x - 18 = 8x + 8$$

$$6x - 26 = 8x$$

$$-26 = 2x$$

$$-13 = x \rightarrow \boxed{x = -13}$$

Solving Absolute Value Equations

1. Isolate the absolute value.
2. Break the absolute value equation into two separate equations. For the first equation, set the expression inside the absolute value notation equal to the opposite side of the equation. For the second equation, make the number on the opposite side negative.
3. Solve each equation.

Ex: $-3|3x+2| - 2 = -8$

$$-3|3x+2| - 2 = -8$$

$$-3|3x+2| = -6$$

$$|3x+2| = 2$$

$$3x + 2 = 2$$

$$x = 0$$

$$3x + 2 = -2$$

$$x = -\frac{4}{3}$$

$$\boxed{x = \{0, -\frac{4}{3}\}}$$

Solving Word Problems Algebraically

1. Define a variable.
2. Write an equation.
3. Solve the equation.
4. Label your answer with the appropriate units.

Ex: Bobby is 4 years younger than twice Jimmy's age.
If Bobby is 26 years old, how old is Jimmy?

Let j = Jimmy's age

$$2j - 4 = 26$$

$$j = 15$$

→ Jimmy is 15 years old

Solve each equation.

1. $-3x - 9 = -27$	2. $25 + 2(n + 2) = 30$	3. $-9b - 6 = -3b + 48$
4. $5 - (m - 4) = 2m + 3(m - 1)$	5. $-24 - 10k = -8(k + 4) - 2k$	6. $f - (-19) = 11f + 23 - 20f$
7. $\frac{3}{4}d - \frac{1}{2} = \frac{3}{8} + \frac{1}{2}d$	8. $-0.5g + 13 = 3g$	9. $-5(h + 12) - (4h - 2) = h - 8$
10. $ 3x + 4 = 16$	11. $3 x - 5 = 27$	12. $-8 2x - 6 + 4 = -60$

Solve each word problem algebraically.

13. The sum of two consecutive integers is one less than three times the smaller integer. Find the two integers.	14. The length of a rectangular picture is 5 inches more than three times the width. Find the dimensions of the picture if its perimeter is 74 inches.
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Finding Slope from 2 Points

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

Ex: Find the slope of the line that passes through the points $(-9, -3)$ and $(7, -7)$

Special Cases:

$\frac{0}{\#} \rightarrow \text{slope} = 0$

$\frac{\#}{0} \rightarrow \text{slope is undefined}$

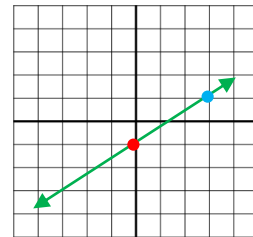
$$m = \frac{-7 - (-3)}{7 - (-9)} = \frac{-4}{16} = -\frac{1}{4}$$

Slope-Intercept Form

$$y = mx + b$$

$m = \text{slope}$ & $b = \text{y-intercept}$

Ex: Graph $y = \frac{2}{3}x - 1$



y-intercept is -1
slope = $\frac{2}{3}$, (so from the y-intercept go up 2 & right 3)

Graphing from Slope-Intercept Form:

1. Make a point at the y-intercept.
2. Use the slope ($\frac{\text{rise}}{\text{run}}$) to make more points.
3. Connect the points to form a line.

Standard Form

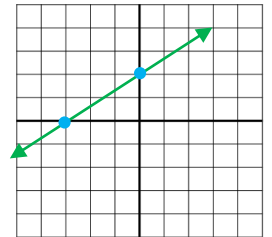
$$Ax + By = C$$

$A, B,$ & C are integers & A is not negative

Ex: Graph $2x - 3y = -6$

x-intercept: $2x - 3(0) = -6$
 $2x = -6 \rightarrow x = -3$
 $(-3, 0)$

y-intercept: $2(0) - 3y = -6$
 $-3y = -6 \rightarrow y = 2$
 $(0, 2)$



Graphing Using Intercepts:

1. Find the x-intercept by substituting 0 for y .
2. Find the y-intercept by substituting 0 for x .
3. Make a point at each intercept and then connect the points to form a line.

Point-Slope Form

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

$m = \text{slope}$ & (x_1, y_1) is a point on the graph

Ex: Write the equation of the line passing through the points $(-1, 2)$ and $(3, 4)$ in point-slope form. Then convert it to slope-intercept and standard form.

$$m = \frac{4 - 2}{3 - (-1)} = \frac{2}{4} = \frac{1}{2}$$

Point-Slope Form: $y - 2 = \frac{1}{2}(x + 1)$

Convert to Slope-Intercept Form:

$$\rightarrow y - 2 = \frac{1}{2}x + \frac{1}{2} \rightarrow y = \frac{1}{2}x + \frac{5}{2}$$

Convert to Standard Form:

$$\rightarrow -2\left(-\frac{1}{2}x + y = \frac{5}{2}\right) \rightarrow x - 2y = -5$$

Converting Point-Slope Form to Slope-Intercept Form:

1. Distribute m .
2. Move y_1 to the other side of the equation.

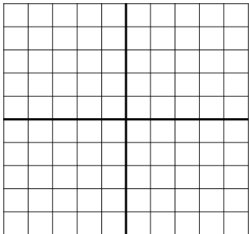
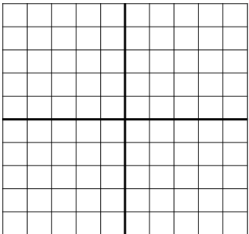
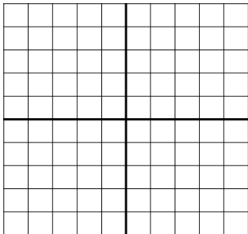
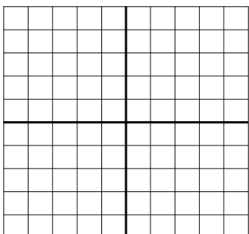
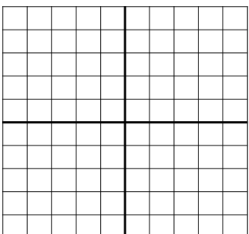
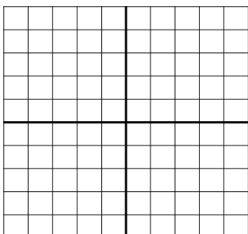
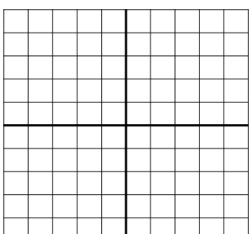
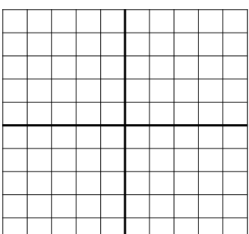
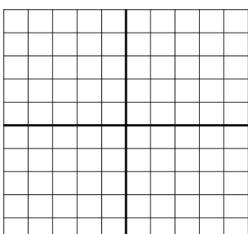
Converting Slope-Intercept Form to Standard Form:

1. Bring the x term to the left.
2. If there are fractions in the equation, multiply everything through by the least common denominator.
3. If A is negative, multiply everything through by -1 .

Find the slope of the line that passes through the pair of points.

25. $(9, -3)$ and $(9, -8)$	26. $(-8, 5)$ and $(3, -6)$	27. $(7, -1)$ and $(15, 9)$
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Graph each line.

28. $y = -\frac{3}{2}x + 2$ 	29. $y = x - 3$ 	30. $y = \frac{1}{3}x + 5$ 
31. $2x - y = -2$ 	32. $x + y = 4$ 	33. $3x + 4y = -12$ 
34. $y + 3 = \frac{1}{2}(x + 2)$ 	35. $y - 1 = \frac{2}{3}(x - 3)$ 	36. $y - 2 = 0$ 

Write the equation of the line in point-slope, slope-intercept, and standard form.

37. Line passing through point $(3, 5)$ with a slope of 1	38. Line passing through points $(-4, 2)$ and $(0, 3)$	39. Line passing through points $(1, 3)$ and $(2, 5)$
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Classifying Polynomials

- Term: each part of a polynomial separated by addition or subtraction
- Degree of a Term: the sum of the exponents of the variables in a term
- Degree of Polynomial: the highest degree of all the terms in a polynomial

Classifying By Number of Terms:

- 1 term: monomial
- 2 terms: binomial
- 3 terms: trinomial
- ≥ 4 terms: n-term polynomial

Classifying Polynomials By Degree:

- 0: constant
- 1: linear
- 2: quadratic
- 3: cubic
- 4: quartic
- 5: quintic
- ≥ 6 : nth degree

Ex: Classify $3x^3 - 9x + 7$.

It is a trinomial because there are 3 terms separated by - and +

The degree of the 1st term is 3, the degree of the 2nd term is 1, and the degree of the 3rd term is 0. So, the degree of the polynomial is 3 since that is the highest degree of all the terms.

→ Is it a cubic trinomial

Adding & Subtracting Polynomials

Adding Polynomials:

1. Add like terms together.
2. Write your answer in Standard Form (decreasing order of degree).

Ex: $(4x^2 - 9) + (7x - 9x^2 + 8)$

$$(4x^2 - 9) + (7x - 9x^2 + 8)$$

$$= -5x^2 - 1 + 7x \rightarrow -5x^2 + 7x - 1$$

Subtracting Polynomials:

1. Turn into an addition problem by changing the - to + between the two polynomials and reversing the sign of each term in the second polynomial.
2. Add like terms together.
3. Write your answer in Standard Form.

Ex: $(3x^2 - 6x - 9) - (2x^2 + 8x - 3)$

$$\rightarrow (3x^2 - 6x - 9) + (-2x^2 - 8x + 3)$$

$$= x^2 - 14x - 6$$

Multiplying Polynomials

Monomial x Polynomial:

1. Use the Distributive Property to multiply the monomial by each term.
2. Write your answer in Standard Form.

Ex: $4x^2(3x^2 - 8x - 5)$

$$4x^2(3x^2 - 8x - 5)$$

$$= 12x^4 - 32x^3 - 20x^2$$

Binomial x Binomial:

1. FOIL (multiply the two first terms, the two outer terms, the two inner terms, and the two last terms).
2. Combine like terms and write your answer in Standard Form.

Ex: $(x + 3)(2x - 1)$

$$(x + 3)(2x - 1)$$

F: $2x^2$ O: $-1x$ I: $6x$ L: -3

$$= 2x^2 + 5x - 3$$

Any Polynomial x Any Polynomial:

1. Multiply each term from the first polynomial by each term in the second polynomial.
2. Combine like terms and write your answer in Standard Form.

Ex: $(x + 2)(x^2 - 3x - 8)$

$$(x + 2)(x^2 - 3x - 8)$$

$$= x^3 - 3x^2 - 8x + 2x^2 - 6x - 16$$

$$= x^3 - x^2 - 14x - 16$$

Classify each polynomial by its degree and number of terms.

76. $8x^3 - 9x$	77. $-2 - 4x^2 + 7x$	78. $8x^2y^2$	79. $6x + 5$
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Find each sum or difference. Write your answer in Standard Form.

80. $(2h^3 + 6h) + (3h^3 - 7h - 3)$	81. $(8x - 4x^2 + 3) - (7x^2 - 9)$	82. $(-14a^2 - 5) - (5a^2 + 6a - 7)$
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Find each product. Write your answer in Standard Form.

83. $5x^3(9x^2 + 4x - 5)$	84. $(x + 4)(x - 3)$	85. $(3n - 8)(4n - 7)$
86. $(2x + 3)(x^2 + x + 3)$	87. $(6x + 1)^2$	88. $4g(2g - 9)(2g + 9)$

Simplify each expression completely. Write your answer in Standard Form.

89. $(x + 2)(x + 8) + (4x^2 + 8x - 3)$	90. $(x + 5)(x - 5) - 6x(x + 1)$
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Math CHOICE BOARD

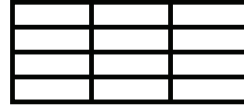
Choose Any 5 Boxes



Plan three dream vacations to destinations of your choice. Compare the budgets of each. Make sure to include transportation, hotel, food, and attractions in the cost calculations.



Measure one room in your home. Calculate the cost to re-paint and re-floor this room using 3 different brands of paint and 3 different types of flooring.



Create a spreadsheet to serve a specific purpose (gradebook, budget, etc.) Use equations in the cells so that calculations such as totals, differences, and averages are automatically computed.

\$500

cost for 1
camper to
attend

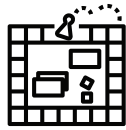
\$300

weekly
counselor
pay rate

6:1

camper to
counselor
ratio

Plan a weeklong overnight summer camp, complete with 3 meals a day and a daily schedule of activities. Use the numbers above to develop a budget.



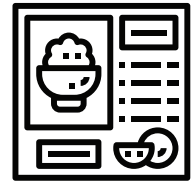
Design an original board game, card game, or dice game to review a math concept you learned this year. Write out the rules, create the game, and play with friends or family members.



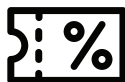
Your marketing firm wants to hire a celebrity spokesperson. Create a presentation, including statistics, graphs, and charts, to convince them to use a particular celebrity.



Find five job listings that provide hourly wages or annual salary. Calculate how long it would take you to earn \$1 million at each job.



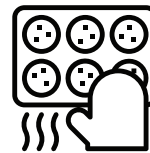
Make a three-day meal plan that meets your dietary requirements for calories, fat, protein, fiber, and carbohydrates.



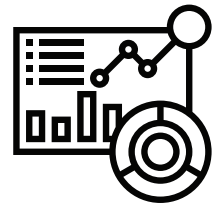
Compare the discounts you would receive with a 10% off coupon versus a \$10 off coupon. Which one is better? Are there situations in which the other one is better? Will they ever get you the same amount of discount?



You have \$100,000 to turn an empty 100 ft. x 200 ft. building into any sort of recreational facility. Create a floor plan and make sure not to go over budget! (Assume the building already has two 20 ft. x 30 ft. bathrooms.)



Calculate how many cookies you could make with a full bag of sugar. Now, figure out how much of each other ingredient you would need in order to make that many cookies.



Make a detailed plan for a viable, original business idea that you could start with \$100 or less.



Find a (preferably) local pizza restaurant that offers at least five sizes of pizzas. Calculate the price per square inch of each pizza. Determine which size is the best deal.



Think of a charity that doesn't already exist in your town or neighborhood. Create a budget to include basic staff, work space, and operating costs. Use an annual income of \$200,000 for the charity.



Create a better design for a juice box. Make sure to consider the volume of the juice box, ease of use, and how much material would be used to produce it.



Plan an elaborate meal for a holiday such as Thanksgiving. Use the recipes and oven temperatures to create a detailed timeline of start and finish times that will allow you to put all the dishes on the table while they're still warm.