

Section 2.1: Linear Equations in One Variable

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9:31 AM

equation - a sentence that expresses the equality of two mathematical expressions

linear means the power on the variable is 1

example: $3x - 1 = 20$

↑
we say that 7 satisfies the equation

solution set - set of all values of variable that make the equation true

the solution set to $3x - 1 = 20$
is $\{7\}$

to "solve an equation" means to find the solution set

non-linear equation

example: solve $x^2 = 4$

answer: $\{-2, 2\}$ or $\{\pm 2\}$

properties of equality:

addition - adding the same number to both sides of an equation does not change the solution set

multiplication - multiplying both sides of an equation by the same non-zero number does not change the solution set

example:

$$3x - 1 = 20$$

$$\frac{3x}{3} = \frac{21}{3}$$

$$x = 7$$

{7}

examples:

$$-5x + 4 = -9 - 4x$$

$$-x = -13$$

$$x = 13$$

{13}

check:

$$-65 + 4 = -9 - 52 \quad \checkmark$$

or

$$-5x + 4 = -9 - 4x$$

$$13 = x$$

$$x = 13$$

$$\{13\}$$

solve

$$15 \left[\frac{x}{3} - \frac{x-5}{5} \right] = 3 \cdot 15$$

$$15 \left(\frac{x}{3} \right) - 15 \left(\frac{x-5}{5} \right) = 3 \cdot 15$$

$$5x - 3(x-5) = 45$$

$$5x - 3x + 15 = 45$$

$$2x = 30$$

$$x = 15$$

$$\{15\}$$

$$\text{check: } 5 - \frac{10}{5} = 3 \quad \checkmark$$

Solve:

$$4 \left[\frac{x-2}{2} - \frac{x-3}{4} \right] = \frac{7}{4} \cdot 4$$

$$\frac{4}{2}(x-2) - \frac{4}{4}(x-3) = 7$$

$$2x - 4 - x + 3 = 7$$

$$x = 8$$

$$\{8\}$$

check:

$$\frac{2}{2} \cdot \frac{6}{2} - \frac{5}{4} = \frac{7}{4}$$

$$\frac{12}{4} - \frac{5}{4} = \frac{7}{4} \checkmark$$

Solve:

$$5m - 2(7 - 2m) = -3(5 - 3m) + 5$$

$$5m - 14 + 4m = -15 + 9m + 5$$

$$9m - 14 = 9m - 10$$

$$-14 = -10$$



solve:

$$2(x+3) - 1 = 2x + 5$$

$$2x + 6 - 1 = 2x + 5$$

$$2x + 5 = 2x + 5$$

$$5 = 5$$

