1.1 Solving One Step Equations

Equations with Adding

$x + k =$ same

To undo addition of **k**, Subtract **k** from both sides of the equation

**If you subtract equal amounts from things that are equal, then the results will still be equal

Ex. $x + 4 = 9$

$-4 \quad -4$

$x + 4 - 4 = 9 - 4$

$x + 0 = 5$

$\boxed{x = 5}$

Let's Check!

$x + 4 = 9$

$(5) + 4 = 9$

$9 = 9$ ✓

Show this work

Ex. $13 + x = 72$

$-13 \quad -13$

$\boxed{x = 59}$

Check:

$13 + x = 72$

$13 + (59) = 72$

$72 = 72$ ✓

Equations with Subtracting

$x - k =$ same

To undo subtraction of **k** or negative numbers that are added ($(-k)+$), Add **k** on both sides of the equal sign

**Adding equals to equals results in equals

Ex. $x - 5 = 7$

$+5 \quad +5$

$\boxed{x = 12}$

Check:

$x - 5 = 7$

$(12) - 5 = 7$

$7 = 7$ ✓

Ex. $-9 + x = -4$

$+9 \quad +9$

$\boxed{x = 5}$

Check:

$-9 + x = -4$

$-9 + (5) = -4$

$-4 = -4$ ✓

Equations with Division

$\frac{x}{k} =$ same

To undo division by **k**, Multiply by **k** on both sides of the equation

**Multiplying equals by equals results in equals

Ex. $\frac{8}{1} \cdot \left(\frac{x}{8}\right) = (9) 8$

$\frac{8 \cdot x}{1 \cdot 8} = 72$

$\frac{8}{8} x = 72$

$\boxed{x = 72}$

Check:

$\frac{x}{8} = 9$

$\frac{(72)}{8} = 9$

$9 = 9$ ✓

Ex. $-10\left(\frac{x}{-10}\right) = (7) \cdot -10$

$\boxed{x = -70}$

Check:

$\frac{x}{-10} = 7$

$\frac{(-70)}{-10} = 7$

$7 = 7$ ✓

Equations with Multiplication

$k \cdot x =$ same

To undo multiplication by **k**, Divide by **k** on both sides

**Dividing equals by equals results in equals

Ex. $4x = 32$

$\frac{4}{4} \quad \frac{4}{4}$

$\frac{4}{4} x = 8$

$\boxed{x = 8}$

Check:

$4x = 32$

$4(8) = 32$

$32 = 32$ ✓

Ex. $-15x = 60$

$\frac{-15}{-15} \quad \frac{-15}{-15}$

$\boxed{x = -4}$

Check:

$-15x = 60$

$-15(-4) = 60$

$60 = 60$ ✓

1.1 Solving One Step Equations

Equations with Multiplication by Fractions

To undo multiplication by $\frac{p}{q}$, Multiply by $\frac{q}{p}$ on both sides (Flip the fraction)

Why? How do we normally divide by a fraction? multiply by the reciprocal and multiply

$\frac{p}{q}x = m$

Ex. $\frac{\frac{3}{4}}{\frac{5}{6}} \rightarrow \frac{3}{4} \div \frac{5}{6} \rightarrow \frac{3}{4} \cdot \frac{6}{5}$ (stay the same, Flip)

Ex. $\frac{-\frac{7}{8}}{-\frac{7}{8}} \rightarrow -\frac{7}{8} \div -\frac{7}{8} \rightarrow -\frac{7}{8} \cdot -\frac{8}{7} = 1$ (keep, Flip)

Ex. $-\frac{8}{7}\left(-\frac{7}{8}x\right) = (-42)\cdot -\frac{8}{7}$

$x = \frac{336}{7}$

$x = 48$

Check: $-\frac{7}{8}(48) = -42$

$-42 = -42$ ✓

Ex. $\frac{5}{3}\left(\frac{3}{5}x\right) = (18)\frac{5}{3}$

$x = 30$

Check: $\frac{3}{5}(30) = 18$

$18 = 18$ ✓

Writing One Step Equations for Word Problems

Write the equation that represents each situation, solve and check it.

1) Read Situation
2) Read & underline
3) Define variable (it answers the question)
4) Write equation Determine operations make a plan
5) Solve for x
6) Check
7) write answer as a sentence!

Lisa is cooking muffins. The recipe calls for 7 cups of sugar total. She has already put in 2 cups. How many more cups does she need to put in?

Addition Equation

Total = starting cup + additional cups

$7 = 2 + x$

x: # of additional cups of sugar

$7 - 2 = 2 - 2 + x$

$5 = x$

She needs 5 more cups of sugar

check $7 = 2 + x$, $7 = 2 + (5)$, $7 = 7$ ✓

At a restaurant, Mike and his three friends decided to split the bill evenly. If each person paid $13 then what was the total bill?

Division Equation

x: the cost $ of the Bill

$\frac{\text{Bill}}{\text{Total Friends}} = \text{cost each Paid}$

$\frac{x}{4} = 13$

$4\left(\frac{x}{4}\right) = (13)4$

$x = 52$

The total bill was $52

How many packages of diapers can you buy with $40, if it costs $8 per package?

x: # of diaper packages bought

Multiplication Equation

Price · object = Total to spend

$8 \cdot x = 40$

$\frac{8x}{8} = \frac{40}{8}$

$x = 5$

Check $8(5) = 40$

You can buy 5 packages of diapers for $40.

If Jenny buys a shirt that is tagged at $19.48, and she receives $30.52 as her final change. How much money did she start off with?

x: $ Jenny starts with

Subtraction Equation

money to spend − shirt cost = change left

$x - 19.48 = 30.52$

$+19.48 = +19.48$

$x = 50.00$

Check: $x - 19.48 = 30.52$

$(50.00) - 19.48 = 30.52$

$30.52 = 30.52$ ✓

Jenny started with $50.