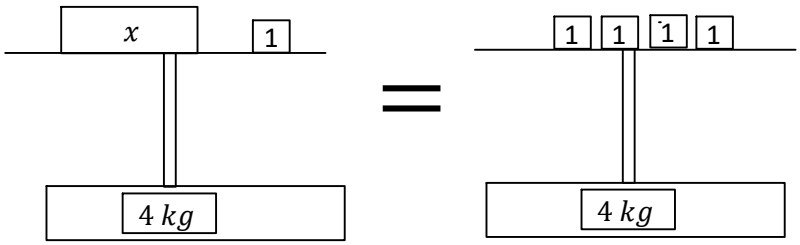
M8 - 10.0 - Golden Rule Scale Picture Notes

$\boxed{1} = 1kg$

The Golden Rule: Whatever you do to the right side of the equal sign, do to the left side.

$What\ plus\ 1\ = 4\ ?$

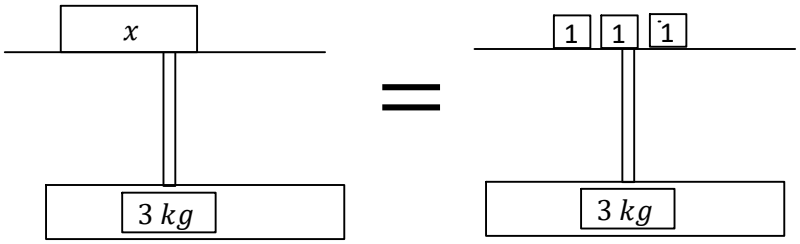


$x + 1 = 4$

$x + 1 = 4$

$-1 \quad -1$

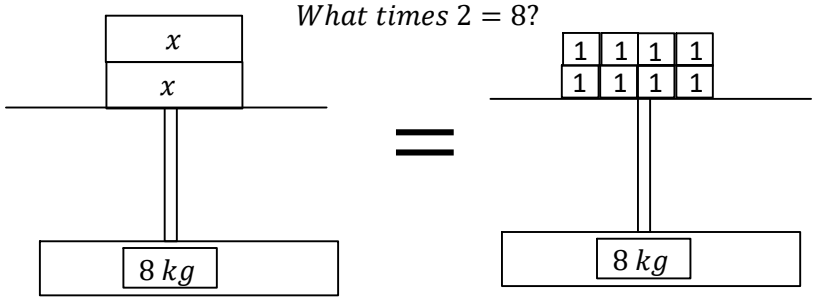
$x = 3$



Take off one from both sides

$x = 3$

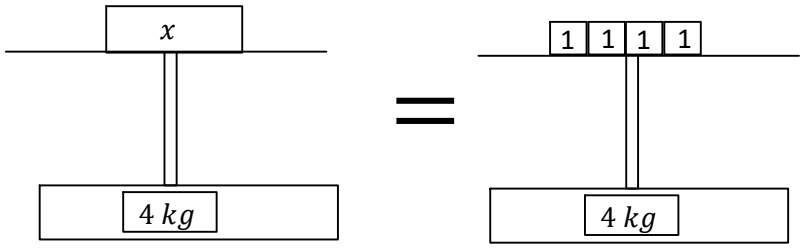
$What\ times\ 2 = 8?$



$2x = 8$

$\frac{2x}{2} = \frac{8}{2}$

$x = 4$



Divide both sides by two

$x = 4$

M8 - 10.1 - "$\pm x \pm a = b$" AlgebranNotes

Answer should say $x =$ ___

Solve for x, *by subtracting to both sides*.

$x + 5 = 9$

$x + 5 = 9$
$-5 \quad -5$ Subtract 5 from both sides

Both sides: The Left Hand Side and the Right Hand Side of the Equal Sign

$x + \cancel{5} = 9$
$\cancel{-5} \quad -5$ Cross it off

$5 - 5 = 0$

$x = 9 - 5$

$x = 4$ Circle Answer

Check Answer

$x + 5 = 9$
$(4) + 5 = 9$
$9 = 9$ ✓

Question
Substitute with Brackets
Left Hand Side Must Equal Right Hand Side

Short Forms

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

$x + \cancel{5} = 9$
$x = 9 - 5$
$x = 4$

Solve for x, *by adding to both sides*.

$x - 3 = 7$

We are always doing the opposite operation to both sides of the equation

$x - 3 = 7$
$+3 \quad +3$ Add 3 to both sides

$x - \cancel{3} = 7$
$\cancel{+3} \quad +3$

$x = 7 + 3$ Cross it off

$x = 10$

Check Answer

$x - 3 = 7$
$(10) - 3 = 7$
$7 = 7$ ✓

Solve for x

$x - 3 = 7$
$-7 \quad -7$
$x - 10 = 0$
$+10 \quad +10$
$x = 10$

If you accidentally get it equal to zero just keep going!

Short Forms

$x - \cancel{3} = 7$
$\cancel{+3} \quad +3$
$x = 10$

$x - \cancel{3} = 7$
$x = 7 + 3$
$x = 10$

Solve for x, *by subtracting to both sides. Then Dividing by* -1.

$-x + 2 = 5$

$-x + 2 = 5$
$-2 \quad -2$ Subtract 2 from both sides
$-x = 3$

$\frac{-x}{-1} = \frac{3}{-1}$ Divide both sides by -1.
Cross it off

$x = -3$

Check Answer

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

Substitute with Brackets!!!

Alternate Solution

$-x + 2 = 5$
$+x \quad +x$ Add x to both sides
$2 = 5 + x$
$-5 \quad -5$ Subtract 5 from both sides
$-3 = x$ Divide both sides by -1

$x = -3$ Mirror

$5 + x = 5 + x$ Can't add unlike terms!

M8 - 10.2 - "$ax = b$" "$\frac{x}{a} = b$" "$\frac{ax}{b} = c$" Notes

Answer should say $x =$ ___

Solve for x, *by dividing to both sides*.

$2x = 4$

$\frac{2x}{2} = \frac{4}{2}$ Divide both sides by 2

$\frac{2x}{2} = \frac{4}{2}$ Cross it off $\frac{2}{2} = 1$

$x = \frac{4}{2}$

$x = 2$

Divide both sides by the coefficient on x.

Short Forms

$\frac{2x}{2} = \frac{4}{2}$

$x = 2$

$2x = \frac{4}{2}$

$x = 2$

Check Answer

$2x = 4$

$2(2) = 4$

$4 = 4$ ✓

Question
Substitute
Left Must Equal Right

Solve for x, *by multiplying to both sides*.

$\frac{x}{3} = 6$

$3 \times \frac{x}{3} = 6 \times 3$ Multiply both sides by 3

$3 \times \frac{x}{3} = 6 \times 3$ Cross it off $\frac{3}{3} = 1$

$x = 6 \times 3$

$x = 18$

Multiply both sides by number below the letter

Short Forms

$3 \times \frac{x}{3} = 6 \times 3$

$x = 18$

$\frac{x}{3} = 6 \times 3$

$x = 18$

Check Answer

$\frac{x}{3} = 6$

$\frac{18}{3} = 6$

$6 = 6$ ✓

Solve for x

$\frac{5}{4}x = 10$

$4 \times \frac{5}{4}x = 10 \times 4$ Multiply both sides by 4

$4 \times \frac{5}{4}x = 10 \times 4$

$5x = 40$

$\frac{5x}{5} = \frac{40}{5}$ Divide both sides by 5

$\frac{5x}{5} = \frac{40}{5}$

$x = \frac{40}{5}$

$x = 8$

Short Form

$4 \times \frac{5}{4}x = 10 \times 4$

$\frac{5x}{5} = \frac{40}{5}$

$x = 8$

$\frac{5}{4}x = 10 \times \frac{4}{5}$

$x = 8$

Check Answer

$\frac{5}{4}x = 10$

$\frac{5}{4}(8) = 10$

$10 = 10$ ✓

M8 - 10.3 - "$\frac{a}{x} = b$""$\frac{a}{bx} = c$" *Notes*

Solve for x

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

$$x \times \frac{8}{x} = 4 \times x$$ Multiply x to both sides

Multiply both sides by the denominator

$$\cancel{x} \times \frac{8}{\cancel{x}} = 4 \times x$$ Cross it off

$$8 = 4x$$

$$\frac{8}{4} = \frac{\cancel{4}x}{\cancel{4}}$$ Divide both sides by 4

$$2 = x$$

Check Answer

$$\frac{8}{x} = 4$$
$$\frac{8}{2} = 4$$
$$4 = 4$$ ✓

Short Form

$$\frac{8}{x} = 4$$
$$\frac{8}{4} = x$$
$$x = 2$$

Solve for x

$$\frac{24}{2x} = 3$$

$$2x \times \frac{24}{2x} = 3 \times 2x$$ Multiply $2x$ to both sides

$$24 = 6x$$

$$\frac{24}{6} = \frac{6x}{6}$$ Divide both sides by 6

$$4 = x$$

Check Answer

$$\frac{24}{2x} = 3$$
$$\frac{24}{2(4)} = 3$$
$$\frac{24}{8} = 3$$
$$3 = 3$$ ✓

Short Form

$$\frac{24}{2x} = 3$$
$$\frac{24}{2(3)} = x$$
$$x = 4$$

M8 - 10.4 - "$\frac{ax}{bx} = \frac{c}{d}$" Cross Multiply Notes

Solve for x, by multiplying both sides by the opposite denominator.

$$\frac{x}{6} = \frac{4}{3}$$

$$\cancel{\frac{x}{6}} = \cancel{\frac{4}{3}}$$

$$3 \times x = 4 \times 6$$

$$3x = 24$$

$$\frac{3x}{3} = \frac{24}{3}$$

$$\boxed{x = 8}$$

Denominators Multiply to Opposite Side Numerator

Divide both sides by 3

Check Answer

$$\frac{x}{6} = \frac{4}{3}$$

$$\frac{8}{6} = \frac{4}{3}$$

$$\frac{4}{3} = \frac{4}{3} \checkmark$$

Short Form

$$\frac{x}{6} \times \frac{4}{3}$$

$$3 \times x = 4 \times 6$$

...

1 $\frac{a}{b} = \frac{c}{d}$

$d \times a = c \times b$

Cross Multiply

2 $\frac{a}{b} = \frac{c}{d}$

$b \times \frac{a}{b} = \frac{c}{d} \times b$

Multiply Both Sides

$\frac{a}{b} = \frac{c}{d}$

$\frac{a}{1} = \frac{c \times b}{d}$

Cross Multiply!

Equivalent Fractions

$$\frac{x}{2} = 4$$

$$\frac{x}{2} = \frac{4}{1}$$

$$\frac{x}{2} = \frac{4 \times 2}{1 \times 2}$$

$$\frac{x}{2} = \frac{8}{2}$$

$$\boxed{x = 8}$$

$$\frac{x}{2} = 4$$

$$\cancel{\frac{x}{2}} = \cancel{\frac{8}{2}}$$

$$\boxed{x = 8}$$

Algebra

$$\frac{x}{2} = 4$$

$$\frac{x}{2} = \frac{4}{1}$$

$$2 \times \frac{x}{2} = \frac{4}{1} \times 2$$

$$\cancel{2} \times \frac{x}{\cancel{2}} = \frac{4}{1} \times 2$$

$$x = 4 \times 2$$

$$\boxed{x = 8}$$

$$\frac{x}{2} = 4 \times 2$$

$$\boxed{x = 8}$$

Cross Multiplication

$$\frac{x}{2} = 4$$

$$\frac{x}{2} \times \frac{4}{1}$$

$$1 \times x = 4 \times 2$$

$$1x = 8$$

$$\boxed{x = 8}$$

$$\frac{x}{2} = \frac{4}{1}$$

$$1x = 4 \times 2$$

$$\boxed{x = 8}$$

M8 - 10.5 - "$\pm ax + b = c, \frac{x}{a} + b = c$" Notes

Solve for x

$6x + 8 = 50$

$6x + 8 = 50$
$-8 \quad -8$ Subtract 8 from both sides

$6x = 42$

$\frac{6x}{6} = \frac{42}{6}$ Divide both sides by 6

$\frac{\cancel{6}x}{\cancel{6}} = \frac{42}{6}$ Cross it off

$x = \frac{42}{6}$

$x = 7$

Short Form

$6x + 8 = 50$
$6x = 50 - 8$
$6x = 42$
$x = 7$

Check Answer

$6x + 8 = 50$
$6(7) + 8 = 50$
$42 + 8 = 50$
$50 = 50$ ✓

Solve for x

$\frac{x}{3} - 8 = -3$

$\frac{x}{3} - 8 = -3$
$+8 \quad +8$ Add 8 to both sides

$\frac{x}{3} = 5$

$\frac{x}{3} \times 3 = 5 \times 3$ Multiply both sides by 3

$x = 5 \times 3$

$x = 15$

Short Form

$\frac{x}{3} - 8 = -3$
$\frac{x}{3} = -3 + 8$
$\frac{x}{3} = 5$
$x = 15$

Check Answer

$\frac{x}{3} - 8 = -3$
$\frac{15}{3} - 8 = -3$
$5 - 8 = -3$
$-3 = -3$ ✓

M8 - 10.6 - "$a(x+b)=c, \frac{a}{x+b}=c$" Distribution Notes

Solve for x, by Distributing a into $x+b$.

$-4(x-3)=-8$

$-4(x-3)=-8$ — Distribute

$-4x+12=-8$

$-4x+12=-8$

$-12 \quad -12$

$-4x=-20$

$\frac{-4x}{-4}=\frac{-20}{-4}$

$x=\frac{-20}{-4}$

$x=5$

Distribution

$-4(x-3)=-4x+12$

Multiply the number in front of the brackets into both numbers inside the brackets.

Check Answer

$-4(x-3)=-8$

$-4(5-3)=-8$

$-4(2)=-8$

$-8=-8$ ✓

OR

Divide 1st

$-4(x-3)=-8$

$\frac{-4(x-3)}{-4}=\frac{-8}{-4}$

$x-3=2$

$x-3=2$

$+3 \quad +3$

$x=5$

Short Forms

$-4(x-3)=-8$

$x-3=2$

$4x=20$

$x=5$

$-4(x-3)=-8$

$-4x+12=-8$

$-4x=-20$

$x=5$

Solve for x, by Distributing a into $x+b$.

$\frac{1}{2}(x+4)=6$

$\frac{x}{2}+\frac{4}{2}=6$

$\frac{x}{2}+2=6$

$-2 \quad -2$

$\frac{x}{2}=4$

$2\times\frac{x}{2}=4\times 2$

$x=8$

Distribute

Check Answer

$\frac{1}{2}(x+4)=6$

$\frac{1}{2}(8+4)=6$

$\frac{1}{2}(12)=6$

$6=6$ ✓

OR

Multiply 1st

$\frac{1}{2}(x+4)=6$

$2\times\frac{1}{2}(x+4)=6\times 2$

$x+4=12$

$-4 \quad -4$

$x=8$

Short Forms

$\frac{1}{2}(x+4)=6$

$x+4=12$

$x=8$

$\frac{1}{2}(x+4)=6$

$\frac{x}{2}+2=6$

$\frac{x}{2}=4$

$x=8$

Solve for x, by multiplying to both sides by $x+b$.

$\frac{14}{x-3}=2$

$(x-3)\times\frac{14}{x-3}=2\times(x-3)$ — Multiply $x-3$ to both sides

$(x-3)\times\frac{14}{x-3}=2\times(x-3)$ — Cross it off

$14=2x-6$ — Distribute

$+6 \quad +6$

$20=2x$

$\frac{20}{2}=\frac{2x}{x}$

$10=x$

$x=10$

Short Form

$\frac{14}{x-3}=2$

$14=2(x-3)$

$14=2x-6$

$20=2x$

$x=10$

Check Answer

$\frac{14}{x-3}=2$

$\frac{14}{10-3}=2$

$\frac{14}{7}=2$

$2=2$ ✓

M8 - 10.7 - LCD "$\frac{x}{a}+\frac{b}{c}=\frac{d}{e}$" Notes

Solve for x by multiplying each term by the LCD

$$x-1=\frac{1}{2}$$

$LCD=2$

$$2\times(x-1)=\frac{1}{2}\times 2$$

Multiply both sides by 2

$$2x-2=1$$

Distribute

$$+2\quad +2$$

Add 2 to both sides

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

Divide both sides by 2

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

Check Answer

$$x-1=\frac{1}{2}$$
$$\frac{3}{2}-1=\frac{1}{2}$$
$$\frac{3}{2}-\frac{2}{2}=\frac{1}{2}$$
$$\frac{1}{2}=\frac{1}{2}\ \checkmark$$

Short Form

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

OR

Algebra

$$x-1=\frac{1}{2}$$
$$+1\quad +1$$
$$x=\frac{3}{2}$$

Add Fractions

$$\frac{1}{2}+1$$
$$\frac{1}{2}+\frac{2}{2}$$
$$\frac{3}{2}$$

Expand $1=\frac{1}{1}=\frac{1\times 2}{1\times 2}=\frac{2}{2}$

$LCD=2$

Solve for x by multiplying each term by the LCD

$$x-\frac{1}{4}=\frac{1}{2}$$

$LCD=4$

$$4\times\left(x-\frac{1}{4}\right)=\frac{1}{2}\times 4$$

Multiply both sides by 4

$$4x-\frac{4}{4}=\frac{4}{2}$$

Distribute

$$4x-1=2$$

Add 1 to both sides

$$+1\quad +1$$
$$4x=3$$

Divide both sides by 4

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

Check Answer

$$x-\frac{1}{4}=\frac{1}{2}$$
$$\frac{3}{4}-\frac{1}{4}=\frac{1}{2}$$
$$\frac{2}{4}=\frac{1}{2}$$
$$\frac{1}{2}=\frac{1}{2}\ \checkmark$$

Short Form

$$x-\frac{1}{4}=\frac{1}{2}$$
$$\left(x-\frac{1}{4}=\frac{1}{2}\right)\times 4$$
$$4x-1=2$$
$$4x=3$$
$$x=\frac{3}{4}$$

Instead of actually multiplying by the LCD we are going to multiply and simplify at the same time.

Solve for x by multiplying each term by the LCD

$$\frac{x}{2}+\frac{1}{4}=\frac{1}{3}$$

$LCD=12$

$$\left(\frac{x}{2}+\frac{1}{4}=\frac{1}{3}\right)\times 12$$

Multiply both sides by 12

$$\frac{12x}{2}+\frac{12}{4}=\frac{12}{3}$$

Distribute

$$6x+3=4$$

Simplify

$$-3\quad -3$$
$$6x=1$$

Algebra

$$x=\frac{1}{6}$$

Check Answer

$$\frac{x}{2}+\frac{1}{4}=\frac{1}{3}$$
$$\frac{\left(\frac{1}{6}\right)}{2}+\frac{1}{4}=\frac{1}{3}$$
$$\frac{1}{12}+\frac{1}{4}=\frac{1}{3}$$
$$\frac{1}{3}=\frac{1}{3}\ \checkmark$$

Fractions ÷ +

$$\frac{\left(\frac{1}{6}\right)}{2}$$
$$\frac{1}{6}\div 2$$
$$\frac{1}{6}\times\frac{1}{2}$$
$$\frac{1}{12}$$

$$\frac{1}{12}+\frac{1}{4}$$
$$\frac{1}{12}+\frac{3}{12}$$
$$\frac{4}{12}$$
$$\frac{1}{3}$$

Short Form

$$\left(\frac{x}{2}+\frac{1}{4}=\frac{1}{3}\right)\times 12$$
$$6x+3=4$$
$$6x=1$$
$$x=\frac{1}{6}$$

M8 - 10.8 - Combining Like Terms Notes

Combine the like terms: Add/Subtract like Terms

$x + x = 2x$ $\quad x + 2x = 3x$ $\quad 2x + 4x = 6x$ $\quad 6x - 4x = 2x$ $\quad 2x - 5x = -3x$ $\quad x - x = 0$

Solve for x

$x = 1 + 2$

$x = 3$

Combine Like Terms

$x + x = 4$

$2x = 4$

$\frac{2x}{2} = \frac{4}{2}$

$x = 2$

Check Answer

$x + x = 4$

$2 + 2 = 4$

$4 = 4$ ✓

$3x + 3x = 4 + 8$

$6x = 12$

$\frac{6x}{6} = \frac{12}{6}$

$x = 2$

Check Answer

$3x + 3x = 4 + 8$

$3(2) + 3(2) = 4 + 8$

$6 + 6 = 12$

$12 = 12$ ✓

Solve for x, by combining like terms by adding and subtracting to both sides

$2x = 4 + x$

$2x = 4 + x$

$-x \quad -x$

$x = 4$

Work on the complicated side!

Subtract x from both sides

Check Answer

$2x = 4 + x$

$2(4) = 4 + (4)$

$8 = 8$ ✓

Short Form

$2x = 4 + x$

$x = 4$

$2x = 4 + x$

$-4 \quad -4$

$2x - 4 = x$

$-2x \quad -2x$

$-4 = -x$

$\frac{-4}{-1} = \frac{-x}{-1}$

$x = 4$

Not Optimal!!!

Solve for x, by combining like terms

$3x + 2 = 2x + 6$

$3x + 2 = 2x + 6$

$-2 \quad -2$

$3x = 2x + 4$

$-2x \quad -2x$

$x = 4$

Subtract 2 from both sides

Subtract 2x from both sides

Check Answer

$3x + 2 = 2x + 6$

$3(4) + 2 = 2(4) + 6$

$12 + 2 = 8 + 6$

$14 = 14$ ✓

Short Form

$3x + 2 = 2x + 6$

$x = 4$

Solve for x, by combining like terms

$3x - 1 + 4x = x + 11$

$3x + 4x - 1 = x + 11$

$7x - 1 = x + 11$

$+1 \quad +1$

$7x = x + 12$

$-x \quad -x$

$6x = 12$

$\frac{6x}{6} = \frac{12}{6}$

$x = 2$

Rearrange Order of Terms (Signs!!!)

Combine Like Terms

Algebra

Check Answer

$3x - 1 + 4x = x + 11$

$3(2) - 1 + 4(2) = (2) + 11$

$6 - 1 + 8 = 2 + 11$

$13 = 13$ ✓

Short Form

$3x - 1 + 4x = x + 11$

$6x = 12$

$x = 2$

M8 - 10.9 - Creating/Solving Equations Notes

Pick a Number.

$Let\ x = the\ number$ Let Statements

Word	Meaning
Sum, More, Add, Increased	$+$
Difference, Less, Subtract, Decreased, Take away	$-$
Product, Times, Multiplied	$\times$
Quotient, Divide, Split	$\div$

Words Problems

Let Statements
Equation
Isolate
Solve (Algebra)
Answer!
Check Answer!

Expressions

Three more than a number $x + 3$

Eight less than a number $x - 8$

A number less than four $4 - x$

Five times a number $5x$

A third of a number $\frac{1}{3}x$

Eight divided by a number $\frac{8}{x}$

Twice the sum of a number and three $2(x + 3)$

A number plus four "ALL" divided by two $\frac{x+4}{2}$

Create and Solve the following:

Five more than a number is 8. What is the number?

$Let\ x = the\ \#$ Let Statements

$x + 5 = 8$ Create Equation

$x + 5 = 8$
$-5 \quad -5$
$x = 3$ Solve

Check Answer
$x + 5 = 8$
$(3) + 5 = 8$
$8 = 8$ ✓

The number is 3 Answer the question

Twice the "SUM" of a number and three is 12. What is the number?

$Let\ x = the\ number$

$2(x + 3) = 12$

$2(x + 3) = 12$
$2x + 6 = 12$
$-6 \quad -6$
$2x = 6$
$\frac{2x}{2} = \frac{6}{2}$

$x = 3$

Check Answer
$2(x + 3) = 12$
$2((3) + 3) = 12$
$2(6) = 12$ ✓

The number is 3

Three less than twice a number is 7. What is the number?

$Let\ x = \#$

$2x - 3 = 7$

$2x - 3 = 7$
$+3 \quad +3$
$2x = 10$
$\frac{2x}{2} = \frac{10}{2}$

$x = 5$

The number is 5

Check Answer
$2x - 3 = 7$
$2(5) - 3 = 7$
$10 - 3 = 7$
$7 = 7$ ✓

Five times a number plus three "ALL" divided by two equals triple the number. What is the number?

$Let\ x = \#$

$\frac{(5x + 3)}{2} = 3x$

$\cancel{2} \times \frac{5x + 3}{\cancel{2}} = 3x \times 2$
$5x + 3 = 6x$
$-5x \quad -5x$

$x = 3$

The number is 3

Check Answer
$\frac{5x + 3}{2} = 3x$
$\frac{5(3) + 3}{2} = 3(3)$
$\frac{18}{2} = 9$
$9 = 9$ ✓

M8 - 10.9 - One vs Two Variable Equations Notes

Create and Solve the following:

One number is two more than another and their sum is 12. What are the numbers?

$Let\ x = 1st\ \#$
$Let\ x - 2 = 2nd\ \#$

One Variable!

$x + (x - 2) = 12$
$x + x - 2 = 12$
$2x - 2 = 12$
$+2 \quad +2$
$2x = 14$
$\frac{2x}{2} = \frac{14}{2}$
$x = 7$

$1st\ \# = 7$
$2nd\ \# = 5$

$2nd\# = x - 2$
$= (7) - 2$
$2nd\# = 5$

$Let\ x = 1st\ \#$
$Let\ x + 2 = 2nd\ \#$

$x + (x + 2) = 12$
$x + x + 2 = 12$
$2x + 2 = 12$
$-2 \quad -2$
$2x = 10$
$\frac{2x}{2} = \frac{10}{2}$
$x = 5$

$1st\ \# = 5$
$2nd\ \# = 7$

OR

$2nd\# = x + 2$
$= (5) + 2$
$2nd\# = 7$

Words Problems

Let Statements
Equation
Solve (Algebra)
Answer!
Check Answer!

One number is two more than another and their sum is 12. What are the numbers?

$Let\ x = 1st\ \#$
$Let\ y = 2nd\ \#$

Two Variable!

OR

$x + y = 12$

Equation #1

$x + y = 12$
$-x \quad -x$
$y = (12 - x)$

Isolate a Variable

(Substitute into other Equation)

$x - y = 2$

Equation #2

$x - y = 2$
$y - x = 2$
$y - 2 = x$
$x - 2 = y$
$x + 2 = y$
$y + 2 = x$

It Doesn't Matter!

Solve

$x - (12 - x) = 2$
$x - 12 + x = 2$
$2x - 12 = 2$
$+12 \quad +12$
$2x = 14$
$\frac{2x}{2} = \frac{14}{2}$
$x = 7$

(Substitute)

$y = 12 - x$
$y = 12 - (7)$
$y = 5$

Solve

Answer

$1st\ \# = 7$
$2nd\ \# = 5$

Check Answer
$5 + 2 = 7$ ✓
$5 + 7 = 12$ ✓

Words Problems

Let Statements
Equation/s
Isolate
Substitute
Solve (Algebra)
Substitute
Solve
Answer!
Check Answer!

M8 - 10.9 - 2/3 Number/Consecutive Equations Notes

Create and Solve the following:

The sum of three numbers is 67. The 2nd number one less than is twice the 1st. The 3rd number is four more than the 1st.

$$Let\ x = 1st\ \#$$
$$Let\ 2x - 1 = 2nd\ \#$$
$$Let\ x + 4 = 3rd\ \#$$

$$x + 2x - 1 + x + 4 = 67$$

$$\begin{aligned} x + 2x - 1 + x + 4 &= 67 \\ 4x + 3 &= 67 \\ -3 \quad &-3 \\ 4x &= 64 \\ \frac{4x}{4} &= \frac{64}{4} \end{aligned}$$

$1st\ \# = 16$ $\quad x = 16$

$$\begin{aligned} 2nd\# &= 2x - 1 \\ &= 2(16) - 1 \\ &= 32 - 1 \\ 2nd\# &= 31 \end{aligned}$$

$$\begin{aligned} 3rd\# &= x + 4 \\ &= (16) + 4 \\ 3rd\# &= 20 \end{aligned}$$

$1st\ \# = 16$
$2nd\ \# = 31$
$3rd\ \# = 20$

Check Answer

$16 + 31 + 20 = 67$ ✓

The sum of three consecutive integers is 24.

Consecutive Integers: ie. -2,-1,0,1,2,3,4,5,6
Consecutive Even Integers: ie. -2,0,2,4,6
Consecutive Odd Integers: ie. -1,1,3,5,7

$$Let\ x = 1st\ \#$$
$$Let\ x + 1 = 2nd\ \#$$
$$Let\ x + 2 = 3rd\ \#$$

$$x + x + 1 + x + 2 = 24$$

$$\begin{aligned} x + x + 1 + x + 2 &= 24 \\ 3x + 3 &= 24 \\ -3 \quad &-3 \\ 3x &= 21 \\ \frac{3x}{3} &= \frac{21}{3} \end{aligned}$$

$1st\ \# = 7$ $\quad x = 7$

$$\begin{aligned} 2nd\# &= x + 1 \\ &= (7) + 1 \\ 2nd\# &= 8 \end{aligned}$$

$$\begin{aligned} 3rd\# &= x + 2 \\ &= (7) + 2 \\ 3rd\# &= 9 \end{aligned}$$

$1st\ \# = 7$
$2nd\ \# = 8$
$3rd\ \# = 9$

Check Answer

$7 + 8 + 9 = 24$ ✓

Find three consecutive odd integers where five less than triple the 2nd is quadruple the 1st.

$$Let\ x = 1st\ \#$$
$$Let\ x + 2 = 2nd\ \#$$
$$Let\ x + 4 = 3rd\#$$

$$3(x + 2) - 5 = 4x$$

$$\begin{aligned} 3(x + 2) - 5 &= 4x \\ 3x + 6 - 5 &= 4x \\ 3x + 1 &= 4x \\ -3x \quad &- 3x \\ 1 &= x \end{aligned}$$

$1st\ \# = 1$ $\quad x = 1$

$$\begin{aligned} 2nd\# &= x + 2 \\ &= (1) + 2 \\ 2nd\# &= 3 \end{aligned}$$

$$\begin{aligned} 3rd\# &= x + 5 \\ &= (1) + 4 \\ 3rd\# &= 5 \end{aligned}$$

$1st\ \# = 1$
$2nd\ \# = 3$
$3rd\# = 5$

Check Answer

$3(3) - 5 = 4(1)$
$9 - 5 = 4$
$4 = 4$ ✓

M8 - 10.9 - Age/Now-Then Equations Notes

Create and Solve the following:

Four years less than triple Mark's age equals fourteen years more than double his age. How old is Mark?

$Let\ m = Mark's\ age$

$$3m - 4 = 2m + 14$$

$$\begin{aligned} 3m - 4 &= 2m + 14 \\ -2m & \quad -2m \\ m - 4 &= 14 \\ +4 & \quad +4 \end{aligned}$$

$$m = 18$$

Answer: Mark is 18 years old

Check Answer

$3(18) - 4 = 2(18) + 14$ ✓

If Nicole were triple her age she was three years ago she would be twice her current age. How old is Nicole now?

$Let\ n = Nicole's\ age$
$Let\ n - 3 = Nicole's\ age\ 3\ years\ ago$
$Let\ 2n = Twice\ Nicole's\ age$

$$3(n - 3) = 2n$$

$$\begin{aligned} 3(n - 3) &= 2n \\ 3n - 9 &= 2n \\ -3n & \quad -3n \\ -9 &= -n \\ \frac{-9}{-1} &= \frac{-n}{-1} \\ 9 &= n \end{aligned}$$

$$n = 9$$

Check Answer

$3(9 - 3) = 2(9)$
$3(6) = 2(9)$
$18 = 18$ ✓

Answer

Nicole is 9 years old now