

M8 - 10.9 - Creating/Solving Equations Notes

Pick a Number.

Let $x = \text{the number}$

Let Statements

Word	Meaning
Sum, More, Add, Increased	+
Difference, Less, Subtract, Decreased, Take away	-
Product, Times, Multiplied	×
Quotient, Divide, Split	÷

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 $x = \text{the \#}$

Let Statements

$$x + 5 = 8$$

Create Equation

$$\begin{array}{r} x + 5 = 8 \\ -5 \quad -5 \\ \hline x = 3 \end{array}$$

Solve

Check Answer

$$\begin{array}{l} x + 5 = 8 \\ (3) + 5 = 8 \\ 8 = 8 \quad \checkmark \end{array}$$

The number is 3

Answer the question

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

Let $x = \text{the number}$

$$2(x + 3) = 12$$

$$\begin{array}{r} 2(x + 3) = 12 \\ 2x + 6 = 12 \\ -6 \quad -6 \\ \hline 2x = 6 \\ \frac{2x}{2} = \frac{6}{2} \end{array}$$

Check Answer

$$\begin{array}{l} 2(x + 3) = 12 \\ 2((3) + 3) = 12 \\ 2(6) = 12 \quad \checkmark \end{array}$$

$x = 3$

The number is 3

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

Let $x = \#$

$$2x - 3 = 7$$

$$\begin{array}{r} 2x - 3 = 7 \\ +3 \quad +3 \\ \hline 2x = 10 \\ \frac{2x}{2} = \frac{10}{2} \end{array}$$

$x = 5$

The number is 5

Check Answer

$$\begin{array}{l} 2x - 3 = 7 \\ 2(5) - 3 = 7 \\ 10 - 3 = 7 \\ 7 = 7 \quad \checkmark \end{array}$$

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

Let $x = \#$

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

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

$x = 3$

The number is 3

Check Answer

$$\begin{array}{l} \frac{5x + 3}{2} = 3x \\ \frac{5(3) + 3}{2} = 3(3) \\ \frac{18}{2} = 9 \\ 9 = 9 \quad \checkmark \end{array}$$

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!

$$\begin{aligned} x + (x - 2) &= 12 \\ x + x - 2 &= 12 \\ 2x - 2 &= 12 \\ +2 \quad +2 & \\ 2x &= 14 \\ \frac{2x}{2} &= \frac{14}{2} \end{aligned}$$

$x = 7$

1st # = 7
2nd # = 5

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

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

$$\begin{aligned} x + (x + 2) &= 12 \\ x + x + 2 &= 12 \\ 2x + 2 &= 12 \\ -2 \quad -2 & \\ 2x &= 10 \\ \frac{2x}{2} &= \frac{10}{2} \end{aligned}$$

$x = 5$

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

Equation #1
 $x + y = 12$

$$\begin{aligned} x + y &= 12 \\ -x & \quad -x \end{aligned}$$

$y = (12 - x)$ Isolate a Variable

(Substitute into other Equation)

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

$y = 5$ Solve

Answer

1st # = 7
2nd # = 5

Equation #2
 $x - y = 2$

$$\begin{aligned} x - (12 - x) &= 2 \\ x - 12 + x &= 2 \\ 2x - 12 &= 2 \\ +12 \quad +12 & \\ 2x &= 14 \\ \frac{2x}{2} &= \frac{14}{2} \end{aligned}$$

$x = 7$

Equation #2

$$\begin{aligned} x - y &= 2 \\ y - x &= 2 \\ y - 2 &= x \\ x - 2 &= y \\ x + 2 &= y \\ y + 2 &= x \end{aligned}$$

It Doesn't Matter!

Solve

Words Problems

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

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

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 $x + 4 = 3rd \#$

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

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

$$4x + 3 = 67$$

$$\begin{array}{r} -3 \quad -3 \\ 4x = 64 \end{array}$$

$$4x = 64$$

$$\frac{4x}{4} = \frac{64}{4}$$

$$x = 16$$

$$1st \# = 16$$

$$x = 16$$

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

$$2nd\# = 31$$

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

$$3rd\# = 20$$

$$1st \# = 16$$

$$2nd \# = 31$$

$$3rd \# = 20$$

Check Answer

$$16 + 31 + 20 = 67 \quad \checkmark$$

The sum of three consecutive integers is 24.

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

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

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

$$3x + 3 = 24$$

$$\begin{array}{r} -3 \quad -3 \\ 3x = 21 \end{array}$$

$$3x = 21$$

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

$$x = 7$$

$$1st \# = 7$$

$$x = 7$$

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

$$2nd\# = 8$$

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

$$3rd\# = 9$$

$$1st \# = 7$$

$$2nd \# = 8$$

$$3rd \# = 9$$

Check Answer

$$7 + 8 + 9 = 24 \quad \checkmark$$

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

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

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

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

$$3x + 6 - 5 = 4x$$

$$3x + 1 = 4x$$

$$\begin{array}{r} -3x \quad -3x \\ 1 = x \end{array}$$

$$1 = x$$

$$1st \# = 1$$

$$x = 1$$

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

$$2nd\# = 3$$

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

$$3rd\# = 5$$

$$1st \# = 1$$

$$2nd \# = 3$$

$$3rd\# = 5$$

Check Answer

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

$$9 - 5 = 4$$

$$4 = 4 \quad \checkmark$$

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 $m = \text{Mark's age}$

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

$$\begin{array}{r} 3m - 4 = 2m + 14 \\ -2m \quad -2m \\ \hline m - 4 = 14 \\ +4 \quad +4 \end{array}$$

$$m = 18$$

Answer

Mark is 18 years old

Check Answer

$$3(18) - 4 = 2(18) + 14 \checkmark$$

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

Let $n = \text{Nicole's age}$

Let $n - 3 = \text{Nicole's age 3 years ago}$

Let $2n = \text{Twice Nicole's age}$

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

$$\begin{array}{r} 3(n - 3) = 2n \\ 3n - 9 = 2n \\ -3n \quad -3n \\ \hline -9 = -n \\ -9 \quad -n \\ \hline -1 = -1 \\ 9 = n \end{array}$$

$$n = 9$$

Check Answer

$$\begin{array}{l} 3(9 - 3) = 2(9) \\ 3(6) = 2(9) \\ 18 = 18 \checkmark \end{array}$$

Answer

Nicole is 9 years old now