8.8A Write One Variable Equations or Inequalities Lesson

Defintions

Equation – a mathematical statement composed of algebraic and/or numeric expressions set equal to each other.

Inequality – a mathematical statement composed of algebraic and/or numeric expression set apart by an inequality symbol.

Variable – a letter or symbol that represents a number.

Ex.

Equation	Inequality
$12 - 4x = 3.2x - \frac{4}{5}$ variable variable	$\frac{1}{5}x - 6 > \frac{4}{7}x + 2$ variable variable

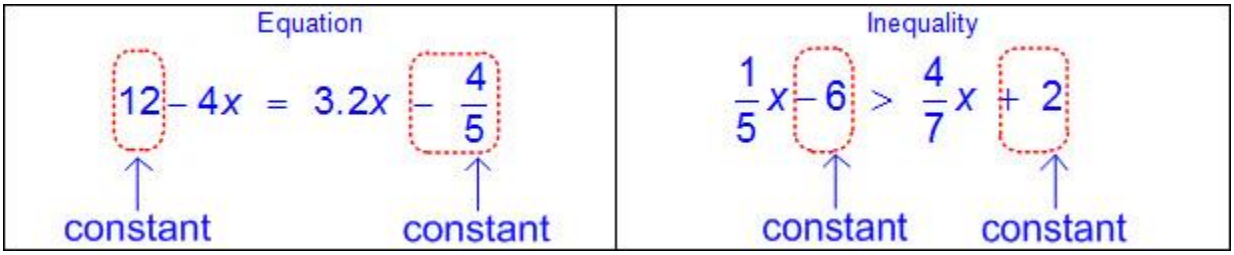
Coefficient - a number that is multiplied by a variable(s).

Ex.

Equation	Inequality
coefficient $12 - 4x = 3.2x - \frac{4}{5}$ coefficient	coefficient $\frac{1}{5}x - 6 > \frac{4}{7}x + 2$ coefficient

Constant – a fixed value that does not appear with a variable(s).

Ex.



Equality and inequality words and symbols -

Equality and Inequality	Example in Words	Example in Symbols
Equal to, =	x is equal to 4	x = 4
Greater than, >	x is greater than 4	x > 4
Greater than or equal to, ≥	x is greater than or equal to 4	x ≥ 4
Less than, <	x is less than 4	x < 4
Less than or equal to, ≤	x is less than or equal to 4	x ≤ 4
Not equal to, ≠	x is not equal to 4	x ≠ 4

Order of operations – the rules of which calculations are performed first when simplifying an expression.

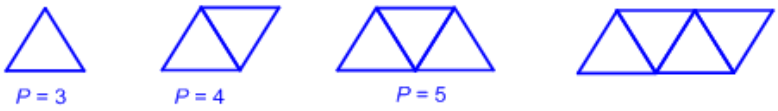
PEMDAS -

Parenthesis/brackets:	Simplify expressions inside parentheses or brackets in order from left to right.
Exponents:	Rewrite in standard numerical form and simplify from left to right.
Multiplication/Division:	Simplify expressions involving multiplication and/or division in order from left to right.
Addition/Subtraction:	Simplify expressions involving addition and/or subtraction in order from left to right.

Tanya must choose between two job offers. Job offer A pays a flat rate of $22.50 plus an additional $9.77 per hour. Job offer B pays a flat rate of $9.95 plus an additional $11.40 per hour. Write an equation to find the number of hours worked, h, at which Job A will earn the same amount of money as Job B.

Sample equation:

$$9.77h + 22.50 = 11.40h + 9.95$$



The perimeter of the first figure in the sequence above is 3. Using the sequence, write an equation to determine when the perimeter of a figure will be twice the position number, n.

Sample equation:

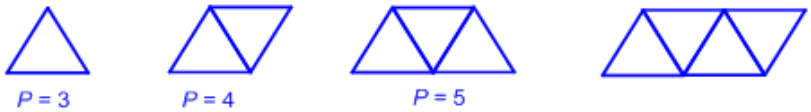
Position Number	Perimeter
1	3
2	4
3	5
4	6
5	7
n	$n + 2$

Therefore, the equation is $n + 2 = 2n$, where n represents the position in the sequence.

Tanya must choose between two job offers. Job offer A pays a flat rate of $22.50 plus an additional $9.77 per hour. Job offer B pays a flat rate of $9.95 plus an additional $11.40 per hour. Write an inequality to find the number of hours worked, h, at which Job A will earn more money than Job B.

Sample inequality:

$$9.77h + 22.50 > 11.40h + 9.95$$



The perimeter of the first figure in the sequence above is 3. Using the sequence, write an inequality to determine when the perimeter of a figure will be greater than or equal to twice the position number, n.

Sample inequality:

Position Number	Perimeter
1	3
2	4
3	5
4	6
5	7
n	$n + 2$

Therefore, the inequality is $n + 2 \geq 2n$, where n represents the position in the sequence.

1) Rhonda bought five shirts from a store and had $10 left. If she had only bought three shirts, she would have had $24 left. If each shirt costs the same, which of the following equations could be used to determine x, the cost of each shirt, in dollars?

We are letting x represent the cost of each shirt. Since each shirt cost the same we can determine that the total amount of money Rhonda had was enough to buy 5 shirts and still have $10 remaining. We can represent this by using the following: 5x + $10

We are also given that when she buys 3 shirts she has $24 left. Therefore, we can determine that the total amount of money Rhonda had was enough to buy 3 shirts and still have $24 remaining. We can represent this by using the following: 3x + $24

We can conclude that the amount of money Rhonda had was enough for her to buy 5 shirts plus $10 which is the same as her buying 3 shirts plus $24. We can then using the following equation to find x the total cost of the shirts.

5x + $10 = 3x + $24

2) Jim received notice from his employer that the equation to calculate his salary was changing. Currently he makes $300 per week plus 4% commission on sales. The new equation will be $450 plus 2% commission on sales. Which equation shows the amount in sales he will need for his salary to be the same?

Let s represent the amount that Jim makes on commission sales.

We want to know when Jim's current salary = Jim's new salary

Jim's current salary can be represented by the following: $300 + 4%(s) or

$300 + .04s after we convert the percentage.

Jim's new salary can be represented by the following: $450 + 2%(s) or

$450 + .02s after we convert the percentage.

Therefore, we can use the following equation:

Jim's current salary = Jim's new salary

$300 + .04s = $450 + .02s

3) Ronald rents a car from Cheap Rent- a-Car for $25 plus $0.05 per mile. Dixon rents a car from Great Cars for $40 plus $0.03 per mile. What would be the equation they should use to determine how many miles must they both drive for their rental fees to be the same?

Let m represent the distance in miles Ronald and Dixon drove.

Ronald's rental from Cheap Rent-a-Car can be represented by the following:

$25 + $0.05m

Dixon's rental from Great Cars can be represented by the following:

$40 + $0.03m

Since we are trying to determine when their rental fees would be the same we can use the following equation to solve for m(miles driven).

Ronald's rental = Dixon's rental

$25 + $0.05m = $40 + $0.03m

4) Karissa is going water skiing. She can purchase skis for $125 or she can rent skis for $30 an hour. In both cases she must rent a safety flotation device to wear that is $5 per hour. Which inequality shows the number of hours Karissa must ski for the cost of buying skis to be less than renting skis?

We want to determine when buying skis $<$ renting skis.

Let h represent the amount of hours Karissa is skiing.

Since Karissa has to rent a safety flotation device whether she buys or rents the skis for $5 an hour the following can be used to represent the amount she would need to spend per hour for the safety flotation device: $5h

Buying the skis can be represented by the following: $125 + $5h

Renting the skis can be represented by the following: $30h + $5h or $35h when combining like terms.

Since we are trying to determine when buying skis $<$ renting skis we can use the following inequality.

Buying $<$ renting

$125 + $5h $<$ $35h

5) Laney is ordering books while she is on summer vacation. Reader's Book Club charges $4.00 per book and requires a one-time membership fee of $12. Perfect Pages requires no membership fee and charges $7.50 for each book ordered. The cost for Laney to order books depends on the number of books ordered, b. Which inequality can be used to find the minimum number of books that can be ordered so that the cost of ordering books from Reader's Book Club is less than the cost of ordering books from Perfect Pages?

We want to determine when the cost of ordering books from

Reader's Book Club $<$ Perfect Pages.

Let b represent the amount of books that Laney is ordering.

Ordering books from Reader's Book Club can be represented by the following: $4b +$12

Ordering books from Perfect Pages can be represented by the following: $7.50b

Since we are trying to determine when Reader's Book Club $<$ Perfect Pages we can use the following inequality.

Reader's Book Club $<$ Perfect Pages

$4b + $12 $<$ $7.50b