All work must be shown or no credit will be awarded. Box all answers!!

Order of Operations

Steps:

1. Do operations that occur within grouping symbols. If there is more than one set of symbols, work from the inside out.
2. Evaluate powers.
3. Multiplication and division from left to right.
4. Addition and subtraction from left to right.

Example Problems:

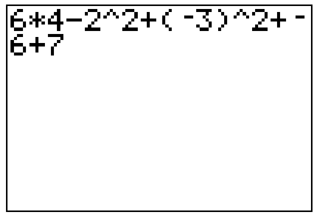
Non-Calculator Procedures

A. $6 \bullet 4 - 2^2 + (-3)^2 + (-6) + 7$

$= 6 \bullet 4 - 4 + 9 - 6 + 7$
$= 24 - 4 + 9 - 6 + 7$
$= 20 + 9 - 6 + 7$
$= 29 - 6 + 7$
$= 23 + 7$
$= 30$

Calculator Keystrokes

6 x 4 – 2 ^ 2 + (-3) ^ 2 + - 6 + 7



This is a screen shot of what the screen on a TI-84 Plus calculator would look like.

B. $\dfrac{4\left[-5-3(-2)^2\right]}{-6-7(-3-2)+5}$

$= \dfrac{4\left[-5-3(4)\right]}{-6-7(-5)+5}$

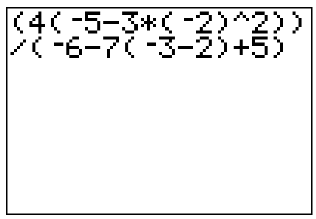
$= \dfrac{4\left[-5-12\right]}{-6+35+5}$

$= \dfrac{4(-17)}{29+5}$

$= \dfrac{-68}{34}$

$= -2$

(4 (-5 – 3 x (-2) ^ 2)) ÷ (-6 – 7 x (-3 – 2) + 5)

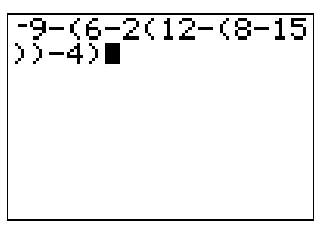


This is a screen shot of what the screen on a TI-84 Plus calculator would look like.

C. $-9-\{6-2[12-(8-15)]-4\}$

$= -9-\{6-2[12-(-7)]-4\}$
$= -9-\{6-2[19]-4\}$
$= -9-\{6-38-4\}$
$= -9-\{-32-4\}$
$= -9-\{-36\}$
$= 27$

- 9 – (6 – 2 (12 – (8 – 15)) – 4)



This is a screen shot of what the screen on a TI-84 Plus calculator would look like.

Use the order of operations to simplify each problem. Show all work!

1. $8 \div 2 \bullet 3^2 - 3 + (-4)^2 - 5$

2. $\dfrac{8(3-4) - 2 \bullet (-8)}{5-3}$

3. $\dfrac{20 - \left[4^2 \div \left(-2 + (-14)\right)\right] + 5}{4^2 - 13}$

4. $98 - \left[(3+5)^2 - \left(4^2 - 1\right)\right]$

Evaluating Expressions

Steps:

1. Substitute the given numbers in for the variables.
2. Simplify using the order of operations.

Example Problems: **Let $x = -2$, $y = \dfrac{-2}{3}$ and $z = \dfrac{7}{4}$**

Non-Calculator Procedures

A. $x + y + z$

$$= -2 + \left(\frac{-2}{3}\right) + \frac{7}{4}$$

$$= \frac{-24}{12} + \left(\frac{-8}{12}\right) + \frac{21}{12}$$

$$= \frac{-32}{12} + \frac{21}{12}$$

$$= \frac{-11}{12}$$

Calculator Keystrokes

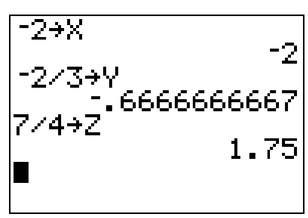
To start these problems on the calculator, you need to store the values for x, y and z into the calculator.

Storing the Values for the Variables:

-2 STO ALPHA STO ENTER

-2 ÷ 3 STO ALPHA 1 ENTER

7 ÷ 4 STO ALPHA 2 ENTER



After these inital steps, the values will be stored for those variables on your calculator. So, for Example A, type in ALPA STO + ALPHA 1 + ALPHA 2 ENTER

To convert the decimal you get to a fraction, press MATH and ENTER twice.

<u>Example Problems:</u> Let $x = -2$, $y = \frac{-2}{3}$ and $z = \frac{7}{4}$

B. $xy + z$

$$= -2\left(\frac{-2}{3}\right)+\frac{7}{4}$$

$$=\frac{4}{3}+\frac{7}{4}$$

$$=\frac{16}{12}+\frac{21}{12}$$

$$=\frac{37}{12}$$

C. $16 - 2xz$

$$= 16-2(-2)\left(\frac{7}{4}\right)$$

$$=16-2\left(\frac{-14}{4}\right)$$

$$=16+\frac{28}{4}$$

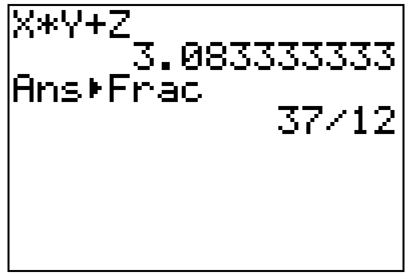
$$=\frac{64}{4}+\frac{28}{4}$$

$$=\frac{92}{4} \quad = 23$$

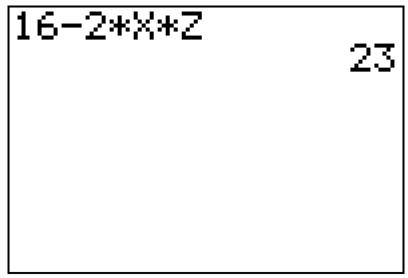
<u>Calculator Keystrokes</u> :

$\boxed{\text{ALPHA}}$ $\boxed{\text{STO}}$ * $\boxed{\text{ALPHA}}$ 1 + $\boxed{\text{ALPHA}}$ 2 $\boxed{\text{ENTER}}$

$\boxed{\text{MATH}}$ $\boxed{\text{ENTER}}$ twice to change to a fraction



16 – 2 * $\boxed{\text{ALPHA}}$ $\boxed{\text{STO}}$ * $\boxed{\text{ALPHA}}$ 2



<u>Evaluate each expression. Show all work!</u>

Let a = 10, b = $\frac{-5}{2}$, c = $\frac{1}{4}$ and d = – 3

5. $4b^2 - ad + ab$

6. $50 - abc$

7. $3abc - 4bc + 6ad^2$

8. $\frac{-1}{2}\left[-5ac+2bd\right]$

<u>Combining Like Terms</u>

<u>Like terms</u> are terms that have the same variable which are raised to the same power. Examples include: $2x$ and $-6x$, $\frac{1}{4}y^2$ and $-12y^2$ or x and $-x$. When combining like terms, you combine the coefficients which are the numbers in front of the variables and keep the variables the same.

Example Problems:

A. $-5x+7x-(-1)+12x-8x$

$=2x+1+12x-8x$

$=14x-8x+1$

$=6x+1$

B. $\frac{4}{5}x^2-8x-\frac{1}{3}x^2$

$=\frac{12}{15}x^2-\frac{5}{15}x^2-8x$

$=\frac{7}{15}x^2-8x$

Simplify each expression by combining like terms. Show all work!

9. $4x-5y+(-3)+9x-7y$

10. $3u+7t+9t+u^2$

11. $\frac{2}{3}x+2y+\frac{1}{2}x$

12. $\frac{3}{4}y+3x^2-\frac{4}{5}y-x^2$

Using the Distributive Property

$$a(b+c)=ab+ac=(b+c)a \qquad or \qquad a(b-c)=ab-ac=(b-c)a$$

Example Problems:

A. $5(3x+2)=5\bullet 3x+5\bullet 2$

$=15x+10$

B. $3x(x-5y)=3x\bullet x+3x\bullet -5y$

$=3x^2-15xy$

C. $-6(2x-4)=-6\bullet 2x-6\bullet -4$

$=-12x+24$

D. $(2x+3y)(-5x)=-5x\bullet 2x+(-5x)\bullet 3y$

$=-10x^2-15xy$

Distribute.

13. $3(2x+1)$

14. $-4(3a-2)$

15. $-(3x-4)$

16. $2y(y+4)$

17. $(5y-3z)(2x)$

18. $(5x^2-3x+2)(-3)$

19. $\left(\frac{-3}{4}\right)(7x^2+8xy-10y^2)$

Distribute then Combine Like Terms

Example Problems:

A. $6x-3(x-4)$

$=6x-3(x)+(-3)(-4)$

$=6x-3x+12$

$=3x+12$

B. $3x-[5x-3(2x-1)]$

$=3x-[5x-6x+3]$

$=3x-[-1x+3]$

$=3x+x-3$

$=4x-3$

C. $3-\{2x-5[2-3x+2(5-8x)]\}$

$=3-\{2x-5[-19x+12]\}$

$=3-\{2x+95x-60\}$

$=3-\{97x-60\}$

$=3-97x+60$

$=-97x+63$

D. $6x^2-[xy-x(x+5y)-x^2]$

$=6x^2-[xy-x^2-5xy-x^2]$

$=6x^2-[-4xy-2x^2]$

$=6x^2+4xy+2x^2$

$=8x^2+4xy$

Distribute then combine like terms. Show all work!

20. $(3x-1)-(-3x-7)-9x$

21. $-1-(-3x-2)+7x-8$

22. $-10k-3+2(5+6k)$

23. $6(-5u+1)-3(4u-12)$

24. $3(4x+6)+7x$

25. $8-5(9+4x)+x$

26. $3m+2(5+m)+5m$

27. $5(8-m)-2(7+7m)$

28. $[3(4x+2)-5]+[4-2(2x-6)-7]$

29. $4\{[6(x-3)+10]-4[3(x+9)-14]\}$

30. $9z^3-[wz-z(w-4z^2)-z^3]$

31. $6r+2t[r-t(r-5t)-r^2]$

First combine like terms, then evaluate. Show all work!

32. $5x+(-y)+8-6x+9y$ if $x = 4$ and $y = -2$

33. $7-x+4y-6x-3y$ if $x = -1$ and $y = 8$

34. $-x-(-y)+(-x)-y-5$ if $x = -3$ and $y = -6$

Translating Expressions, Equations, & Inequalities

Words that mean **Addition**	Words that mean **Subtraction**	Words that mean **Multiplication**	Words that mean **Division**
Plus	Minus	Times	Divided by
Sum	Difference	Product	Quotient
More than	Less than	Of	
Increased by	Decreased by	Multiplied by	
	Subtracted from		

Words that translate to =	Words that translate to >	Words that translate to ≥	Words that translate to <	Words that translate to ≤
Equals	**Is** greater than	**Is** greater than or equal to	**Is** less than	**Is** less than or equal to
Is	**Is** more than	**Is** more than or equal to		At most
		At least		

Example Problems:

Translate each expression, equation or inequality.

A. 12 decreased by the quotient of twice a number and 3. $12-\frac{2x}{3}$

B. 5 less than the sum of 5 and twice a number is less than The sum of x and it's cube. $(2n + 5) - 5 < x + x^3$

C. 2 more than the sum of half a number and 9 is equal to the product of 4 and the same number plus 3. $\left(\frac{1}{2}x+9\right)+2=4x+3$

D. The product of 5 and a number is at most the quotient of the sum of 2 and x, and 9. $5n \le \frac{2+x}{9}$

Translate each expression, equation or inequality.

35. The cube of the sum of x and twice y, decreased by the product of a and b.

36. Ten less than the difference of three and a number n is less than nine.

37. Six more than the quotient of a number and 7 is 4.

Solving Equations & Inequalities

Steps:

1. Distribute and rid the problem of all grouping symbols.
2. Clear any fractions or decimals by multiplying every term by the common denominator.
3. Combine like terms on the same side of the equation.
4. Move the variable to the left hand side of the equation.
5. Add or subtract the constant to get the variable alone.
6. Multiply or divide by the coefficient in front of the variable to solve the equation.

Example Problems:

A. $3a - 5 = -11$

$$\begin{aligned} 3a - 5 &= -11 \\ +5 &= \ \ +5 \\ \hline \frac{3a}{3} &= \frac{-6}{3} \\ \boxed{a = -2} \end{aligned}$$

B. $12 - 4x = x - 3$

$$\begin{aligned} 12 - 4x &= x - 3 \\ -x \ &\ \ -x \\ \hline 12 - 5x &= -3 \\ -12 \ \ &\ \ -12 \\ \hline \frac{-5x}{-5} &= \frac{-15}{-5} \\ \boxed{x = 3} \end{aligned}$$

To check a solution, substitute the answer back into the original equation.
 12 – 4(3) = 3 – 3
 12 – 12 = 0
 0 = 0
Since this is a true statement, x = 3 is a solution.

C. $-12 = \dfrac{-4x}{15} - 10$

$$15\left[-12 = \frac{-4x}{15} - 10\right]$$

$$\begin{aligned} -180 &= -4x - 150 \\ +150 &\qquad\ \ +150 \\ \hline \frac{-30}{-4} &= \frac{-4x}{-4} \\ \boxed{\frac{15}{2} = x} \end{aligned}$$

D. $3(x-4) - 4(x-3) = x + 3 - (x-2)$

$$3x - 12 - 4x + 12 = x + 3 - x + 2$$

$$\begin{aligned} \frac{-x}{-1} &= \frac{5}{-1} \\ \boxed{x = -5} \end{aligned}$$

E. $x(x+12)+36=x^2-3(5x-12)$

$$\begin{aligned}
x^2+12x+36 &= x^2-15x+36\\
\underline{-x^2\qquad} &\quad \underline{-x^2\qquad\qquad}\\
12x+36 &= -15x+36\\
\underline{+15x\qquad} &\quad \underline{+15x\qquad}\\
17x+36 &= 36\\
\underline{-36} &\quad \underline{-36}\\
\frac{17x}{17} &= \frac{0}{17}
\end{aligned}$$

$\boxed{\mathbf{x = 0}}$

F. $3(y-1)-4(y+2)=11-y$

$$\begin{aligned}
3y-3-4y-8 &= 11-y\\
-y-11 &= 11-y\\
\underline{+y\qquad} &\quad \underline{+y}\\
-11 &= 11
\end{aligned}$$

$\varnothing$

(No Solution because this is a false statement)

G. $3a-\left[5-2a+3(a-6)\right]=2+3(4-a)$

$$\begin{aligned}
3a-[5-2a+3a-18] &= 2+12-3a\\
3a-[-13+a] &= 14-3a\\
3a+13-a &= 14-3a\\
2a+13 &= 14-3a\\
\underline{+3a\qquad} &\quad \underline{+3a}\\
5a+13 &= 14\\
\underline{-13} &\quad \underline{-13}\\
\frac{5a}{5} &= \frac{1}{5}\\
\mathbf{a} &= \frac{1}{5}
\end{aligned}$$

H. $9-5(x-3)\ge 14$

$$\begin{aligned}
9-5x+15 &\ge 14\\
24-5x &\ge 14\\
\underline{-24\qquad} &\quad \underline{-24}\\
\frac{-5x}{-5} &\ge \frac{-10}{-5}\\
x &\le 2
\end{aligned}$$

When you divide by a negative, you must reverse the inequality symbol.

I. $5a-3>-9-(4-3a)$

$$\begin{aligned}
5a-3 &> -9-4+3a\\
5a-3 &> -13+3a\\
\underline{-3a\qquad} &\quad \underline{-3a}\\
2a-3 &> -13\\
\underline{+3} &\quad \underline{+3}\\
\frac{2a}{2} &> \frac{-10}{2}\\
\boldsymbol{a} &> \mathbf{-5}
\end{aligned}$$

To check a solution, substitute a number within the conditions of the solution back into the original inequality.
Let a = 0 since 0 > -5, so
5(0) – 3 > - 9 – (4 – 3(0))
0 – 3 > - 9 – (4 – 0)
-3 > - 9 – 4
-3 > - 13
Since this is a true statement, a > -5 is the solution.

<u>Solve the following equations or inequalities.</u>

38. $\frac{-3}{4}=\frac{-1}{8}x$

39. $-4x-9=19$

40. $-8=32-5x$

41. $18=\frac{-x}{32}+20$

42. $\frac{3}{5}x-\frac{1}{10}x=12$

43. $-15=6x+15-10x$

44. $9x-1\le x-25$

45. $-9(x+3)>4x-3$

46. $4x+5(7x-3)=9(x-5)$

47. $-2(6x+3)\le 18-3(16-3x)$

Literal Equations

48. Solve for x: $ax = y$

49. Solve for m: $\frac{m}{n}=\frac{y}{x}$