

We will use these basic concepts in almost every problem. We must understand them.

Elementary algebra

Class notes

Basic Operations, Variable Expressions, and Equations (section 1.4)

Review of Exponents and Order of Operations:

expl 1: For the expression 5^3 , label the parts 5 and 3. What are these numbers called?

expl 2: Write 5^3 as **repeated multiplication** to make sense of it. What is the value of 5^3 ?

expl 3: Calculate 1^7 and 7^1 . How do they differ? Use repeated multiplication to show the difference.

expl 4: Use repeated multiplication to calculate $\left(\frac{2}{5}\right)^3$.

To multiply fractions, multiply the tops and bottoms separately, then simplify if needed.

expl 5: Use order of operations to simplify the following.

a.) $(3+5) \cdot 2$

b.) $3+5 \cdot 2$

c.) $3+(5 \cdot 2)$

How do the parentheses affect your answers?

expl 6: Use order of operations to simplify the following.

a.) $3 \cdot 4^2$

b.) $3[5-3(6+1)]$

PEMDAS

Worksheet: PEMDAS:

Practice using the order of operations including some problems involving variables. The solutions are available.

Review Absolute Value:

expl 7: Simplify.

$$\frac{5 + 2|6 - 3| - 1}{2}$$

PEMDAS

Absolute value is distance to zero on the real number line.

Variables:

Variables play many different roles in algebra. Below are three examples. Deciphering a variable's role helps us know what we are expected to do.

$$4x + 2 = 10$$

$$5y^2$$

$$A = lw$$

All variables represent numbers.

Some variables represent specific numbers while others could be nearly any value.

Some variables show the relationship among numbers in the real world.

expl 8: Simplify.

$$3x + 5x$$

expl 9: Evaluate the following when $x = 2$, $y = 5$, and $z = 7$.

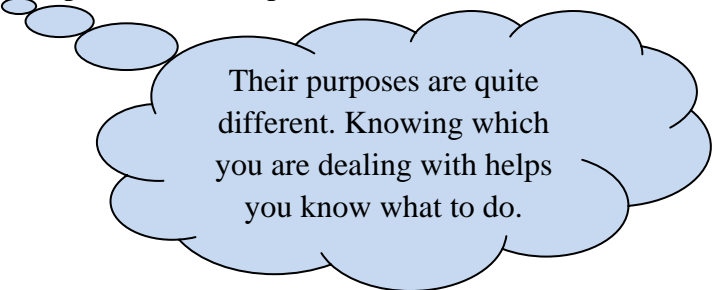
a.) $3x^2 - 4z$

b.) $\frac{2x + y}{3}$

c.) $|3x - 9| + 2$

Equations versus Expressions:

How do equations and expressions differ? Write an example of each and point out the main difference.



Their purposes are quite different. Knowing which you are dealing with helps you know what to do.

What does it mean to solve an equation?

expl 10: Solve the following equation. Check your answer.

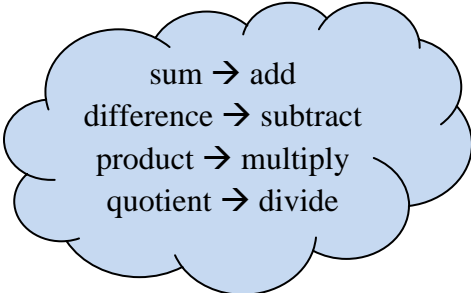
$$3x + 5 = 20$$

Using Variables:

expl 11: Let x represent the unknown number.

Write each **phrase** as an algebraic **expression**.

a.) the sum of a number and 6



sum \rightarrow add
difference \rightarrow subtract
product \rightarrow multiply
quotient \rightarrow divide

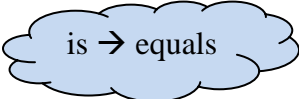
b.) the quotient of 15 and a number

c.) the product of a number and 2, increased by 15

expl 12: Let x represent the unknown number.

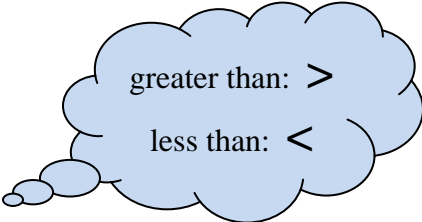
Write each **sentence** as an algebraic **equation or inequality**.

a.) The sum of a number and 6 is 10.



is \rightarrow equals

b.) The quotient of 15 and a number is equal to 3 squared.



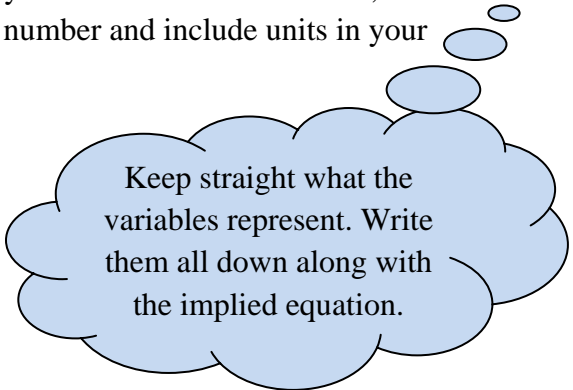
greater than: $>$

less than: $<$

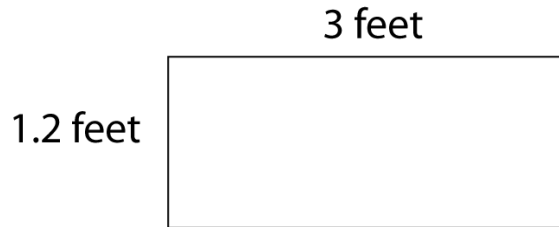
c.) The product of a number and 2, increased by 15, is greater than 45.

Story Problems:

expl 13: The expression $\frac{d}{t}$ represents the rate r (in miles per hour) of a trip where d represents the distance in miles and t represents the time (in hours) it takes. Saint Louis, MO and San Francisco, CA are 2100 miles apart. If it takes Jeff and Marty 32 hours to make the drive, find their rate of travel. Round your answer to the nearest whole number and include units in your answer.



expl 14: The perimeter P of a rectangle is given by the expression $2l + 2w$ where l is the length and w is the width of the rectangle. Find the perimeter of the rectangle to the right.



Worksheet: Things to know about your calculator (Texas Instruments – 82, 83, 85, 86):

A laundry list of things I have found useful over the years. Read it over and try out the stuff it talks about. If you have a TI84, use the instructions for the TI83. If you have a different brand calculator, try to figure out if your calculator has the same functionality.