

8/28/2020

Four basic functions: addition, subtraction, multiplication and division

$$45 + 67 = 112$$

$$45 - 67 = 45 + (-67) = -22$$

If both the same sign add the numbers. If they are opposite signs, then subtract the smaller number from the larger number and use the sign of the larger number.

$$67 - 45 = 22$$

$$132 \times 57 = \\ 132 \times 7 + 132 \times 50 = 924 + 6600 = 7524$$

$$\begin{array}{r} 7 \overline{)6541} \\ \underline{63} \phantom{00} \\ 24 \phantom{00} \\ \underline{21} \phantom{00} \\ 31 \phantom{00} \\ \underline{28} \phantom{00} \end{array}$$

934 R 3

$$934 \frac{3}{7}$$

For basic operations do multiplication and division first. Then do addition and subtraction. Both sets are done left-to-right.

$$7 + 3 - 9 \times 2 \div 3 + 11 = 7 + 3 - 6 + 11 = 10 - 6 + 11 = 4 + 11 = 15$$

Exponents & Roots  
Parentheses

PEMDAS  
Please Excuse My Dear Aunt Sally

Absolute Values:  $|-3| = 3$ ,  $|3| = 3$  done at the level of parentheses

$$\frac{4 \times 5 + 2^3}{11 - 6 \div 2} = \frac{(4 \times 5 + 2^3)}{(11 - 6 \div 2)} = \frac{4 \times 5 + 8}{11 - 6 \div 2} = \frac{20 + 8}{11 - 3} = \frac{28}{8} = \frac{7}{2} = 3 \frac{4}{8} = 3 \frac{1}{2}$$

Fractions

$$\frac{3}{7} + \frac{2}{7} = \frac{5}{7}$$

$$\frac{1}{3} + \frac{1}{6} = \frac{2}{6} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$$

$$\frac{1}{4} + \frac{1}{7} = \frac{7}{28} + \frac{4}{28} = \frac{11}{28}$$

For subtraction, find a common denominator, and then also deal with the signs when adding/subtracting the numerators.

$$\frac{1}{4} - \frac{1}{7} = \frac{7}{28} - \frac{4}{28} = \frac{3}{28}$$

Finding prime factorization: but it will help with finding common denominators.

$$\frac{9}{14} + \frac{11}{36} = \frac{239}{252}$$

$$14 = 2 \times 7$$
$$36 = 2 \times 2 \times 3 \times 3$$

$$LCD = 2 \times 7 \times 2 \times 3 \times 3 = 252$$

Multiply the decimal answer from the calculator by the LCD to get the numerator.

Multiplying and dividing fractions:

$$\frac{4}{7} \times \frac{49}{36} = \frac{4}{1} \times \frac{7}{36} = \frac{1}{1} \times \frac{7}{9} = \frac{7}{9}$$

Division: Flip the second fraction

$$\frac{3}{16} \div \frac{9}{28} = \frac{3}{16} \times \frac{28}{9} = \frac{1}{16} \times \frac{28}{3} = \frac{1}{4} \times \frac{7}{3} = \frac{7}{12}$$

Signs: two negatives make a positive. Odd numbers of negatives are negative.

$$-3 \times 4 = -12$$

$$-3 \times (-4) = 12$$

$$(-2)^2 = (-2)(-2) = 4$$
$$(-2)^3 = (-2)(-2)(-2) = -8$$

Area and volume: rectangles, rectangular solid (box), triangles.

$$A = lw \text{ (rectangle)}$$

$$V = lwh \text{ (box)}$$

$$A = \frac{1}{2}bh \text{ (triangle)}$$

Complex shapes break up into simpler shapes.

Unit conversion: converting feet to inches, and centimeters to meters.

Rounding:

Suppose we want to round the number 14.91642 to:

Round to a whole number:  $14.91642 \approx 15$

Round to the tenth position:  $14.91642 \approx 14.9$

Scientific Notation

Based on powers of 10

$$\begin{aligned}4 &= 4 \times 10^0 \\40 &= 4 \times 10^1 \\400 &= 4 \times 10^2 \\400,000 &= 4 \times 10^5 \\0.4 &= 4 \times 10^{-1} = 4 \times \frac{1}{10} \\0.04 &= 4 \times 10^{-2}\end{aligned}$$

$\# \times 10^n$ , and the # must start with 1-9.

$2.9 \times 10^7$  good!

$0.29 \times 10^8$  bad!!!

$29 \times 10^6$  bad!!!

$330,000,000 = 3.3 \times 10^7$

Large numbers will have positive exponents.

Small numbers will have negative exponents.

$$0.00000513 = 5.13 \times 10^{-6}$$

$$\frac{4.9 \times 10^5}{(7 \times 10^{-2})}$$

Be careful with scientific notation in denominators: need parentheses

Significant digits: non-zero digits in a whole number, or the number of digits after any non-zero number in a decimal.

$330,000,000 = 2$  significant digits.

$0.041300 = 5$  significant

When converting to scientific notation use the correct number of significant digits if it doesn't tell you to round.

3300, 330, 0.033

In a calculator you will often see "E" instead of  $10^n$

$$E10 = 10^{10}$$
$$E - 6 = 10^{-6}$$

Rounding errors in calculator:  $1.3E - 13 \approx 0$

Rate/base/part: dealing with percentages.

25 is what percent of 125?

What is 7% of 434?

Part occurs before the "is"

Percent part is the "rate"

"of" multiplication

Base is the thing that occurs after the "of".

$$P=R*B$$

$$25=x*125$$

$$\frac{25}{125} = x = 0.2$$

Convert to % by multiplying by 100

25 is 20% of 125

$$x = 7\% \times 434$$
$$x = 0.7 \times 434 = 30.38$$