

MATH REVIEW

FRACTIONS:

Definitions:

Numerator – The value above the line in the common fraction.

Example: X/Y , X is the numerator

Denominator – The value below the line in the common fraction.

Example: X/Y , Y is the denominator

Reciprocal – The interchange of the numerator and the denominator.

Example: X/Y , the reciprocal is the Y/X

Adding:

Step 1: find lowest common denominator

Step 2: add numerators

Ex. $2/5 + 3/6$

Find lowest common denominator (always multiply by one so the fractions value doesn't change)

$$\begin{aligned} & [(6/6) * 2/5] + [(5/5) * 3/6] \\ & = 12/30 + 15/30 \end{aligned}$$

Add numerators

$$\begin{aligned} & 12/30 + 15/30 \\ & = 27/30 \end{aligned}$$

Subtracting:

Step 1: find lowest common denominator

Step 2: subtract numerators

Ex. $2/5 - 3/6$

Find lowest common denominator

$$\begin{aligned} & [(6/6) * 2/5] - [(5/5) * 3/6] \\ & = 12/30 - 15/30 \end{aligned}$$

Subtract numerators

$$\begin{aligned} & 12/30 - 15/30 \\ & = -3/30 \\ & = -1/10 \end{aligned}$$

Multiplying:

Step 1: multiply numerators across, and denominators across

Ex. $2/5 * 3/6$

Multiply across

$$\begin{aligned} & 2/5 * 3/6 \\ & = 6/30 \\ & = 3/15 \end{aligned}$$

Dividing:

Step 1: take the reciprocal of the divider (the fraction after the division sign)

Step 2: multiply the numerator and denominators across

Ex. $2/5 \div 3/6$

Take the reciprocal of the divider

$$2/5 \div 6/3$$

Multiply across

$$2/5 * 6/3$$

$$= 12/15$$

$$= 4/5$$

DECIMALS:

Adding:

Step 1: align the decimals

Step 2: add corresponding decimal places

Ex. $1.25 + 10.034$

Align decimals

$$1.25$$

$$\underline{+10.034}$$

Add corresponding decimal places

$$1.25$$

$$\underline{+10.034}$$

$$11.284$$

Subtracting:

Step 1: align the decimals

Step 2: subtract corresponding decimal places

Ex. $10.987 - 5.56$

Align decimals

$$10.987$$

$$\underline{-5.56}$$

Subtract corresponding decimal places

$$10.987$$

$$\underline{-5.56}$$

$$5.427$$

Multiplication:

Step 1: ignore the decimal for now and multiply as normal aligning numbers on the right

Step 2: count the number of values to the right of the decimals

Step 3: place the decimal the same amount of places in from the right

Ex. $10.987 * 1.25$

Multiply

$$10.987$$

$$\underline{x 1.25}$$

$$54935$$

$$219740$$

$$\underline{+ 1098700}$$

$$1373375$$

Count the number of values to the right of the decimal

$$10.987 = 3$$

$$1.25 = 2$$

$$2+3 = 5$$

Place the decimal in the answer

$$13.73375$$

Division:

Step 1: Move the decimal all the way to the right in the divider and move the decimal the same number of spaces to the right in the dividend (add zeros if necessary).

Step 2: Use standard long division techniques to solve

Step 3: Align the decimal in the answer with the decimal in the dividend.

Ex. $15.5 \div 1.268$

Move the decimal all the way to the left

$$1268 \overline{) 15500}$$

Use standard long division

$$\begin{array}{r} 122239 \\ 1268 \overline{) 15500} \\ \underline{1268} \\ 2820 \\ \underline{2536} \\ 2840 \\ \underline{2536} \\ 3040 \\ \underline{2536} \\ 5040 \\ \underline{3804} \\ 12360 \\ \underline{11412} \end{array}$$

Place decimal in the answer aligned with the decimal in the dividend

12.224 (Round to the same decimal as in the original problem)

EXPONENTS:

Properties of Exponents:

$$a^n = a \cdot a \cdot a \cdot a \dots \cdot a \text{ (n times)}$$

$$a^n \cdot a^m = a^{n+m}$$

$$(a^n)^m = a^{n \cdot m}$$

$$a^n \div a^m = a^{n-m}$$

$$a^0 = 1$$

$$a^{-n} = 1/a^n$$

Ex. $7^4 = ?$

$$7^4 = 7 \cdot 7 \cdot 7 \cdot 7 = 2401$$

Ex. $8^2 + 2^6 = ?$
 $8^2 + 2^6 = (8*8) + (2*2*2*2*2*2)$
 $= 64 + 64 = 128$

Ex. $5^2 * 5^4 = ?$
 $5^2 * 5^4 = 5^{2+4}$
 $= 5^6$
 $= 15625$

Ex. $(4^3)^2 = ?$
 $(4^3)^2 = (4^3) * (4^3)$
 $= (4*4*4) * (4*4*4)$
 $= 4^6$
 $= 128$

Ex. $6^4 \div 6^2 = ?$
 $= (6*6*6*6)/(6*6)$
 $= 6*6$
 $= 6^2 = 36$

SCIENTIFIC NOTATION

Standard Scientific Notation Form:

$x.xxx * 10^x$ (where x can be equal to any number)

Converting from Decimals to Scientific Notation:

Step 1: move the decimal so that there is one value to the left of the decimal point

Step 2: multiply the base by 10 to the power of the number of spaces you needed to move the decimal point

- if the decimal is moved to the left ie. 324 becomes 3.24 the exponent is positive
- if the decimal is moved to the right ie. .0324 becomes 3.24 the exponent is negative

Ex. Convert to Scientific notation
 $6254.07 = 6.25407 * 10^3$

Ex. Convert to Scientific notation
 $.02576 = 2.576 * 10^{-2}$

Converting from Scientific Notation to decimal form:

Step 1: move the decimal the in the base the power that 10 is raised to

- If the power is negative the decimal moves to the left (add zeros as necessary)
- If the power is positive the decimal moves to the right (add zeros as necessary)

Ex. Convert to Decimal notation
 $6.897 * 10^4 = 68970.0$

Ex. Convert to Decimal notation
 $5.546 * 10^{-3} = 0.005546$

ALGEBRA:

Order of Operations:

- 1) Complete all operations inside parentheses () and brackets []
- 2) Complete any operations involving exponents
- 3) Complete all multiplication and division operations from left to right.
- 4) Complete all addition and subtraction from left to right.

Ex. $4 + (9 \cdot 2) - 10 =$
 $= 4 + (18) - 10$
 $= 4 + 18 - 10$
 $= 12$

Solving for an unknown

Points to remember

- What you do to one side MUST be done to the other side
- Order of Operation still applies

Ex. $5x + 4 = 14$
 $5x = 10$
 $x = 2$

Ex. $2(x - 4) = 3(x + 4)$
 $2x - 8 = 3x + 12$
 $-8 - 12 = 3x - 2x$
 $-20 = x$

Ex. Solve for W: $X = (Y \cdot Z)/W$
 $WX = (Y \cdot Z)$
 $W = (Y \cdot Z)/X$

GEOMETRY:

Pythagorean Theorem

$$a^2 + b^2 = c^2$$

- Where a and b are the sides of a triangle and c is the hypotenuse

Ex. If $a = 3$ and $c = 5$ what is the length of side b?

$$3^2 + b^2 = 5^2$$
$$9 + b^2 = 25$$
$$b^2 = 25 - 9$$
$$b^2 = 16$$
$$b = 4$$

Area of a Rectangle:

Width * Height

Ex. Find the area of a 3 x 4 rectangle

$$3 \cdot 4 = 12$$

Volume of a Rectangle:

$$\text{Base} \cdot \text{Height} \cdot \text{Width}$$

Ex. Find the area of a cube with height 6, base 4 width 4

$$4 \cdot 6 \cdot 4 = 96$$

Area of a Circle:

$$\text{Area} = \pi \cdot \text{radius}^2$$

Ex. Find the area of a circle with diameter of 8

(radius = $\frac{1}{2}$ (diameter))

$$\begin{aligned} A &= 3.14 \cdot 4^2 \\ &= 3.14 \cdot 16 \\ &= 50.24 \end{aligned}$$

Volume of a Cylinder:

$$\text{Volume} = \text{Area} \cdot \text{Height} = \pi \cdot \text{radius}^2 \cdot \text{height}$$

Ex. Find the volume of the cylinder with the height of 4 and radius of 2

$$\begin{aligned} V &= (3.14 \cdot 2^2) \cdot 4 \\ &= (3.14 \cdot 4) \cdot 4 \\ &= (12.56) \cdot 4 \\ &= 50.24 \end{aligned}$$