Mathematics 9
Section 3.6 – Order of Operations with Rational Numbers

Even when we deal with the order of operations with rational numbers, we still follow the same basic principles that you learned in the past.

The helpful saying BEDMAS still applies, and will continue to apply throughout the rest of your math education.

A quick refresher:

B → BRACKETS

Any brackets with more than one number inside must be fully evaluated first. Since we use curved brackets to show a specific integer, (−5), we often (but not always) use square brackets to group terms.

$$[(+9)-(-2)]\times(-3)$$

If there are brackets within brackets, we always work from the inside out.

$$((2+23-7)\times 2)\div 4$$
$$((18)\times 2)\div 4$$
$$36\div 4$$
$$9$$

E → Exponents

Exponents can also be referred to as "Powers". We will often say "four to the power of three". This is describing an exponent, which has the following components:

$$\text{Base}^{\text{Exponent}} = 4^3$$

Exponents tell us how many times to multiply the base by itself.

$$4^3 = 4\times 4\times 4 = 64$$

D → DIVISION

M → MULTIPLICATION

When it comes time to evaluate all of the division and multiplication operations, we work from LEFT TO RIGHT through the expression. So a MULTIPLICATION operation could be done before a DIVISION depending on which came first in an expression.

A → ADDITION

S → SUBTRACTION

When it comes time to evaluate all of the addition and subtraction operations, we work from LEFT TO RIGHT through the expression. So a SUBTRACTION operation could be done before an ADDITION, depending on which came first in an expression.

Other useful information to keep in mind:

When we write an expression as a fraction, the dividing bar acts as a Grouping Symbol, exactly like brackets. Therefore, the entire Top & Bottom must be fully evaluated BEFORE doing the final DIVISION.

$$\frac{(7-4)\times 2}{5-3} = \frac{6}{2} = 3 \qquad 6 \div 2 \qquad [(7-4)\times 2] \div (5-3)$$

Be careful with your negatives!!! If you end up with a negative number, be sure to keep it in brackets!!

$$4((-9)-(-8))\times(-4)$$
$$4((-9)+8)\times(-4)$$
$$4(-1)\times(-4)$$
$$(-4)\times(-4)$$
$$=16$$

Example:

$$\left(-\frac{2}{3}\right) \div \left[\frac{1}{4} - \left(-\frac{1}{2}\right)\right] \times \frac{1}{3}$$

START WITH THE SQUARE BRACKETS, SIMPLIFY EXCESS NEGATIVES

$$\left(-\frac{2}{3}\right) \div \left[\frac{1}{4} + \frac{1}{2}\right] \times \frac{1}{3}$$

FIND COMMON DENOMINATOR → $\frac{1}{4} + \frac{1}{2 \times 2}^{\times 2} = \frac{1}{4} + \frac{2}{4}$

ADD FRACTIONS $= \frac{3}{4}$

$$\left(-\frac{2}{3}\right) \div \frac{3}{4} \times \frac{1}{3}$$

DO DIVISION FIRST (KISS & FLIP)

$$-\frac{2}{3} \times \frac{4}{3} = -\frac{8}{9}$$ MULTIPLY

$$-\frac{8}{9} \times \frac{1}{3} = \frac{-8}{27}$$

P. 140 4ac, 7ab, 8b, 12, 13ac, 17, 21

Homework: pg.