Mathematical Operations: Division

**Dividing Numbers**

Rule #1: If you are dividing two numbers that have the same sign (++ or ), then the result (called the “quotient”) will be positive.

Rule #2: If you are dividing two numbers that have different signs (+ or +), then the result will be negative.

Rule #3: If you are dividing two numbers, you can write the problem as fraction, which can be simplified.

Rule #4: If you are simplifying a fraction, then you must divide both top and bottom (“numerator” and “denominator”) by the same value.

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| **Example 1** | **Example 2** | **Example 3** | **Example 4** |
| Simplify.  *(as a fraction: 18/6)*  *I know that 186=3, but, if I didn’t, I could reduce a fraction to figure it out:* | Simplify.  *(as a fraction: -4/-20)*  *Since the smaller number is on top of the fraction (before the ), I know that the answer’s absolute value will not be bigger than 1:* | Simplify.  *(as a fraction: -12/3)* | Simplify.  *(as a fraction: 7/-14)*  *Since the smaller number is on top of the fraction (before the ), I know that the answer’s absolute value will not be bigger than 1:* |
| 1. Simplify. | 2. Simplify. | 3. Simplify. | 4. Simplify. |
| 5. Simplify. | 6. Simplify. | 7. Simplify. | 8. Simplify. |

Rule #5: If you are dividing a variable term by a number, then the numbers divide while the variable stays the same.

Rule #6: If you are dividing a variable term by a variable that doesn’t match (x with y, a with b…), then the variables stay the same without combining, while the numbers in front (called “coefficients”) divide.

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| **Example 5** | **Example 6** | **Example 7** | **Example 8** |
| *(15 can’t be divided by 6, but both of them can be divided by 3, so…)* |  |  |  |
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Rule #7: If you are dividing a variable term by a matching variable, then the exponents will subtract from each other () without changing the coefficient(s) in front.

Rule #8: If you subtract the variable exponents and the result is positive, then that variable belongs on top of the fraction, and the exponent stays positive.

Rule #9: If you subtract the variable exponents and the result is negative, then that variable belongs on the bottom of the fraction, but the exponent changes from negative to positive.

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| **Example 9** | **Example 10** | **Example 11** | **Example 12** |
| *(same as )*  *(exponent was positive,*  *so x4 goes on top)* | *(exponent was negative,*  *so goes on bottom)* | *(exponent was negative,*  *so goes on bottom)* | *(negative exponent to bottom ,*  *positive to top )* |
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Rule #9: If you are dividing a number from a group, then you must divide the number from every term in the group.

Rule #10: If you cannot divide a number from every term in the group, then you cannot divide by that number – look for a smaller number that can divide from all involved terms.

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| **Example 13** | **Example 14** | **Example 15** | **Example 16** |
| *(5 divides from both, so…)*  *Another way to think of it is as a backwards multiplication table. You know the inside, so figure out what multiplied to make it.*   |  |  |  | | --- | --- | --- | |  | *?* | *?* | | 5 | 5x | +20 | | *(-2 divides from both, so…)*  *or:*   |  |  |  | | --- | --- | --- | |  | *?* | *?* | | -2 | 4b | -36 | | *(-6 doesn’t divide from both -21 & -12, so I need to find a number that divides from them all. -1 will, so…)* | *(42 doesn’t divide from both 14r & 42, but 7 will divide from all of them, so…)* |
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