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|  | **COUNTING NUMBERS**  *1, 2, 3, … n* | **WHOLE NUMBERS** counting numbers***n***and ***0*** *0, 1, 2, 3 … m* | **FRACTIONS** whole numbers***m****,* ***n*** (***n*** *≠ 0*) and their divisions    *, , , , …* | **RATIONAL NUMBERS** (positive) fractions, their reflections across *0* (negative fractions) *… , , , , , , , …* |
| **ADDITION  *a + b = c******b*** added onto***a*** gives you ***c******a***and***b***can be  **any two numbers** | ***c > a*** [sums will***always***be greater] | if***b = 0****,* then***c = a*** *0 is the identity element.*  if ***b ≠ 0****,* then ***c > a****,* [sums will be greater] | if***b = 0****,* then***c = a*** *0 is the identity element.*  if ***b ≠ 0****,* then ***c > a****,* [sums will be greater] | if***b = 0****,* then***c = a*** *0 is the identity element.*  if***b ≠ 0****,*  if***b > 0****,* then***c > a*** [sums will be greater]  if***b < 0****,* then***c < a*** [sums will be less]  if***b = –a****,* then***c = 0***sums will be *0*. [*additive inverse*] |
| **MULTIPLICATION  *a ∙ b = d******a***copies of***b***gives you***d******a***and***b***can be  **any two numbers** | if***a > 1****,* then ***d > b***  if ***a = 1****,* then ***d = b***  *1 is the identity element.* | if ***a = 0****,* then ***d = 0***  if***a > 1****,* then ***d > b***  if***a = 1****,* then ***d = b*** *1 is the identity element* | if ***a = 0****,* then ***d = 0***  if ***a > 1****,* then ***d > b***  if ***a < 1****,* then ***d < b***  if ***a = 1****,* then ***d = b*** *1 is the identity element.*  if ***a =*** then***d = 1***  [*multiplicative inverse*] | if ***a = 0****,* then ***d = 0***  ***sign*** *[positive or negative]:*  if ***a > 0****,* then ***d*** and ***b***have the same sign  if ***a < 0****,* then ***d*** and ***b***have opposite signs  ***absolute value*** *[distance from 0]:*  if **|*a| > 1****,* ***|d| > |b|***  products will be *farther from* *0*  if **|*a| < 1****,* ***|d| < |b|***  products will be *closer to* *0*  if **|*a| = 1****,* then ***|d| = |b|*** *1 is the identity element.*  if **|*a| =***then***|d| = 1***  [*multiplicative inverse*] |
| **SUBTRACTION** (from addition) ***c* – *a = b*** means ***b*** is the number so that ***a* + *b = c*** | *Make sure* ***c > a****,*then ***b***will be the number added onto***a*** that gives you***c*** | | | *For* ***any numbers****,* ***a****,* ***b****, and* ***c****,* ***b***will be the number added  onto***a***that gives you***c*** |
| **DIVISION** (from multiplication)    **= *b*** means ***b*** is the number so that ***a ∙ b = d*** | *Make sure* ***d*** *is a multiple of* ***a****.*  Then ***b*** will be the number such that ***a*** copies of ***b*** gives you ***d****.* | *Make sure* ***d*** *is a multiple of* ***a******AND*** *that* ***a ≠ 0****.* Then ***b*** will be the number such that ***a*** copies of ***b*** gives you ***d****.* | *Make sure* ***a ≠ 0****. Then* ***d****,* ***a****, and* ***b*** *can be* ***any numbers—including fractions****.* (It is not necessary that ***d*** be an integer multiple of ***a***.) ***b*** will still be the number such that ***a*** copies of ***b*** gives you ***d****.*  *(Since* ***a****,* ***b****, and* ***d*** *can all be fractions, “****a*** *copies of* ***b*** *gives you* ***d****” has to be appropriately interpreted for fractions.)* | |