Issues with Integers? Self-Help Guide!

Dividing Integers

Division is the inverse operation of multiplication. If $3 \times 4 = 12$, then $12 \div 4 = 3$. Rather than return to a conceptual understanding of division, this connection to multiplication will be used.

Example #19: $(-12) \div 4 = -3$

If $(-3)(4) = -12$, then $(-12) \div 4 = -3$

(See Example #15 – Multiplication of Integers)

Example #20: $12 \div 4 = 3$

If $(3)(4) = 12$, then $12 \div 4 = 3$

(See Example #16 – Multiplication of Integers)

Example #21: $(-12) \div (-4) = 3$

If $(3)(-4) = -12$, then $(-12) \div (-4) = 3$

(See Example #17 – Multiplication of Integers)

Example #22: $12 \div (-4) = -3$

If $(-3)(-4) = 12$, then $12 \div (-4) = -3$

(See Example #18 – Multiplication of Integers)

Based on the examples shown above as well as additional examples that could be produced, when integers with the same sign are divided, the answer is positive. When integers with different signs are divided, the answer is negative. The "rules" are the same as those generated in multiplication of integers.

Operation	Signs		Sign of Answer
Division	Same	$+, +$ $-, -$	$+$
Division	Different	$+, -$ $-, +$	$-$

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Dividing With Zero

Division involving zero (0) should also be considered. It was not necessary to consider addition or subtraction with zero. Zero or "nothing" added to or subtracted from any real number would not change the value of that real number. Multiplication involving zero (0) was not addressed earlier as the outcome is not affected by the sign of the number being multiplied by zero. Recall that any number multiplied by zero (0) equals zero (0). Also note that zero has no sign; it is neither positive nor negative.

To examine division involving zero (0), again recall that division is the inverse operation of multiplication.

Example #23: $0 \div (-4) = 0$

If $(0)(-4) = 0$, then $(0) \div (-4) = 0$

Zero multiplied by any number is always zero.
Therefore zero divided by any number
(other than zero) equals zero.

Example #24: $(-4) \div 0$ = Undefined

Consider (what number?)$(0) = -4$

There is no number when multiplied by zero
that will produce a number other than zero.
Therefore division by zero is undefined.

Additional Note: $0 \div 0$ does *not* equal 0 or 1. Division *by* zero is undefined. In more advanced levels of mathematics, division by zero can take on new meaning.