Signs and Math Operations

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FIRST: Learn Signs with Multiplication/Division

RULE 1: If two numbers have **like** (same) signs, the answer is **positive.**

Multiplication

Ex 1: $(+2)(+1) = (+2)$ simplifies to: $2 \cdot 1 = 2$

Ex 2: $(-2)(-1) = (+2)$ simplifies to: $-2(-1) = 2$

A number with no sign means it is positive. Also, the • symbol optionally replaces the parentheses.

Division

Ex 1: $\frac{(+2)}{(+1)} = (+2)$ simplifies to: $\frac{2}{1} = 2$

Ex 2: $\frac{(-2)}{(-1)} = (+2)$ simplifies to: $\frac{-2}{-1} = 2$

The leading parenthesis (-2) is removed since there is another parenthesis to the right of -2 which indicates multiplication. That other parenthesis (-1) however **must** stay.

RULE 2: If two numbers have **unlike** (opposite) signs, the answer is **negative.**

Multiplication

Ex 1: $(-2)(+1) = (-2)$ simplifies to: $-2 \cdot 1 = -2$

Ex 2: $(+2)(-1) = (-2)$ simplifies to: $2(-1) = -2$

Remove unnecessary parenthesis and + signs wherever you can. The extra parentheses and + signs are used here to explicitly show the rules of multiplication and division with positive numbers. But you should simplify as shown on right.

Division

Ex 1: $\frac{(+2)}{(-1)} = (-2)$ simplifies to: $\frac{2}{-1} = -2$

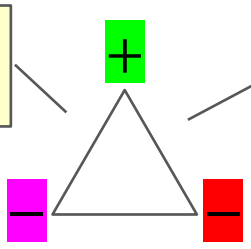
Ex 2: $\frac{(-2)}{(+1)} = (-2)$ simplifies to: $\frac{-2}{1} = -2$

It does not matter which number has the negative sign, the answer is still negative.

Multiplication/Division Memory Aids

- "***Like*** *+*" OR "*We* ***like positive***" OR "***Like*** *signs give* ***positive*** *results*"
- "***Dislike*** *−*" OR "*We* ***dislike negative***" OR "***Unlike*** *signs give* ***negative*** *results*"

OPPOSITE SIGNS TRIANGLE
Only use this for multiplication and division.



Multiply/divide 2 adjacent signs to get sign of answer.

- Start anywhere.
- Go clockwise or counterclockwise.

Ex 1: $(+)(-) \Longrightarrow -$ as does $(+)(-) \Longrightarrow -$

Ex 2: $(-) \div (-) \Longrightarrow +$ as does $(-) \div (-) \Longrightarrow +$

Continued ↗

SECOND: Learn Signs with Addition/Subtraction

PRELIMINARY DISCUSSION: Format of an Addition/Subtraction Problem

- Adding and subtracting signed numbers can be confusing because the format of problems may vary.
- It can be difficult to know if you should add or subtract. It is simpler to **first reformat the problem by removing extra parenthesis and + signs.** Then "combine" the two numbers using Rule 1 or 2.

Ex 1: $(+2)+(+1)=+3$
$2+1=3$

Leading parenthesis and + included here but are not required.

Recall that parenthesis means multiplication. Also, $+(+)\Longrightarrow +$. Therefore we can remove parenthesis around the $(+1)$ and reformat the original problem as $2+1=3$.

Ex 2: $(-2)-(-1)=-1$
$-2+1=-1$

Reduce 3 signs down to 2. Also, remove leading parenthesis. Now simpler to solve.

Since $-(-)\Longrightarrow +$, remove parenthesis around the (-1) and reformat the original problem as $-2+1=-1$.

RULE 1: If two numbers have the **same** signs, **add** the numbers and the answer will have the **same** sign.

*Combine with **Addition***

Ex 1: $(+2)+(+1)=+3$ simplifies to: $2+1=3$

Ex 2: $(-2)+(-1)=-3$ simplifies to: $-2-1=-3$

Ex 3: $(-2)-(+1)=-3$ simplifies to: $-2-1=-3$

Always, reduce 2 consecutive signs down to 1 sign by *multiplying* the signs.

Ex 1: **Add** two positives, keep positive as answer.

Ex 2 and 3: **Add** two negatives, keep negative as answer.

Ex 3: Multiply 2 consecutive signs to reformat and simplify: $-(+1)\Longrightarrow -1$. Then, since both signs are negative $-2-1$, **add** the two numbers and keep negative as answer.

RULE 2: If two numbers have **opposite** signs, **subtract** the numbers and the answer will have the sign of the **bigger** number.

*Combine with **Subtraction***

Ex 1: $(+2)-(+3)=-1$ simplifies to: $2-3=-1$

Ex 2: $(-2)+(+1)=-1$ simplifies to: $-2+1=-1$

Ex 3: $(-2)-(-1)=-1$ simplifies to: $-2+1=-1$

Ex 3: Multiply 2 consecutive signs to reformat and simplify: $-(-1)\Longrightarrow +1$. Then, since the signs are opposite $-2+1$, **subtract** the two numbers and keep sign of bigger number. The bigger number is -2 so answer has a $-$ sign.

Ex 2: Multiply 2 consecutive signs to reformat and simplify: $+(+1)\Longrightarrow +1$. Then, since signs are opposite $-2+1$, **subtract** the two numbers and keep sign of bigger number. The bigger number is -2 so answer has a $-$ sign.