Name:_____

The Bracket Method: A New Approach to Algebra **Lesson 1.1**

No More Double Signs

Lesson 1

In life, and in math, everything is either positive or negative (up or down, increase or decrease, good or bad, forward or backward). The first thing we must learn to do is to dump the idea of double signs. It will make your math life a lot easier. If your middle school worksheets looked like some of the examples below, this short chapter will help break the habit of double signs: one sign, and one sign only!

Example 1:

$$5 - {}^{-}7 + 15 + {}^{-}8 - {}^{+}16 + 17$$

The Simple Rule for Double Signs

2 Negative Signs always creates a positive (make a plus sign with your ***2*** fingers)

- - = +

1 Negative can never create positive: stays negative (try making a plus sign with one finger!)

+ - = -

- + = -

0 Negative Signs, obviously stays positive (why would you change it?)

+ + = +

Technically they are the multiplication rules

$$5 + 7 + 15 - 8 - 16 + 17$$

▶ V-Notes: this symbol denotes the next section is on the Video Notes. Log on to the teacher website, and press the *Video-note link* for each lesson.

Example 2:

$$18 - 9 + {}^{-}68 + 25 - 98 - {}^{-}8 - {}^{+}89$$

Example 3:

$$-32 - {}^{+}65 - 90 - {}^{-}61 + 17$$

A "+", or "-" sign can mean many things; create a list of real life words for both signs:`

"+": positive, plus, add, up, _____

_____

"-": negative, subtract, minus, down, _____

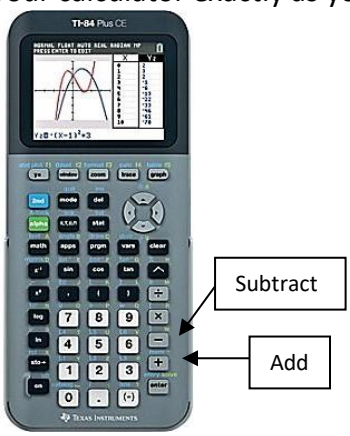
_____

Name:_____

The Bracket Method: A New Approach to Algebra **Lesson 1.2**
No More Double Signs
Worksheet 1

Circle all double signs and replace with one sign, then punch the problem in your calculator exactly as you see it!

Calc. Note
The colored buttons on your calculator are math operations (add and subtract). Use these buttons only! Do not touch the negative sign if you want to add or subtract!

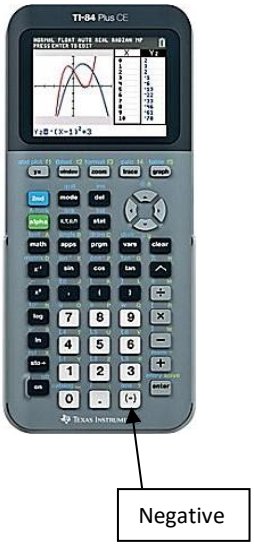


1: $51 + {}^{-}36 - 46 + 71 + {}^{-}26$

2: $15 + 62 - {}^{+}18 - {}^{-}12 - 6$

What happens when the first number is "-"? You must tell the calculator the starting point is negative! The only time you use the "negative sign" when adding or subtracting is to tell the calculator the first number is negative.

Calc. Note
The negative (-) button is only used to tell the calculator the starting point of an addition or subtraction problem is negative. If the first number is negative, use this button.



3: $-32 - {}^{+}65 - 90 - {}^{-}61 + 17$

4: $-28 - 18 + 92 + {}^{-}28 + {}^{-}65$

5: $-120 - 85 + {}^{-}62 - {}^{+}24 - 82$

6: $18 - 9 + {}^{-}68 + 25 - 98 - {}^{-}8 - {}^{+}89$

7: $87 - {}^{-}68 + 54 + {}^{-}8 - {}^{-}12 - {}^{+}37$

8: $-61 + {}^{-}72 - 6 - {}^{-}35 - {}^{+}74$

The Big Ugly (TBU): $-125.89 + {}^{-}95.32 + 58.6 - {}^{-}71.6 + 36.9 - 17.68 - {}^{+}85.13 + 98.2 - {}^{-}84.2$

Circle the Sign Mistake

10: $51(+\ {}^{-})36 - 46 + 71(+\ {}^{-})26$

$51 - 36 - 46 - 71 - 26$

11: $15 + 62(-\ {}^{+})18 - {}^{-}12 - 6$

$15 + 62 - 18 - 12 - 6$

12: $18 - 52(+\ {}^{-})53 - {}^{-}12 - 97(+\ {}^{-})31$

$18 - 52 + 53 + 12 - 97 + 31$

Name:_____

The Bracket Method: A New Approach to Algebra **Lesson 1.3**
No More Double Signs
Worksheet 2

Everything in math is either positive or negative: the sign tells (1) if it is positive or negative; and (2) whether to add or subtract when combining. No more "5 + -10" or "6 - +7". A number is either + or –!

Write the following real-life scenarios as a number with the *one* appropriate sign.

_____ 1: balance of your checking account is $134 _____ 2: write a check for $103

_____ 3: you sell $350 worth of junk at a garage sale _____ 4: the fence must be 7 feet longer

Write the following real-life scenarios as an expression with the *one* appropriate sign; then solve

5: the temperature drops by 16 degrees, then falls another 6 degrees

_____ = _____

6: you lose 5 points for not writing your name, but get the extra credit for 2 extra points

_____ = _____

7: 60 students left the concert early, but 23 students came in late

_____ = _____

8: "$20 in your pocket"; buy a shirt for $5, socks for $2, borrow $1 from a friend

_____ = _____

A little tougher: remember one sign for each number.

9: Starting temperature is 67 degrees; the temperature rises 15 degrees at noon, then goes up 8 more degrees by dinner time; the temperature then drops 19 degrees at sundown, and decreases another 5 during the night.

_____ = _____

10: The business account had a starting balance of $1340. You write a check for $245; then you take $160 out at an ATM; make a deposit for $378; and finally, you write another check for $29.

_____ = _____

Name:_____

The Bracket Method: A New Approach to Algebra
No More Double Signs
Worksheet 3

Fraction Time: Get rid of double signs; then use your calculator to find the answer; put the answer as a fraction.

1: $\frac{3}{5}+\frac{7}{9}-\frac{-1}{4}+\frac{4}{7}+\frac{-6}{7}$

12: $-\frac{3}{5}-\frac{+1}{8}-\frac{-3}{4}+\frac{-5}{6}+\frac{3}{7}$

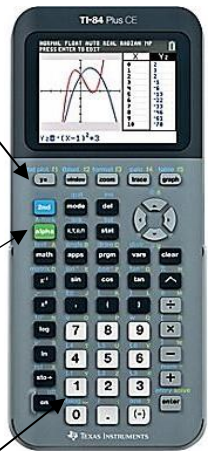
13: $\frac{3}{5}+\frac{-7}{9}-\frac{+1}{4}+\frac{4}{7}-\frac{-6}{7}$

Calc. Note

If you are not good with fractions, or just lazy like most of us, many calculators have a fraction button (or function). On most TI's, fraction input is done by pressing the following buttons:

[Alpha (green)], [Y=], [1]

(use the ▶ to move to the next level of the fraction)



Speak Geek
Commutative Property: Do you see the "**Co"** in the word Commutative?
Remember ***Co*** is "change order". You can change the order of an addition (or subtraction) problem, without changing the final answer.

Prove the Commutative property by going through the following examples. **a & b are the same problem, just a different order. Put both in the calculator; do you get the same answer?**

4a: -32 - 65 – 90 + 61 + 17

4b: 61 – 32 + 17 – 65 – 90

5a: -120 + 85 - 62 + 24 – 82

5b: 85 – 62 - 82 + 24 – 120

Commutative Property mistake: they switched the order but messed up the signs; *circle the sign mistakes*?

6a: -120 – 85 + 62 - 24 + 82

6b: -85 + 62 + 82 + 24 -120

7a: -14 + 75 - 12 - 34 + 45

7b: 45 – 12 + 34 – 75 + 14

8a: -15 – 5 + 82 - 24 + 59

8b: -24 - 15 + 59 + 5 + 82

Name:_____

How to Bracket

Lesson 2

The first, major difference, between the Bracket Method and the old PEMDAS method is "bracketing terms". In the PEMDAS method, students have to search the entire mathematical expression for six separate "operations"; performing one at a time (if possible). In the bracket method, students are taught to sequentially break an expression down into separate terms. There is only one rule, and it never changes.

$$5x^2 - (3 - x) + (-6) - 2(3x) + 6(3x^2 - 5)$$

The Simple Rule for Bracketing

Start at the beginning of the math expression and look for the first "+" or "-" sign *not* in parenthesis. That sign marks the end of one term and the beginning of another. (That sign is included in the next term; not the previous one). Continue finding the next "+" or "-" sign not in parenthesis until you reach the end of the expression.

$$\overbrace{5x^2}\ \overbrace{- (3 - x)}\ \overbrace{+ (-6)}\ \overbrace{- 2(3x)}\ \overbrace{+ 6(3x^2 - 5)}$$

Common Mistakes

Below are the common mistakes to look for.

$$\overbrace{5x^2}\ \overbrace{- (3 - x)}\ \overbrace{+ (-6)}\ \overbrace{- 2(3x)}\ \overbrace{+ 6(3x^2 - 5)}$$

Never stop a bracket in the middle of a sign. The sign belongs to the next term

Never stop a bracket after a sign; always before it. That sign belongs to the next term!

Never stop a bracket inside the parenthesis. These signs are part of the term.

▶ V-Notes

Example 1:

$5(3x) - 7(-2x) + 4(3x - 9) + 2x(3)$

Example 2:

$-5x + (7x - 8) + 4x^2 - 18(x)(-4) - (-x^3)$

Name:_____

How to Bracket

Worksheet 1

Bracketing Terms: the first step to the bracket method is to be able to "bracket the terms" in an expression

What is the rule for bracketing:

_____

_____

Bracket the following expressions

1: $5x^2 – 6(3x) + 5y(8x) - 17$

2: $-6x(4y) – 7x(2y-7t) + 6z – 8(5) + 19(-t)$

3: $-2(5x) + 6(2x-7+8y) + 9(3)(-7)$

4: $6x2(4x) – 2(5y)(-6)(-9y) – 6t – 7t^3 + 2$

5: $-5 + 6y – (5)(-8x)(6y) - 8t(-6x)(3y4) – 4(-7x) – (-x)$

Don't panic, stick with your rules!

6: $5\sqrt{6} + \sqrt{7} - 3x - 8\sqrt{7x} - (2!)(6x - 5y)$

7: $5x(7y) - 6x^2 + \sin 6x - \cos(3x - 9)$

TBU: $-6(5x) + 6x(6y)(-6) – (4x +5-7y) – 8(4)(-6) + 5x – 6(-x)(-y) + 4 – 6(-8) – 2 + 9x(-3x)(-6x)$

How well have you trained your eyes? *Without bracketing*, write the number terms in each expression?

_____8: $5x(-40) – 7(-3) – (3x-4) – (3-6y)$

_____9: $4(3x)(4y)(-5z) – 2(3) – (53y) – 2(-5)$

_____10: $-6(3x)(-6y) – 6x – 6(4x-7) - 6(7)$

_____11: $-5x(7y)(-6) – 2x^2 + 5(-3x-2y^2) – x(5y) + (-t)$

Speak Geek
Expression: numbers and/or variables put together in a mathematical sentence with + or – signs (no equal sign).
Term: a part of a mathematical expression or equation separated by + or – signs.

Name:_____

Mash Multiplication

Lesson 3

( ) are a visual hint that there is a multiplication within the term. There are only two types of multiplication in algebra. The first type is just "straight up" multiplication. We call it "Mash". Multiplication is the easiest operation in algebra: there are no "rules", just put it all together.

Buzz Word: "Mash"

Mash means Multiply

"Mash" is a Visual Cue

When numbers or variables are mashed together (no sign between them), think "mash potatoes"

Think **Mash Potato** Bowl:

- Throw everything in a pile
- No rules – everything in
- Create a potato bowl (new term)
- Mash *all* numbers on the calculator (not separate problems; one line)

Example 1: $4(5x)(6y)(5z)$

600xyz

Multiply is Mash

Step 1: Mash the numbers (1 big pile)

4*5*6*5=600

Step 2: Throw in the peas, corn,and gravy (the variables) into the pile

xyz

Example 2: $4(\frac{5}{3}x)(y)(2t)$

$\frac{40}{3}xyt$

Multiply is Mash

Step 1: Mash the numbers (1 big pile)

$4 * \frac{5}{3} * 2 = \frac{40}{3}$

Step 2: Throw in the peas, corn, and gravy (the variables) into the pile

xyt

Name:_____

Mash Multiplication

Notes 1: Mash is Multiply

V-Notes

Mashing Negatives: There is no reason to put negatives in your calculator.

The basic multiplication rules:

-3(2) = -6 ⟶ 1 negative is equal to a negative

-3(-1) = 3 ⟶ 2 negatives is equal to a positive

How about these questions?

-1(-1)(-1)(-1)(-1)(-1) ⟶ _____…why?_____

-1(-1)(-1)(-1)(-1)(-1)(-1) ⟶ _____…why?_____

The Simple Rule for Mashing/Multiplying Signs

Even number (count by 2) of negatives will always have a positive (+) answer
Odd number of negatives (one extra negative sign) will always have a negative (-) answer.

Remember the "Double Signs" rules: Two negatives create a positive!
*Only count negatives, don't worry about positives; they don't affect the answer

Buzz Phrase: Every two negatives, is a positive

Example 1: $4(-5x)(6y)(-2z)$

Do not type in negatives; you already know the answer is +

Mash is Multiply

Step 1: Count (Mash) negative signs
2 negatives: answer is positive
Step 2: Mash the numbers (1 big pile)
4*5*6*2=240
Step 3: Throw in the corn, peas, and gravy (the variables) into the pile
xyz

Example 2: $-(-5x)(6y)(-2z)$

Do not type in negatives; you already know the answer is -

Mash is Multiply

Step 1: Count (Mash) negative signs
3 negatives: answer is negative
Step 2: Mash the numbers (1 big pile)
5*6*2=60
Step 3: Throw in the corn, peas, and gravy (the variables) into the pile
xyz

Name:_____

Mash Multiplication

Worksheet 1: Multiply is Mash (Potatoes)

In algebra, the easiest operation is multiplication. Just put it all the signs, numbers, letters in one pile (like your uncle's mash potato plate at thanksgiving: potato's, butter, peas, carrots, etc.),

Multiply each term

1: 4(3x)(6y) 2: 7x(7y)(5t)(2) 3: 6(2x)(5)(2t)(10) 4: x(y)(t)(z) 5: 2(x)(5)(2y)

Don't forget about signs?

a: Even # of – signs = _____ b: Odd # of – signs = _____

Multiply each term: (1) signs; (2) numbers; (3) letters

6: -3(4x)(7y)(-5t) 7: 4t(6y)(-5)(-8z) 8: -6(-4x)(-7y)(5t)(10z)

9: 4(-3x)(12y)(-4)(-9z) 10: -(2)(3x)(-7y)(-10)(-8t) 11: -x(y)(-z)(t)

12: -6.8x(2.3y)(-7.1z) 13: 2.5(-6.8x)(6.25y)(-6.5t) 14: -(3.4x)(8.4y)(-9.2t)(-4)

TBU: $\frac{3}{5}(7x)\left(-\frac{3}{4}\right)\left(\frac{2}{8}y\right)(-5t)(-t)(-8z)$

Math Geeks Only:

15: Is 5(4)(-6)(-10) the same as -6(5)(-10)(4) ? Use your calculator and prove it!

16: What property allows you to change the order and keep the same answer? (hint: change order)

Name:_____

The Bracket Method: A New Approach to Algebra
Mash Multiplication

Notes 2: Put it together (Bracket and Mash)
Bracket (1st) and then mash (2nd) each term separately (signs, numbers, letters)

Example 1: -(-3x) + 16y(-4x) – 4(2y)

3x - 64xy – 8y

Bracket, then Mash each term

Step 1: Bracket terms
Step 2: Mash
- Count Negative Signs
- Mash Numbers
- Peas and Carrots

V-Notes

A quick note on the "Solo Artist"

What happens if there is no () in a bracket? It simply means there is no multiplication (mash or distribute) that needs to be done. We refer to this as a solo "artist" (just for fun). Just bring it down exactly as it is.

Solo

Example 1: 5 + 7(2x)

Example 2: 3 – (3x) + 16y(-4) – 4(2x) + 7

Example 3: 4(-3x)(-5y) – 7(-4y) – 3 + 3(x)(–5t) + x – (-3t)

Bracket and Mash (with Solo)

Example 2: 4(-3x)(-5y) – 7(4y) – 3 + 3(x)(–5t) + x – (-3t)

Name:_____

Mash Multiplication

Worksheet 2: Put it together (Bracket and Mash)

Bracket (1st) and then Mash (2nd) each term separately (signs, numbers, letters)

1: 4(3x) - 4(-5x)(2y) - 3(4y)

2: -5x(4y)(2) – 5(-2x) + 7(3t)(-5x)

3: 3(-5) + 3x(-7y) - 3(-x)(y)(-t)

4: -(4)(-5) – 5(-2x)(-7) + 4(-6x)(y)

5: -(-4x) + (-6)(-5t)(7z) – x(-y)(-z)

6: 7(3) – 4(-8x) + 4x(2y) – 6(-8t)

7: x – 4t(6)(3) – 6 + 2x(-6y)

8: -6(-4)(-5)(7) – (2x)(3y)(-6y)(3)

9: -(-1)(-1)(-5) + 3x(-3z) + 5(-y)

10: 3.2(-6.5) + 4x(-5.7)(-2.1) – 3.6z(-4.5t)

11: -12(7x)(-15y) – 5(-19)(6t) – (-12x)(-25)

12: -t – (-x)(-t)(-y) – (v)(-z)(-t) – x(z)

TBU: $\frac{3}{5}x(7y) - 5\left(\frac{2}{3}x\right)\left(-\frac{4}{7}t\right) + 5.6t(-5x)\left(\frac{2}{5}y\right) - (-7.2t) + 5.8\left(\frac{7}{9}y\right)\left(\frac{6}{5}t\right) - x(-y)(-8z) + \frac{9}{3}$

Name:_____

The Bracket Method: A New Approach to Algebra
Mash Multiplication
Worksheet 3: Mixed Review

Part I: Circle Double Signs; Replace with one sign; calculate

1: -32 - $^{+}$65 – 90 - $^{-}$61 + 17

2: -28 – 18 + 92 + $^{-}$28 + $^{-}$65

3: -120 – 85 + $^{-}$62 - $^{+}$24 - 82

4: 18 – 9 + $^{-}$68 + 25 – 98 - $^{-}$8 - $^{+}$89

Part II: Bracket the following terms: don't do the math; just see how many terms there are!

5: 5(2x) – 7(-3) + x(y)(-z)

6: sin32 – 14(x) + 4cos(3x) – 2(3)(4)

7: $\frac{3}{4}(4x\text{-}7)+3\sqrt{49\text{-}5x}+\frac{2}{5}(x)(y)$

8: 4 – (7 -2x) – (x)(2y) + 17(4) – $2x^3$ + 16$(-x^2)(x)^3$

Part III: Mash the following terms

9: 2(-3x)(-6y)

10: -(-3x)(4y)(-7z)

11: -2(-x)(-7)(-y)

12: 7(-6y)(5x)(-t)

13: $\frac{3}{5}(5y)\left(\frac{2}{3}t\right)\left(-\frac{3}{8}x\right)$

14: -(-x)(-y)(-t)(-z)

Part IV: Bracket; then Mash each term.

15: 2(-4) + 4x(-6y) - 3(-x)(5)(-t)

16: -(3)(-5) – 2(-3x)(-5) + 3(-6x)(y)

17: -(-4x) + (-3)(-2t)(7z) – x(-2)(-z)

18: 5(4) – (-8z) + 4x(2y) – 3(-7t)