

rules for adding signed numbers

- remember...
- Same Sign add
 - Different subtract
 - Keep the sign of the greater (absolute value)
 - and you'll be exact!
- Examples:
- 1) $-8 + -5 = -13$
same sign add
 - 2) $-10 + 15 = 5$
diff. sign subtract
 - 3) $-3.4 + 9.7 = 6.3$
diff. sign subtract
 - 4) $3\frac{2}{5} + -1\frac{1}{3}$
diff. sign subtract

Think
Same Sign = Sum
Different = Difference
 (Subtract)

Multiplication and Division follow the same rules...

- $+(+) = (+)$
- $(+)(-) = (-)$
- $-)(-) = (+)$
- $(-)(+) = (-)$

same signs = positive
 different signs = negative

for problems with multiple signed numbers...
 an odd amount of negatives will result in an negative solution
 an even amount of negatives will result in a positive solution

Examples:

- 1) $-15 \div 3 = -5$
- 2) $27 \times -3 = -81$
- 3) $(\frac{-3}{5})(\frac{-4}{8}) = \frac{12}{40} \div 4 \frac{3}{10}$
- 4) $(\frac{-3}{4}) \div (-\frac{1}{2}) = \frac{-3}{4} \times \frac{-2}{1} = \frac{6}{4} \rightarrow 1\frac{2}{4}$

$1\frac{1}{2}$

Examples:

- 1) $10 - 15 = -5$
 $10 + (-15) = -5$
- 2) $-13 - 27 = -40$
 $-13 + (-27) = -40$
- 3) $-12 - (-7) = -5$
 $-12 + 7 = -5$
- 4) $5.3 - (-6.2) = 11.5$
 $5.3 + 6.2 = 11.5$

Remember...
Add the Opposite!

Step 1: change the subtraction to addition

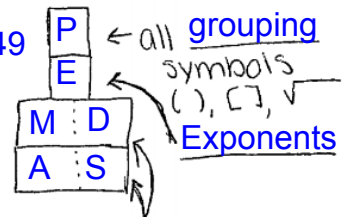
Step 2: change the sign of the number following the operation to its opposite
 negative \leftrightarrow positive

Step 3: follow the rules for adding signed numbers to solve.

Examples:

- 1) $(-5)^2 - 2 \times (-9) + 6$
 $-5 \times -5 - 2 \times (-9) + 6$
 $25 + 18 + 6 = 49$
- 2) $(-3)^3 - 2 + 8 \div (-8)$
 $-3 \times -3 \times -3$
 $-81 - 2 + 8 / -8$
 $-81 - 2 - 1$
 $-81 + -2 + -1$
 -83

Fill in each blank to represent the steps of the order of operations



Complete each step from left to right the operation that comes first.

Rewrite the subtraction as addition (add the opposite)
 Same Sign: ADD

(+)(+) = (+) (-)(+) = (-) (-)(-) = (+) (+)(-) = (-) > RULES FOR SIGNING numbers

MULTIPLYING & DIVIDING INTEGERS

Multiply or divide as indicated.

1. $6(-8)$ 2. $-5(-9)$ 3. $-63 \div (-9)$ 4. $-36 \div 9$

5. $12(-6)$ 6. $(-4)(-9)$ 7. $(-5)(-3)(-1)(3)$ 8. $36 \div (-3)$

9. $-48 \div (-6)$ 10. $\frac{63}{-9}$ 11. $\left(-\frac{3}{4}\right)^2$ 12. $3(-9)$

fraction bars mean to divide exponents mean to multiply by itself

$63 \div -9$ $\left(-\frac{3}{4}\right)\left(-\frac{3}{4}\right)$

13. $(-7)(-6)$ 14. $(-1)(-2)(-3)(-4)$ 15. $-42 \div 7$ 16. $-56 \div -8$

17. $\frac{48}{-8}$ 18. -5^2 19. -6^2 20. $(-4)^2$

fraction bars mean to divide exponents mean to multiply by itself exponents mean to multiply by itself

$48 \div (-8)$

$(-)(5)(5)$
- 25

$(-)(6)(6)$
- 36

$(-4)(-4)$
16

PLACEMENT OF THE NEGATIVE AND PARENTHESIS MATTERS!!!

**Integer Operations:
Addition and Subtraction**

Rules for Adding Integers

Rule 1: If the signs are the **same** then add the numbers. Keep the same sign.

Rule 2: If the signs are **different** then subtract the smaller number from the larger number. Keep the sign of the bigger number.

**Rules for Subtracting Integers:
The "Keep, Change, Change" Method**

The "Keep, Change, Change" method is only used when you are **subtracting** two numbers and parenthesis surround the **second** number.

When implementing "Keep, Change, Change," **keep** the first term, **change** the subtraction to addition, and **change** the sign of the second term.

Rewrite Subtraction as Addition: ADD THE OPPOSITE!!!

Solve. Show all of your work.

$$\begin{aligned} (-87) - (-31) &= \\ -87 + 31 &= -56 \end{aligned}$$

$$\begin{aligned} 84 - (-37) &= \\ 84 + 37 &= 121 \end{aligned}$$

$$\begin{aligned} (-43) - 71 &= \\ -43 + -71 &= -114 \end{aligned}$$

$$\begin{aligned} (-25) - 88 &= \\ -25 + -88 &= -113 \end{aligned}$$

$$\begin{aligned} (-56) + 91 &= 35 \\ \text{already addition.} \end{aligned}$$

$$\begin{aligned} (-39) + 47 &= 8 \\ \text{already addition.} \end{aligned}$$

Diff. Sign: Sub

Diff. Sign: Sub

$$\begin{aligned} (-3) + (-71) &= -74 \\ \text{already addition.} \end{aligned}$$

$$\begin{aligned} 52 + 23 &= 75 \\ \text{already addition.} \end{aligned}$$

$$\begin{aligned} (-61) - 26 &= \\ -61 + -26 &= -87 \end{aligned}$$

Same Sign: Add

Same Sign: Add

Rules for Subtracting Integers
The "Keep, Change, Change" Method

When subtracting two integers, use "Keep, Change, Change" to **keep** the first term, **change** the subtraction to addition, and **change** the sign of the second term.

<p>Example: $-2 - (+6)$</p> <p>Keep the -2.</p> <p>Change the $-$ to a $+$.</p> <p>Change the $+$ to a $-$.</p> <p>Rewrite: $-2 + (-6)$</p> <p>Note that you are now adding two negatives. Follow Rule 1 to solve.</p>	<p>Example: $-4 - (-8)$</p> <p>Keep the -4.</p> <p>Change the first $-$ to a $+$.</p> <p>Change the second $-$ to a $+$.</p> <p>Rewrite: $-4 + (+8)$</p> <p>Note that you are now adding two numbers with different signs. Follow Rule 2 to solve.</p>
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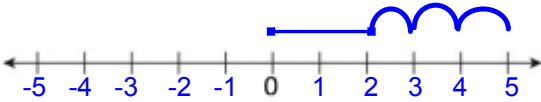
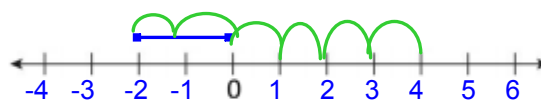
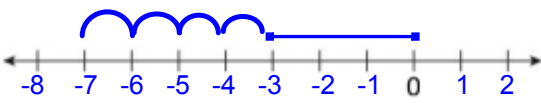
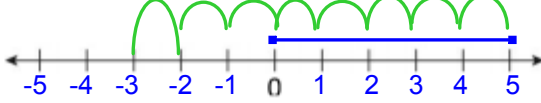
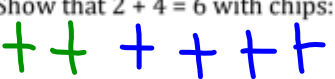
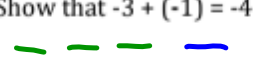
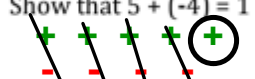

Find each sum and difference. If subtracting, first rewrite the problem using the "Keep, Change, Change" method, then solve.

Rewrite Subtraction as Addition: ADD THE OPPOSITE!!!

$-16 + 8$	$-9 - 19$	$-4 - (-16)$	$3 + (-9)$
$-16 + -8$	$-9 + -19$	$-4 + 16$	already addition. Diff. Sign: Sub
<u>-24</u>	<u>-28</u>	<u>12</u>	<u>-6</u>
$-19 - 5$	$11 - (-8)$	$-17 + 7$	$14 + (-11)$
$-19 + -5$	$11 + 8$	already addition. Diff. Sign: Sub	already addition. Diff. Sign: Sub
<u>-24</u>	<u>19</u>	<u>-10</u>	<u>3</u>

[Guided Notes] Castan

Adding Integers Note Page

Same Sign	Different Signs
Both numbers are positive, or both numbers are negative	One number is positive, one is negative
Ex. $8 + 5$ or $-7 + (-5)$	Ex. $-7 + 3$ or $5 + (-2)$
Number Lines: Show that $2 + 3 = 5$ on a number line: 	Number Lines: Show that $-2 + 6 = 4$ on a number line: 
Show that $-3 + -4 = -7$ on a number line: 	Show that $5 + (-8) = -3$ on a number line: 
Integer Chips: Show that $2 + 4 = 6$ with chips:  Show that $-3 + (-1) = -4$ 	Integer Chips: Show that $5 + (-4) = 1$ with chips:  Show that $-6 + (2) = -4$ 
The Rule: Add <u>the numbers</u> together and <u>keep</u> the same sign.	The Rule: Subtract the <u>smaller</u> number from the <u>bigger</u> number and keep the sign of the <u>larger</u> number. <small>**larger absolute value (distance from zero)</small>
Examples: 1) $4 + 3 = \underline{7}$ 2) $-4 + (-3) = \underline{-7}$ 3) $-100 + (-200) = \underline{-300}$ 4) $25 + 40 = \underline{65}$	Examples: 1) $-8 + 5 = \underline{-3}$ $8 - 5 = 3$ 2) $8 + (-5) = \underline{3}$ 3) $6 + (-4) = \underline{2}$ $6 - 4$ 4) $-6 + 4 = \underline{-2}$
The song (to the tune of Row, Row, Row Your Boat) Same signs, add and keep Different signs, subtract Take the sign of the larger number, Then you'll be exact.	
Mixed Practice:	1) $3 + (-5) = \underline{-2}$ 2) $-2 + (-3) =$ 3) $7 + 1 =$
4) $-4 + (-2) = \underline{-6}$ 5) $-8 + (-1) = \underline{-9}$ 6) $-5 + 3 =$ 7) $20 + (-10) =$	
8) $-15 + 5 = \underline{-10}$ 9) $-4 + (-5) = \underline{-9}$ 10) $-3 + 0 =$ 11) $5 + (-5) =$	
12) $-5 + 8 = \underline{3}$ 13) $-2 + 9 = \underline{7}$ 14) $-5 + 5 =$ 15) $-6 + (-6) =$	
16) $-6 + 1 = \underline{-5}$ 17) $-3 + (-2) = \underline{-5}$ 18) $-2 + 2 =$ 19) $5 + 3 + (-2) =$	

Subtracting Integers Note Page

The Rule: *Change the subtraction sign to an addition sign, and ALSO change the very next number's sign to the opposite sign. THEN, following the adding integers rules.*

Simply put: Change it to **"Adding the Opposite"** or **"Stay, Flip, Flip"**

Proof that changing the subtraction sign to "Adding the Opposite" works:

What is $4 - 3$? 1

Now compute $4 - 3$ but change it to "Adding the Opposite": $4 - 3$ will become $4 + (-3)$

Now following the adding integers rules for $4 + (-3) = 1$

Examples: $-7 - 5$ will become $-7 + (-5) = -12$

$-3 - (-6)$ will become $-3 + (+6) = 3$

$4 - 9$ will become $4 + (-9) = -5$

$8 - (-4)$ will become $8 + (-4) = 4$

Practice problems:

1) $-4 - 6$ becomes <u>$-4 + (-6)$</u> . The final answer is <u>-10</u> <i>**same sign add, keep the sign</i>
2) $6 - 9$ becomes <u>$6 + (-9)$</u> . The final answer is <u>-3</u> <i>**different sign subtract, keep bigger sign</i>
3) $5 - (-4)$ becomes <u>$5 + 4$</u> . The final answer is <u>9</u> <i>**same sign add, keep the sign</i>
4) $-2 - (-3)$ becomes <u>$-2 + 3$</u> . The final answer is <u>1</u> . <i>**different sign subtract, keep bigger sign</i>

****now follow the rules for adding integers!****

More practice:

5) $-5 - 4 = \underline{-9}$ (Same signs add and keep the sign) $-5 + (-4)$

6) $3 - 8 = \underline{5}$ (Different signs, subtract and keep the big number's sign) $3 + (-8)$

7) $-1 - (-5) = \underline{4}$ (Different signs, subtract and keep the big number's sign) $-1 + 5$

8) $6 - (-2) = \underline{8}$ (Same signs add and keep the sign) $6 + 2$

9) $-3 - 0 = \underline{-3}$ 10) $-8 - 2 = \underline{-10}$ 11) $-4 - (-6) = \underline{2}$ 12) $-1 - 1 = \underline{-2}$

13) $-5 - 2 = \underline{-7}$ 14) $7 - 2 = \underline{5}$ 15) $-2 - 6 = \underline{-8}$ 16) $-5 - 5 = \underline{-10}$

17) $-6 - 3 = \underline{-9}$ 18) $-4 - (-6) = \underline{-2}$ 19) $0 - (-4) = \underline{4}$ 20) $8 - (-2) = \underline{10}$

*****Example Problems above rewritten as addition problems using the "ADD THE OPPOSITE STRATEGY!!"*****

- | | | | |
|---------------|---------------------|---------------|---------------|
| 9. $-3 + 0$ | 10. $-8 + -2$ | 11. $-4 + 6$ | 12. $-1 + -1$ |
| 13. $-5 + -2$ | 14. can remain sub. | 15. $-2 + -6$ | 16. $-5 + -5$ |
| 17. $-6 + -3$ | 18. $-4 + 6$ | 19. $0 + 4$ | 20. $8 + 2$ |

Lesson 2-4

Pages 95-99

Add. **REMEMBER the RULE:** Same Sign ADD, Different SUBTRACT

1. $-4 + 8$ 4

2. $14 + 16$ 30

3. $-7 + (-7)$ -14

4. $-9 + (-6)$ -15

5. $-18 + 11$ -7

6. $-36 + 40$ 4

7. $42 + (-18)$ 24

8. $-42 + 29$ -13

9. $18 + (-32)$ -14

10. $12 + (-9)$ 3

11. $-24 + 9$ -15

12. $-7 + (-1)$ -8

#s: 1, 5, 6, 7, 8, 9, 10, 11 -- Different Sign Subtract

#s: 2, 3, 4, 12 -- Same Sign Add

Evaluate each expression if $a = 6$, $b = -2$, $c = -6$, and $d = 3$.

13. $-96 + a$ -90

14. $b + (-5)$ -7

15. $c + (-32)$ -38

16. $d + 98$ 101

17. $-120 + b$ -122

18. $-120 + c$ -126

19. $5 + b$ 3

20. $a + d$ 9

21. $c + a$ 0

22. $d + (-9)$ -6

23. $b + c$ -8

24. $d + c$ -3

Substitution shown and rule to follow ~

13. $-96 + 6$ different sign: Sub. 14. $-2 + (-5)$ same sign: Add 15. $-6 + (-32)$ same sign: Add
 16. $3 + 98$ same sign: Add 17. $-120 + (-2)$ same sign: Add 18. $-120 + -6$ same sign: Add
 19. $5 + -2$ different sign: Sub. 20. $6 + 3$ same sign: Add 21. $-6 + 6$ different sign: Sub.
 22. $3 + (-9)$ different sign: Sub. 23. $-2 + -6$ same sign: Add 24. $3 + -6$ different sign: Sub.

Lesson 2-5

Pages 103-106

Subtract. *rewrite as addition then solve! (REMEMBER: Add the Opposite!)**

1. $3 - 7 \rightarrow 3 + -7 = -4$ 2. $-5 - 4 \rightarrow -5 + -4 = -9$ 3. $-6 - 2 \rightarrow -6 + -2 = -8$

4. $8 - 13 \rightarrow 8 + -13 = -5$ 5. $6 - (-4) \rightarrow 6 + = 10$ 6. $2 - 9$

7. $-2 - 23 \rightarrow -2 + -23 = -25$ 8. $63 - 78 \rightarrow -63 + -78 = -141$ 9. $0 - (-14) \rightarrow 0 + 14 = 14$

10. $15 - 6$ 11. $18 - 20 \rightarrow 18 + -20 = -2$ 12. $-5 - 8 \rightarrow -5 + -8 = -13$

13. $21 - (-37) \rightarrow 21 + 37 = 58$ 14. $-60 - 32 \rightarrow -60 + -32 = -92$ 15. $57 - 63 \rightarrow 57 + -63 = -6$

#s 6 and 10 circled as you do not have to rewrite as addition. These are basic subtraction problems that you can solve regularly

Evaluate each expression if $k = -3, p = 6, n = 1,$ and $d = -8.$

16. $55 - k = 58$

17. $p - 7 = -1$

18. $d - 15 = -23$

19. $n - 12 = -11$

20. $-51 - d = -43$

21. $k - 21 = -24$

22. $n - k = 4$

23. $-99 - k = -96$

24. $p - k = 9$

25. $d - (-1) = -7$

26. $k - d = 5$

27. $n - d = 9$

*****substitute and rewrite as addition then solve! (Add the Opposite!)**

16. $55 - (-3)$

17. $6 - 7$

18. $-8 - 15$

$55 + 3 = 58$

$6 + (-7) = -1$

$-8 + -15 = -23$

19. $1 - 12$

20. $-51 - (-8)$

21. $-3 - 21$

$1 + -12 = -11$

$-51 + 8 = -43$

$-3 + -21 = -24$

22. $1 - (-3)$

23. $-99 - (-3)$

24. $6 - (-3)$

$1 + 3 = 4$

$-99 + 3 = -96$

$6 + 3 = 9$

25. $-8 - (-1)$

26. $-3 - (-8)$

27. $1 - (-8)$

$-8 + 1 = -7$

$-3 + 8 = 5$

$1 + 8 = 9$