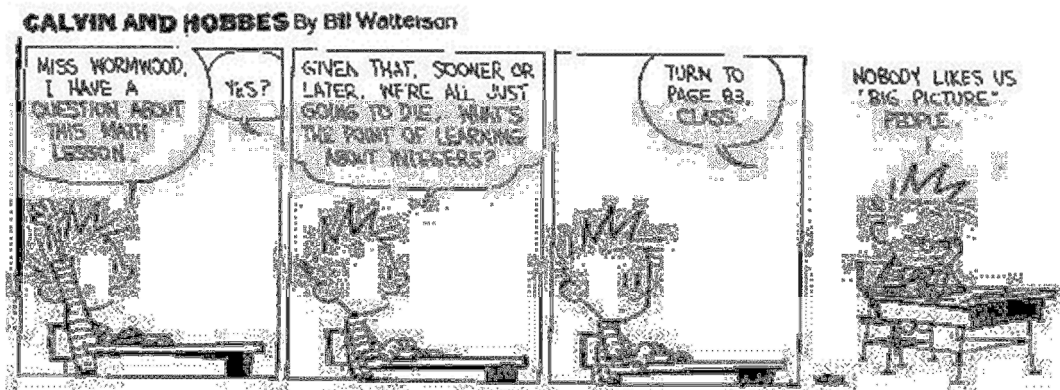# SIXTH GRADE MATHEMATICS: CHAPTER 13

INTEGERS IN SPORTS

TOPICS COVERED:

- Introduction to integers
- Opposite of a number and absolute value
- Adding integers
- Subtracting integers
- Multiplying and dividing integers
- Integer Labs

CALVIN AND HOBBES By Bill Watterson

MISS WORMWOOD, I HAVE A QUESTION ABOUT THIS MATH LESSON.

YES?

GIVEN THAT, SOONER OR LATER, WE'RE ALL JUST GOING TO DIE, WHAT'S THE POINT OF LEARNING ABOUT INTEGERS?

TURN TO PAGE 83, CLASS.

NOBODY LIKES US "BIG PICTURE" PEOPLE.

We are about to take a trip. We are now leaving the land of positive numbers. Not for good, but we want to become world travelers and so we are going to pack our bags and go to the land of Negative Numbers! Come join us on this magical journey.

The number line can be used to represent the set of integers. Look carefully at the number line below and the definitions that follow.
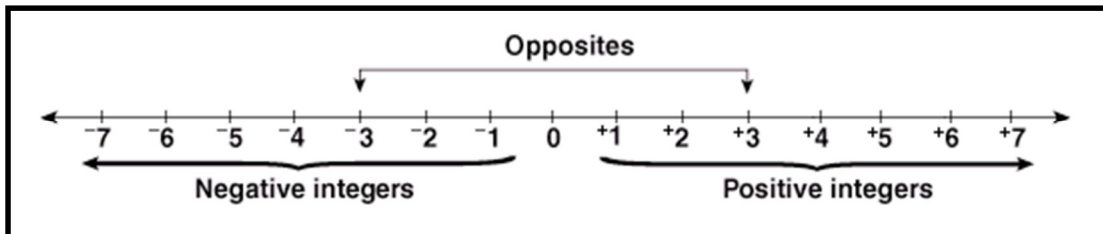
Definitions

> 🖊 **The number line goes on forever in both directions.** This is indicated by the arrows.
>
> 🖊 Whole numbers greater than zero are called **positive integers**. These numbers are to the right of zero on the number line.
>
> 🖊 Whole numbers less than zero are called **negative integers**. These numbers are to the left of zero on the number line.
>
> 🖊 The integer **zero is neutral**. It is neither positive nor negative.
>
> 🖊 The **sign** of an integer is either positive (+) or negative (-), except zero, which has no sign.
>
> 🖊 Two integers are **opposites** if they are each the same distance away from zero, but on opposite sides of the number line. One will have a positive sign, the other a negative sign. In the number line above, $^{+}3$ and $^{-}3$ are labeled as opposites.

Integers – the whole numbers and their opposites (positive counting numbers, negative counting numbers, and zero)	$5, 7, 0, -5, -7, -200$
Opposite of a number – a number and its opposite are the same distance from zero on the number line	-7 and 7 are opposites
Absolute value – the number of units a number is from zero on the number line without regard to the direction	The absolute value of -6 is 6. The sign for absolute value is two parallel lines: $|-6| = 6$

1-10. Place the correct letter corresponding to each integer on the number line below.

-10   0   +10
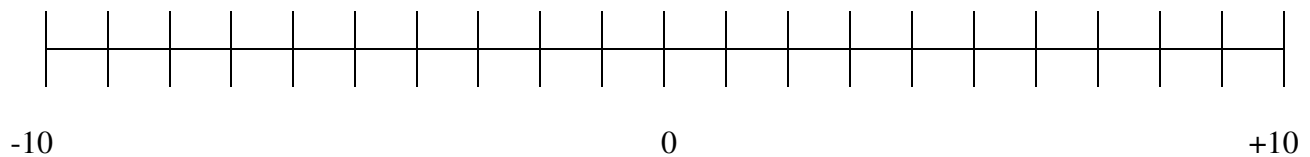
A. -5	B. $+2$	C. -7	D. 4	E. -9
F. -1	G. $+6$	H. -3	I. 0	J. -6

Write an integer to represent each situation.

11.	lost $72		12.	gained 8 yards		13.	fell 16 degrees	

Name the opposite of each integer.

14.	26		15.	-83		16.	$+100$	

Compare the following integers. Write <, >, or =.

17.	-5 ___ 8	18.	12 ___ -13	19.	-10 ___ -21	20.	-7 ___ -11

Find the absolute value of the following numbers.

21.	$|+11|$		22.	$|-6|$		23.	$|-55|$		24.	$|0|$	
25.	$|28|$		26.	$|-203|$		27.	$|+75|$		28.	$|-3|$	

Write true or false.

29.	$-3 > -7$		30.	$9 > -1$		31.	$-6 > -2$	
32.	$|-5| < -5$		33.	$|-8| = |8|$		34.	$-5 < -6$	

1. List the following temperatures from greatest to least.

A	The temperature was 25 degrees Fahrenheit below zero.	
B	The pool temperature was 78 degrees Fahrenheit.	
C	Water freezes at 32 degrees Fahrenheit.	
D	The low temperature in December is -3 degrees Fahrenheit.	
E	The temperature in the refrigerator was 34 degrees Fahrenheit.	

Think of the days of the week as integers. Let today be 0, and let days in the past be negative and days in the future be positive.

2.	If today is Tuesday, what integer stands for last Sunday?	
3.	If today is Wednesday, what integer stands for next Saturday?	
4.	If today is Friday, what integer stands for last Saturday?	
5.	If today is Monday, what integer stands for next Monday?	

Write an integer to represent each situation.

6.	moving backwards 4 spaces on a game board	
7.	going up 3 flights in an elevator	
8.	a 5-point penalty in a game	
9.	a $1 increase in your allowance	

Order from least to greatest.
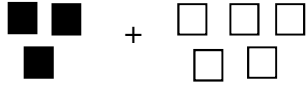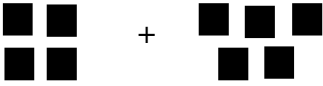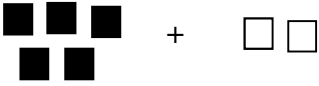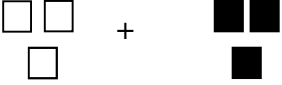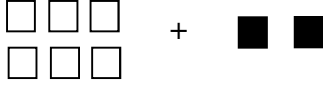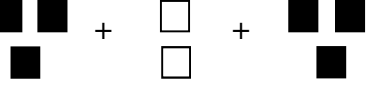
10.	$\{6, -3, 1, -1, -5, 7, 0, 9\}$	
11.	$\{2, -1, 3, 4, -6, 13, -8, 2\}$	

Absolute Value: Pick seven students to the front of the class each holding a number from -3 to $+3$. Look at how far away the students are away from person zero.

Write a numerical expression for each model. Find the sum.

■ = one positive

□ = one negative

1.	2.	3.
4.	5.	6.

Draw a model of the following problems using chips similar to the pictures above. Then solve. Use a separate sheet of paper.

7.	$-2+-8$		8.	$8+-4$		9.	$-6+3$	
10.	$6+-4$		11.	$-1+7$		12.	$-8+3$	
13.	$-2+-6$		14.	$6+-9$		15.	$-5+-7$	
16.	$-7+4$		17.	$4+8$		18.	$-3+10$	
19.	$2+-1+-3$		20.	$0+-5$		21.	$3+2+-1$	
22.	$-5+5$		23.	$-6+1$		24.	$6+-1$	

Solve.

1.	$-2+-8$		2.	$8+-4$		3.	$-6+3$	
4.	$6+-4$		5.	$-1+7$		6.	$-8+3$	
7.	$-2+-6$		8.	$6+-9$		9.	$-5+-7$	
10.	$-4+-7$		11.	$4+-7$		12.	$-4+7$	
13.	$2+-1+-3$		14.	$0+-5$		15.	$3+2+-1$	
16.	$-5+5$		17.	$-6+1$		18.	$6+-1$	

Some of the sixth grade teachers decide to try out for the Dallas Cowboys. They each are allowed one rushing attempt against the Cowboys defense. The table below summarizes the results of their attempts:

Johnsen	-8	Atkins	-19	Hoag	$+18$
Underwood	$+24$	Loewen	$+2$	Buckmaster	-26
Snow	-13	Mangham	$+37$	Landry	$+6$

Use the table above to answer the following addition problems. Show both your expressions and answers on a separate sheet of paper.

19.	Mangham + Buckmaster	20.	Underwood + Johnsen
21.	Snow + Atkins	22.	Hoag + Landry
23.	Atkins + Mangham	24.	Snow + Landry
25.	Loewen + Underwood	26.	Johnsen + Buckmaster
27.	$|$Snow + Hoag$|$	28.	Landry + Johnsen
29.	Underwood + Mangham	30.	Atkins + Buckmaster
31.	Hoag + Atkins + Snow	32.	Hoag + Landry + Loewen
33.	Buckmaster + Atkins	34.	Johnsen + Hoag

35.	Place the teachers in order from the worst carry (smallest) to the best carry (largest).	

Compare. Write <, >, or =.

36.	$-5+-6$ _____ $6+-5$	37.	$-8+10$ _____ $-3+6$
38.	$-4+-9$ _____ $-8+-5$	39.	$20+-12$ _____ $-12+-4$

Below are several rushing attempts in a football game. Plot the attempts on the number lines to determine to total amount of yardage.

1. a gain of 3 yards and then a gain of 4 yards $(3 + 4)$

-10   -5   0   5   10
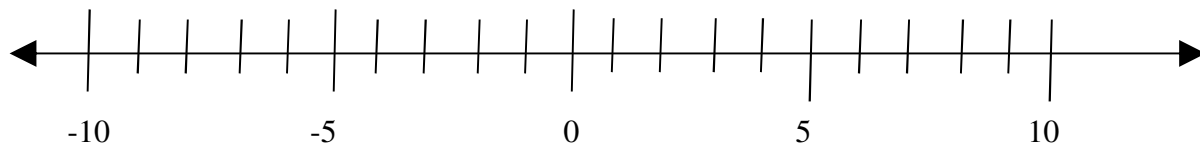
2. a loss of 5 yards and then a gain of 7 yards $(-5+7)$

-10   -5   0   5   10
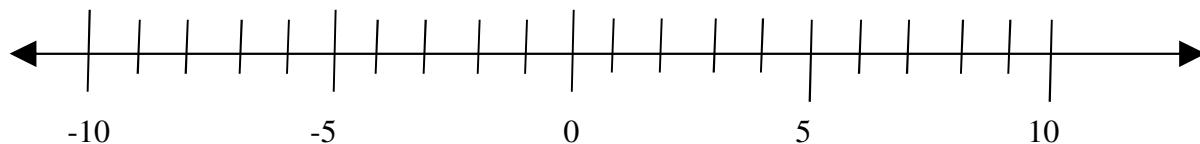
3. a loss of six yards and then another loss of 2 yards $(-6+-2)$

-10   -5   0   5   10
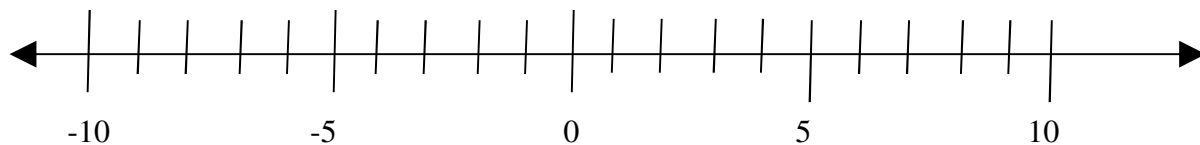
4. a gain of 8 yards and then a loss of 9 yards $(8+-9)$

-10   -5   0   5   10
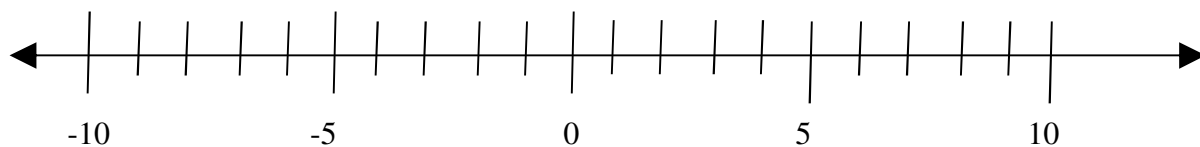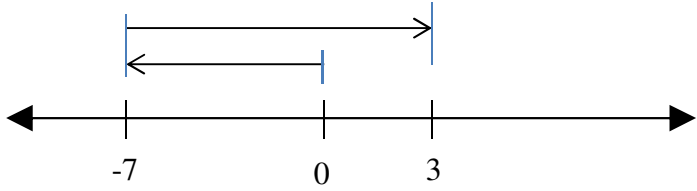
5. a loss of 3 yards and then a loss of 1 yard $(-3+-1)$

-10   -5   0   5   10
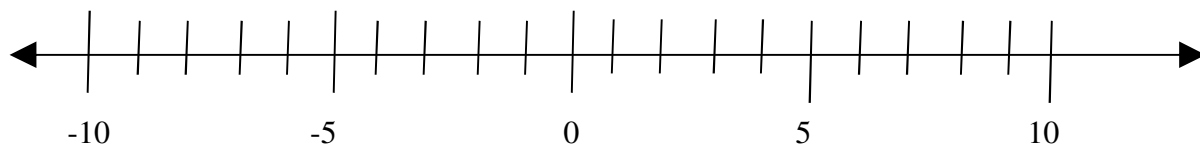
6. a gain of 7 yards and then a loss of 7 yards $(7+-7)$

-10   -5   0   5   10

1.	Which expression is represented by the model below? -7 0 3 A. $-7+0$ B. $-7+7$ C. $-7+3$ D. $-7+10$
2.	Model the following expressions by drawing number lines below. A. $-4+-2$ B. $5+-3$ C. $-2+8$ D. $-4+6+-3$
3.	Model the following expressions by drawing two-color counters below. A. $-4+-2$ B. $5+-3$ C. $-2+8$ D. $-4+6+-3$

Write a numerical expression for each model. Find the sum.

■ = one positive

□ = one negative

1.	2.	3.
□□ − □□ □□ □	■■ − ■ ■ ■ ■■ ■■	□□□ − □□ □□
4.	5.	6.
□□ − □□ □ □	■■■ − ■ ■ ■■■	□□ − □ − □ □ □ □□

**Draw a model of the following problems using chips similar to the pictures above. Then solve.
Use a separate sheet of paper.**

7.	$-8--2$		8.	$8-4$		9.	$-6--3$	
10.	$6-4$		11.	$-7--1$		12.	$-8--3$	
13.	$7-2$		14.	$-6--6$		15.	$-7--5$	
16.	$7-4$		17.	$-8--4$		18.	$10-3$	
19.	$8-4-2$		20.	$5-5$		21.	$-7--7$	
22.	$3--4$		23.	$-1--5$		24.	$3-4$	

An integer and its opposite are the same distance from 0 on a number line. The integers 5 and -5 are opposites. The sum of an integer and its opposite is 0. To subtract an integer add its opposite.

	$t = 6 - 9$		$m = -10 - -12$
Example 1:	$t = 6 + -9$	**Example 2:**	$m = -10 + +12$
	$t = -3$		$m = 2$

Subtract.

1.	$-2 - -8$		2.	$8 - (-4)$		3.	$-6 - 3$	
4.	$6 - -4$		5.	$-1 - 7$		6.	$3 - 8$	
7.	$-2 - 6$		8.	$6 - -9$		9.	$-5 - (-7)$	
10.	$-4 - (-7)$		11.	$4 - -7$		12.	$-4 - 7$	
13.	$2 - (-1) - (-3)$		14.	$-8 - 8$		15.	$2 - 3 - -1$	
16.	$-5 - (-5)$		17.	$-6 - 1$		18.	$6 - -1$	

In hockey, each player is given a plus/minus rating. This rating is based on how many goals are scored by their team while the player is on the ice minus how many goals are scored by the opposing team while the player is on the ice. A high number is good and a low number is bad. Here are the best and worst plus/minus ratings for 2009-2010:

1	Jeff Schultz – WSH	+50	874	Ryan Potulny – EDM	−21
2	Alex Ovechkin – WSH	+45	875	Kyle Okposo – NYI	−22
3	Mike Green – WSH	+39	876	Steve Staios – EDM	−27
4	Nicklas Backstrom – WSH	+37	877	Shawn Horcoff – EDM	−29
5	Daniel Sedin – VAN	+36	878	Rod Brind'Amour – CAR	−29
6	Alexander Semin - WSH	+36	879	Patrick O'Sullivan – EDM	−35

Use the table above to answer the following subtraction problems. Show both your expressions and answers on a separate sheet of paper.

19.	Schultz – Okposo	20.	Staios – Green
21.	Sedin – Ovechkin	22.	O'Sullivan – Semin
23.	Potulny – Backstrom	24.	Brind'Amour – Horcoff
25.	Green – O'Sullivan	26.	Semin – Schultz
27.	Staois – Brind'Amour	28.	Potulny – Schultz
29.	Semin – Sedin – Schultz	30.	Backstrom – Green
31.	Horcoff - Ovechkin	32.	Ovechkin – O'Sullivan
33.	Okposo – Staios	34.	Potulny – Brind'Amour

Subtracting integers is often the hardest of the four basic operations for students. Sometimes students try to take a shortcut and they don't change the signs to "add the opposite." The problem can be easy to miss when you don't change these signs.

Here are some other explanations to help you remember why we can change the subtracting problem to an addition problem.

PARTY #1: This is a positive party. It is filled with positive people. What could you do to make this party less positive?
- One option would be to make some of the positive people go home. ***This means you are subtracting positive people.***
- A second option would be to bring in some negative people. ***This means you are adding negative people.***

Therefore you have accomplished the same thing two different ways.
Subtracting positives is the same as adding negatives.

PARTY #2: This is a negative party. It is filled with negative people. What could you do to make this party less negative (more positive)?
- One option would be to make some of the negative people go home. ***This means you are subtracting negative people.***
- A second option would be to bring in some positive people. ***This means you are adding positive people.***

Therefore you have accomplished the same thing two different ways.
Subtracting negatives is the same as adding positives.

1. $7 - 2$
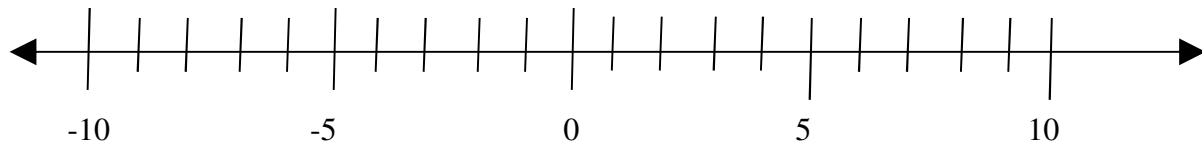
2. $4 - 6$
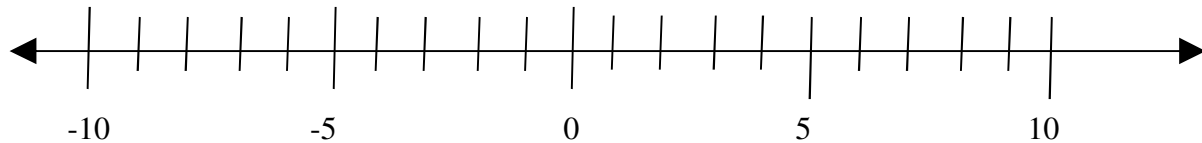
3. $-6 - -1$
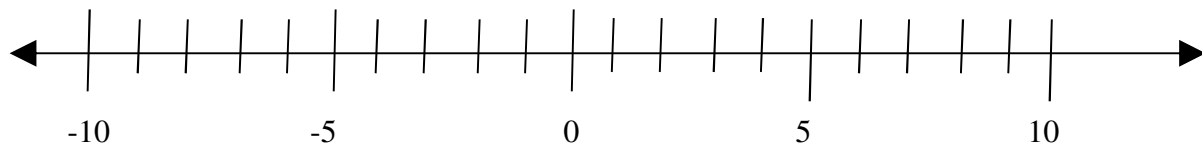
4. $5 - -3$
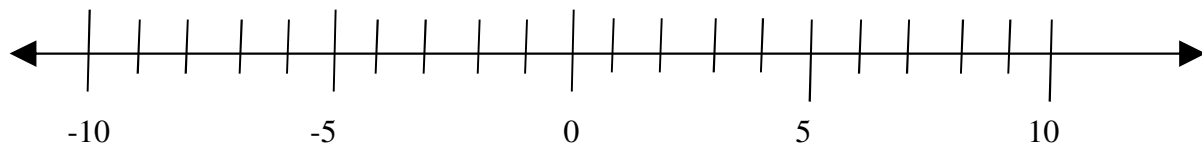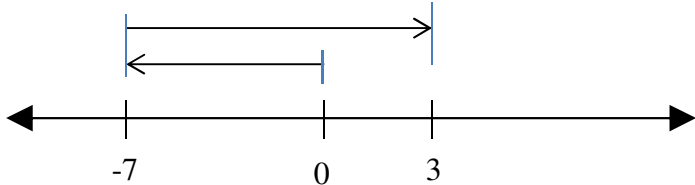
5. $-3 - 4$

6. $-2 - -5$

1.	Which expression is represented by the model below?
	
	       -7 0 3
	
	    A. $-7-3$ B. $-7-7$ C. $-7-(-3)$ D. $-7-(-10)$

2.	Model the following expressions by drawing number lines below. A. $-4-(-2)$ B. $5-(-3)$ C. $-2-8$ D. $-4-6-(-3)$
3.	Model the following expressions by drawing two-color counters below. A. $-4-(-2)$ B. $5-(-3)$ C. $-2-8$ D. $-4-6-(-3)$

Write the expression for each word problem and then solve.

1.	Jerry Jones has overdrawn his account by $15. There is $10 service charge for an overdrawn account. If he deposits $60, what is his new balance?		
2.	The outside temperature at noon was 9 degrees Fahrenheit. The temperature dropped 15 degrees during the afternoon. What was the new temperature?		
3.	The temperature was 10 degrees below zero and dropped 24 degrees. What is the new temperature?		
4.	The football team lost 4 yards on one play and gained 9 yards on the next play. What is the total change in yards?		
5.	The temperature in Tahiti is 27 degrees Celsius. The temperature in Siberia is -33 degrees Celsius. What is the difference in temperatures?		
6.	Horatio Hornswoggle was born in 57 BC. (BC would be negative years) and died in 16 AD (AD would be positive years). How old was Horatio when he died?		
7.	You have a bank account balance of $357 and then write a check for $486. What is your new balance?		
8.	A mountain climber is at an altitude of 4572 meters and, at the same time, a submarine commander is at -609 meters. What is the difference in altitudes?		
9.	The Roman Empire was established in 509 B.C. and fell 985 years later. In what year did the Empire fall?		
10.	A scuba diver is at an altitude of -12 meters and a shark is at an altitude of -31 meters. What is the difference in altitudes?		
11.	A submarine descended 32 feet below the surface of the ocean. It then rose 15 feet to look at a shark. Write an expression and solve to find the submarines current depth.		
12.	In January, the temperature at Mt. Everest averages $-36°C$. It can drop as low as $-60°C$. In July, the average summit temperature is 17 degrees Celsius warmer. What is the average temperature at the summit of Mt. Everest in July?		
13.	What is the difference in elevation between Mt. McKinley (+20,320 feet) and Mt. Everest (+29,035 feet)?		
14.	Find the difference in elevation between Death Valley (-282 feet) and the Dead Sea (-1348 feet).		
15.	The highest ever recorded temperature on earth was $136°F$ in the US and the lowest was $-129°F$ in Antarctica. What is the difference of these temperatures recorded on Earth?		
16.	The temperature in Mrs. Cagle's room was $-14°F$ yesterday, but it rose $8°F$ today. What is the new temperature today?		
17.	The boiling point of water is $212°F$ and $-460°F$ is its absolute lowest temperature. Find the difference between these two temperatures.		

2010 PGA Tour Masters Results							
Place	Name	4th Round Score	Final Score	Place	Name	4th Round Score	Final Score
1	Phil Mickelson	-5	-16	18	Ernie Els	-4	-1
2	Lee Westwood	-1	-13	26	Kenny Perry	+2	+1
3	Anthony Kim	-7	-12	36	Lucas Glover	+2	+4
4	Tiger Woods	-3	-11	38	Retief Goosen	+1	+6
6	Fred Couples	-2	-11	42	Zach Johnson	+3	+7
10	Ian Poulter	+1	-5	45	Sergio Garcia	+6	+10

In golf, the goal is to get the **lowest** score possible. A score of "E" is equivalent to a 0. Use the table to answer the following questions.

1. List the 12 players above in order from best to worst based on their **4th round score**. If there is a tie, the player with the better final score should come first.

1.	2.	3.	4.
5.	6.	7.	8.
9.	10.	11.	12.

13-24. Determine the absolute value of the **final score** for each player.

Phil Mickelson		Lee Westwood		Anthony Kim		Tiger Woods	
Fred Couples		Ian Poulter		Ernie Els		Kenny Perry	
Lucas Glover		Retief Goosen		Zach Johnson		Sergio Garcia	

Determine the **sum** of the following groups of players' **final scores**.

25.	Woods + Goosen		26.	Perry + Couples	
27.	Garcia + Kim		28.	Johnson + Els + Garcia	
29.	Mickelson + Poulter		30.	Woods + Kim + Glover	
31.	Westwood + Els		32.	Goosen + Couples + Els	

Determine the **difference** of the following groups of players' **final scores**.

33.	Woods – Goosen		34.	Perry – Couples	
35.	Mickelson – Westwood		36.	Kim – Woods – Els	
37.	Poulter – Couples		38.	Glover – Garcia	
39.	Johnson – Els		40.	Goosen – Garcia – Woods	

Directions: Players take turns joining any two dots next to each other. Diagonals are not allowed. When a player makes a square, the player's initials go in the box. When all the squares are completed, add up all the integers in your boxes. Then subtract this total from 25. The player with the highest score is the winner.

ROUND 1

●	●	●	●	●	●
-3	2	4	-6	-2	
●	●	●	●	●	●
1	7	-4	3	-1	
●	●	●	●	●	●
5	3	6	2	-5	
●	●	●	●	●	●
3	-4	1	4	-3	
●	●	●	●	●	●
6	-1	2	5	-4	
●	●	●	●	●	●
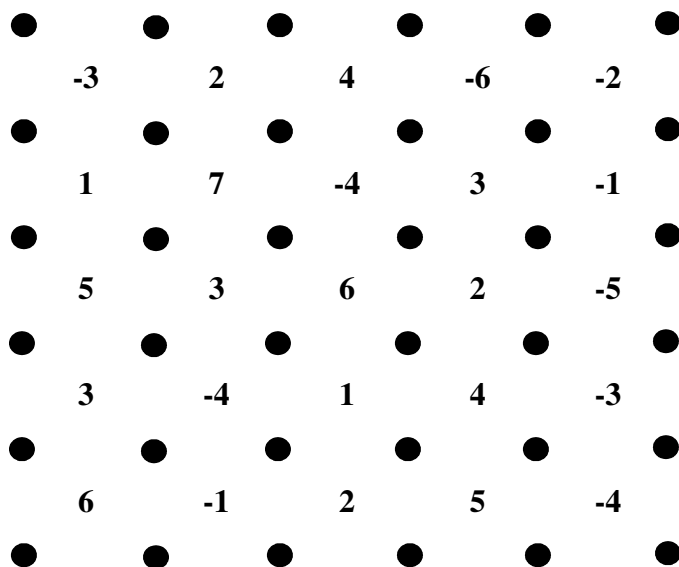
PLAYER 1:   TOTAL OF ALL BOXES: _____

            Now subtract this total from 25:   25 -_____ = _____ (final score)

PLAYER 2:   TOTAL OF ALL BOXES: _____

            Now subtract this total from 25:   25 -_____ = _____ (final score)

ROUND 2

●	●	●	●	●	●
-3	2	4	-6	-2	
●	●	●	●	●	●
1	7	-4	3	-1	
●	●	●	●	●	●
5	3	6	2	-5	
●	●	●	●	●	●
3	-4	1	4	-3	
●	●	●	●	●	●
6	-1	2	5	-4	
●	●	●	●	●	●

In two minutes name as many sums of integers that yield a positive 4 as you can.   You may loop pairs of integers that are next to each other, either horizontally, vertically, or diagonally.

-4	8	-3	7	-2	4	-7	5	-1	9	-4	7
1	-8	2	-4	5	-5	1	-7	6	-4	8	-5
-9	2	-5	7	-3	8	-8	2	-3	6	-5	4
5	-1	2	-4	4	-6	5	-4	9	-1	4	-7
-7	6	-1	8	-3	2	-1	4	-3	6	-7	3
3	-2	8	-5	7	-9	4	-3	7	-2	5	-5
-8	6	-4	3	-7	2	-9	6	-2	1	-8	5
2	-4	6	-2	5	-1	7	-5	5	-6	9	-3
-6	9	-2	8	-1	7	-2	3	-3	9	-1	6
4	-3	2	-9	7	-3	6	-5	7	-8	3	-2

In two minutes name as many sums of integers that yield a positive 4 as you can.   You may loop pairs of integers that are next to each other, either horizontally, vertically, or diagonally.

-4	8	-3	7	-2	4	-7	5	-1	9	-4	7
1	-8	2	-4	5	-5	1	-7	6	-4	8	-5
-9	2	-5	7	-3	8	-8	2	-3	6	-5	4
5	-1	2	-4	4	-6	5	-4	9	-1	4	-7
-7	6	-1	8	-3	2	-1	4	-3	6	-7	3
3	-2	8	-5	7	-9	4	-3	7	-2	5	-5
-8	6	-4	3	-7	2	-9	6	-2	1	-8	5
2	-4	6	-2	5	-1	7	-5	5	-6	9	-3
-6	9	-2	8	-1	7	-2	3	-3	9	-1	6
4	-3	2	-9	7	-3	6	-5	7	-8	3	-2

Integer Operation Game

Using a deck of cards, pull out two cards. Add the two cards together using these rules:
- Reds are negative and blacks are positive
- Jacks are 11, Queens are 12, Kings are 13, and Aces are 1.

Kyle has four integer cards. Two cards show positive integers and two cards show negative integers.

| -9 | 8 | 4 | -5 |

1.	What is the sum of all four cards?	
2.	What is the largest sum Kyle can make with two cards?	
3.	What is the smallest sum Kyle can make with two cards?	
4.	What is the smallest sum that Kyle can make with three cards?	
5.	What is the largest difference Kyle can make with two cards?	
6.	What is the smallest difference Kyle can make with two cards?	
7.	What is the difference closest in value to 10 that Kyle can make with two cards?	

The <u>**Official Kissing Rules**</u> help you remember answer signs on multiplying or dividing problems.

A boy sees a girl he likes. (+) The boy does kiss her. (+) The boy is happy! (+)	+	+	+	A boy sees a girl he likes. (+) The boy does **not** kiss her. (−) The boy is **not** happy. (−)	+	−	−
A boy sees a girl he does **not** like. (−) The boy does **not** kiss her. (−) The boy is happy! (+)	−	−	+	A boy sees a girl he does **not** like. (-) The boy does kiss her. (+) The boy is **not** happy. (−)	−	+	−
When multiplying/dividing two positives or two negatives, the answer is positive.				When multiplying/dividing one negative and one positive, the answer is negative.			

Solve each equation.

1.	$m = 2(-8)$		2.	$t = -3(-4)$		3.	$x = 8(-4)$	
4.	$p = (-5)(-5)$		5.	$r = (-12)(5)$		6.	$w = (-4)^2$	
7.	$e = -12(13)$		8.	$v = 14(-3)$		9.	$n = (-14) \bullet 5$	
10.	$h = (-12)^2$		11.	$d = -7 \bullet -8$		12.	$b = -9(10)$	

Evaluate each expression if $m = -6$, $n = 3$, and $p = -4$.

13.	$-4m$		14.	np		15.	$2mn$	
16.	$-2m^2$		17.	$-5np$		18.	$-10mp$	
19.	$-12np$		20.	mnp		21.	p^2	

Solve each equation.

22.	$f = -16 \div -4$		23.	$v = -100 \div 10$		24.	$m = -28 \div 7$	
25.	$g = 52 \div -4$		26.	$d = -125 \div -25$		27.	$q = -32 \div -16$	
28.	$e = -120 \div -12$		29.	$t = 45 \div -9$		30.	$p = 33 \div -3$	
31.	$z = -36 \div 12$		32.	$d = -200 \div -25$		33.	$c = -88 \div 11$	

Evaluate each expression if $e = -36$, $f = 4$, and $g = -3$.

34.	$\dfrac{e}{f}$		35.	$\dfrac{e}{g^2}$		36.	$\dfrac{e}{fg}$	
37.	$\dfrac{e^2}{f}$		38.	$\dfrac{-48}{g}$		39.	$\dfrac{eg}{f}$	
40.	$\dfrac{e^2}{fg}$		41.	$\dfrac{-100}{f}$		42.	$\dfrac{e^2}{g^2}$	

Why is it when you multiply two negative numbers you get a positive number? Good question!

The First Answer

Some people think of a negative as meaning "not". So if I say, "I am not going to the store," that is sort of the negative version of "I am going to the store."

So what do two "nots" mean? Consider this sentence: "You may tell me NOT to go to the store, but I'm NOT going to do what you say!" By negating your negation, I am insisting that I will go to the store.

Two "nots" cancel each other out, just like two negatives.

The Second Answer

Let's use negatives with money. A green chip is worth $5. A red chip means that I owe you $5. So if you lose $5, you can represent that by giving up a green chip or by picking up a red chip. So a green chip is +$5 and a red chip is -$5.

If you gain three green chips, what happens? 3 times $5 equals a $15 gain.

If you gain three red chips, what happens? 3 times -$5 equals a $15 loss.

What if you lose three green chips? You just lost $15. -3 times $5 equals a $15 loss.

What is you lose three red chips? You just gained $15. -3 times -$5 equals a $15 gain.

The Third Answer

How about proving it with a pattern?

$3 \bullet 5$	**+15**
$2 \bullet 5$	**+10**
$1 \bullet 5$	**+5**
$0 \bullet 5$	**0**
$-1 \bullet 5$	**-5**
$-2 \bullet 5$	**-10**

So….

$3 \bullet -5$	**-15**
$2 \bullet -5$	**-10**
$1 \bullet -5$	**-5**
$0 \bullet -5$	**0**
$-1 \bullet -5$	**+5**
$-2 \bullet -5$	**+10**

Complete the table below using your knowledge of integers as well as noticing the pattern that the table creates.

					5				15		
					4				12		
					3	0	3	6	9	12	15
					2				6		
					1				3		
					0				0		
-5	-4	-3	-2	-1	x	0	1	2	3	4	5
					-1						
					-2						
					-3						
					-4						
					-5						

Solve each equation.

1.	$x = -6 \bullet 8$		2.	$y = -12 \bullet 4$	
3.	$x = -9 \bullet (-11)$		4.	$y = (-7)(17)$	
5.	$14(-4) = h$		6.	$-15(10) = k$	
7.	$(10)(-8)(-2) = r$		8.	$(-3)(3)(-10) = t$	
9.	$w = (-12)(-1)(-6)$		10.	$y = (20)(-5)(-5)$	
11.	$x = (4)(-16)(-6)$		12.	$n = (16)(9)(-2)$	

Evaluate each expression if $x = -5$ and $y = -6$.

13.	$3y$		14.	$-8x$		15.	$-4y$		16.	$12x$	
17.	$-15x$		18.	$-19y$		19.	$-6xy$		20.	$4xy$	

Solve each equation.

21.	$x = \dfrac{-150}{-25}$		22.	$k = \dfrac{-98}{14}$		23.	$x = \dfrac{-312}{24}$	
24.	$\dfrac{-208}{-26} = t$		25.	$\dfrac{-180}{15} = n$		26.	$z = \dfrac{930}{-30}$	
27.	$\dfrac{-189}{-21} = p$		28.	$\dfrac{288}{-18} = d$		29.	$b = \dfrac{-396}{-36}$	

30.	At noon on Friday, the temperature was 0 degrees. Six hours later the temperature was -18 degrees. On average, what was the temperature change per hour?	
31.	Mangham Architecture has monthly profits of $1200, $755, -$450, $210, and -$640 over 5 months. What was the average profit for those months?	
32.	On a separate sheet of paper, model the following expressions by drawing number lines. A. $4 \bullet (-2)$ B. $5 \bullet (-1)$ C. $3 \bullet -3$	
33.	On a separate sheet of paper, model the following expressions by drawing two-color counters. A. $4 \bullet (-2)$ B. $5 \bullet (-1)$ C. $3 \bullet -3$	

The multiplication table below contains 42 mistakes. Shade in each box that contains a mistake. You will end up with a famous farming expression.

X	2	-4	-9	6	3	8	-1	4	-8	-2	-6	7	-5	9	-7
-3	6	-12	-27	-18	9	-24	-3	12	-24	6	-18	-21	-15	27	-21
9	-18	-36	-81	54	-27	72	9	36	-72	-18	54	63	45	81	63
-6	12	-24	54	-36	18	-48	-6	24	48	12	-36	-42	-30	-54	-42
5	-10	-20	-45	30	-15	40	5	20	-40	-10	30	35	25	45	35
-7	14	-28	-63	-42	21	-56	-7	28	-56	14	-42	-49	-35	63	-49

Flipping For Integers

The object of this game is to have the highest score at the end of the game. You may play in a group of 2 or a group of 3.

You need: your game card, a red/yellow chip, a single die

Rules: Each player takes turns flipping their chip and rolling their die. The chip represents whether your number is positive (yellow) or negative (red). For example, if you flip a red and roll a 4 your number is -4. Place your number in **any of the ten rows** on your scoring sheet. After each player has had ten turns and all rows are filled in calculate your values and add them together to get your final score.

GAME 1	
$5 + ($ $)$	
$7 - ($ $)$	
$3 \bullet ($ $)$	
$-2 \bullet ($ $)$	
$($ $)^2$	
$6 - 2 \bullet ($ $)$	
$($ $) - 4 \bullet -1$	
$8 - ($ $) + 5$	
$-4 \bullet ($ $) \bullet -2$	
$6 - ($ $)^2$	
TOTAL	

GAME 2	
$5 + ($ $)$	
$7 - ($ $)$	
$3 \bullet ($ $)$	
$-2 \bullet ($ $)$	
$($ $)^2$	
$6 - 2 \bullet ($ $)$	
$($ $) - 4 \bullet -1$	
$8 - ($ $) + 5$	
$-4 \bullet ($ $) \bullet -2$	
$6 - ($ $)^2$	
TOTAL	

Choose one of the following topics: Weather (Temperature), Money, Golf, Time (Years), Elevations and Altitudes, Game/Video Game Scores, Football, or Physical Science (Atoms and Molecules). Then pick a more specific theme such as "Jeopardy!" under the main topic of Games or "Scuba Diving" under the topic Elevations and Altitudes. Check with Mr. Mangham if you have another topic you wish to use which is not on this list.

Your Survival Guide will consist of 8 pages (2 folded pieces of construction paper). The goal is to teach integers to students who have not learned about them yet. The following details what information should be included on each page.

Page 1: Title Page – Title, Pictures, Theme
- Your title must include the words "Survival Guide to Integers"

(10 points)

Page 2: Introduction to Integers
- State at least three places of where we use negative numbers in real life (include specific examples of how they would be used in each)
- Give **definitions and examples** for these words:
    - Integer (provide examples of integers and numbers that are not integers)
    - Opposite of a number
    - Absolute value

(20 points)

ADDITION – Pages 3 and 4 – **Make sure to include a variety of samples** (positive plus negative where there are more positives, positive plus negative where there are more negatives, negative plus negative, etc.)

Page 3: Addition of integers
- **Teach** how to add integers using both:
    - Yellow and red chips (introduce zero pairs)
    - Number lines
- Explain in words what is happening
- Provide specific examples of each

Page 4: Addition of integers
- **Teach** how to add integers in mathematical expressions (without chips or a number line) by providing specific examples
- Write 4 word problems involving adding integers and relating to your theme. Do not solve. Your problems must include a mixture of negative and positive numbers and must make logical sense.

(20 points)

SUBTRACTION – Pages 5 and 6 – **Make sure to include a variety of samples** which show all the different possibilities for subtraction problems

Page 5: Subtraction of integers
- **Teach** how to subtract integers using both:
    - Yellow and red chips (make sure to include zero pair problems)
    - Number lines
- Explain in words what is happening
- Provide specific examples of each

Page 6: Subtraction of integers
- **Teach** how to subtract integers in mathematical expressions (without chips or a number line) by providing specific examples
- Write 4 word problems involving subtracting integers and relating to your theme. Do not solve. Your problems must include a mixture of negative and positive numbers and must make logical sense.

(30 points)

MULTIPLICATION AND DIVISION – Pages 7 and 8

Page 7: Rules for multiplying and dividing integers
- Create your own graphic to demonstrate "The Official Kissing Rules"
- Your graphic should relate to your theme in some way
- **Teach** (explain) how the rules work and how they apply to problems
- Provide specific examples with numbers

Page 8: Multiplying and dividing integers
- Write 5 problems which involve a mixture of multiplication and division of integers. You do not need any word problems.
- Write 5 problems which involve integers and order of operations. You must include at least one multiply or divide in each. Also include other operations (addition, subtraction), parenthesis, exponents, square roots, etc.

(20 points)

The following, in order, will play a major part in your overall grade:
1) Each topic above is completed with mathematical accuracy
2) Each topic is well explained (i.e. pretend you are teaching someone who has never seen a negative number before)
3) A wide variety of examples are given (combinations of positive and negative numbers)
4) Your overall use of a theme
5) Neatness, Colorful, Easy-to-follow

Want another example instead of the Kissing Rules? How about this one:
Good things happen to good people, this is good
Good things happen to bad people, this is bad
Bad things happen to good people, this is bad
Bad things happen to bad people, this is good

SURVIVAL GUIDE TO INTEGERS GRADING RUBRIC

NAME: _____

		Possible Points	Your score
Cover and Theme	Contains Theme	5	
	Says Survival Guide to Integers	3	
	Neat and interesting	2	
Intro to Integers	What are integers (definition/examples)	6	
	Where used in real-life	6	
	Opposite definition/examples	4	
	Absolute value definition/examples	4	
Addition	Add with chips (zero pairs)	3	
	Add on number line	3	
	Add mathematically	3	
	Written explanation	4	
	Wide variety of examples	4	
	Four word problems with +/- integers	3	
Subtraction	Subtract with chips (zero pairs)	4	
	Subtract on number line	4	
	Subtract mathematically	6	
	Written explanation	6	
	Wide variety of examples	6	
	Four word problems with +/- integers	4	
Multiplication/ Division	Kissing Rule table with theme	4	
	Apply rules in examples	3	
	Written explanation	4	
	5 problems	3	
	5 order of operation problems	3	
	10 correct answers listed	3	
TOTAL		100	

Integer – all whole numbers and their opposites (or positive and negative counting numbers and zero)

Absolute value – the distance a number is from zero. The absolute value of -8 is 8. The absolute value of 11 is 11. $\left|-8\right| = 8$ $\left|11\right| = 11$

Opposite of a number – To find the opposite, simply change the sign. A number and its opposite add up to zero. The opposite of 5 is -5. The opposite of -12 is 12.

Adding Integers	
two positives	Add the numbers like usual Adding a positive and a positive will create more positives.
two negatives	Add the numbers, put a negative sign in front of the answer Adding a negative and a negative will create more negatives.
one positive and one negative	When adding a positive and a negative, some positives and negatives will combine and cancel each other out. Ask: Do I have more positives or more negatives? The answer will determine the sign of the final answer. Then ask, how many more positives do I have than negatives (or how many more negatives do I have than positives?). This will determine the correct number to go with the sign.

Subtracting Integers	
all	Subtracting is the opposite of addition. Thus, the easy way to subtract a number is to simply **add its opposite**. Ex. 6 - -3 = 6 + +3 = 9 Ex. -12 – 7 = -12 + -7 = -19

Multiplying/Dividing Integers			
When multiplying and dividing, determine the number as with normal multiplication and division. Use the table below, The Kissing Rules, to determine the sign.			
Phrase to remember….	This x	this =	this
A girl sees a boy she likes (+). She does kiss him (+). She is happy (+).	+	+	+
A girl sees a boy she likes (+). She does not kiss him (-). She is sad (-).	+	-	-
A boy sees a girl he doesn't like (-). He does kiss her (+). He is sad (-).	-	+	-
A boy sees a girl he doesn't like (-). He does not kiss her (-). He is happy (+).	-	-	+

ADDING INTEGERS

When adding two positive integers, add the numbers together. Your answer is always going to be positive. Ex. 5 + 6 = 11

When adding two negative integers, add the two numbers together and place a negative sign in front of your answer. Ex. -6 + -3 = -9

When adding a positive and a negative integer, first ask yourself, "Are there more positives or negatives?" If there are more positives, you answer is going to be positive. If there are more negatives, then you answer is going to be negative. Then ask yourself, "How many more (negatives/positives) are there than (positives/negatives)?"

Ex. -8 + 6   Are there more negatives or positives? Negatives. How many more? 8 – 6 = 2. So there are 2 more negatives than positives and your final answer is -2.

SUBTRACTING INTEGERS

The easiest way to subtract integers is to always turn the expression into an addition problem.

To subtract an integer **add its opposite**. An integer and its opposite are the same distance from 0 on a number line so the integers 5 and -5 are opposites.

Then follow the rules above for adding.

Ex. -7 - -8   Change the problem to -7 + +8. There are more positives than negatives. How many more? One. So your answer is +1.

MULTIPLYING/DIVIDING INTEGERS

When multiplying or dividing integers, multiply and divide just like you would for positive numbers to get the number part of the answer. Then use the table below to determine the correct sign.

First Sign	Second Sign	Answer Sign	First Sign	Second Sign	Answer Sign
+	+	+	+	-	-
-	-	+	-	+	-
When multiplying two positives or two negatives, the answer is positive.			When multiplying one negative and one positive, the answer is negative.		

10 all-time hottest temperatures	
Obtained from state temperature records, NCDC	
1. Death Valley, California	134
2. Lake Havasu, Arizona	128
3. Laughlin, Nevada	125
4. Lakewood, New Mexico	122
5. Alton, Kansas	121
6. Steele, North Dakota	121
7. Ozark, Arkansas	120
8. Tipton, Oklahoma	120
9. Seymour, Texas	120
10. Usta, South Dakota	120
1. Prospect Creek, Alaska	-80
2. Rogers Pass, Montana	-70
3. Peters Sink, Utah	-69
4. Riverside, Wyoming	-66
5. Maybell, Colorado	-61
6. Tower, Minnesota	-60
7. Parshall, North Dakota	-60
8. Island Park Dam, Idaho	-60
9. McIntosh, South Dakota	-58
10. Couderay, Wisconsin	-55

Created by Lance Mangham, 6th grade teacher, Carroll ISD