Unit 4: Integers

- They are positive and negative WHOLE numbers

- The zero is neutral

- The sign tells the *direction* of the number:
  - ➤ Positive means to the right of zero on a number line
  - ➤ Negative means to the left of zero on a number line

- Every positive number has an opposite negative number of the same size.
  For example: -88 is the opposite of +88 because both are the same distance from zero.
  This means –88 and +88 has an *absolute value* of 88

Practice: Write an integer for each.

❶ 6 units to the left of 11 on a number line.	❷ 7 units to the right of ˉ2 on a number line.
❸ The stock market went down 291 points today.	❹ A loss of $35,535 on an investment.
❺ 20° below zero.	❻ Deposit $1,556 into a bank account.
❼ The opposite of 201.	❻ 8 units to the left of ˉ4 on a number line.

Put the integers in order from least to greatest.

❶ 8, 5, -10, -3, 9, -6, -4, 11, 2, 7, -7
❷ 6, 4, -11, 17, 18, -14, 7, 21
❸ -40, 44, -51, 24, 5, -48, -50, 49
❹ -5, -51, 21, -61, 42, -66, 5, 39, -31, -71, 31, 66

B I N G O

		INTEGER BINGO		

On the next page are a series of **Integers**, **Phrases** and **Operations**

1. Cut out each of the integers, phrases and operations;

2. Match each phrase or operation to an integer;

3. Glue 24 of the integers to the above BINGO card;

4. Get some bingo chips & you are ready to play INTEGER BINGO! ☺

Cut out each of these rectangles, there are 52 integers, phrases and operations in total. After you cut them out, match the integer with the phrase or operation. Once your teacher has checked your matches you will glue JUST the integers onto your BINGO card! ☺

⁻9	temperature started at -5 °C, it rose 13°	10	20° below zero.
1	5 units to the left of 11 on a number line	⁻11	The opposite of 27
6	Add six to negative one	8	7 units to the right of -16 on a number line
⁻17	Nine plus negative twelve	⁻7	Three greater than negative seven
3	Five more than a positive five	108	Four less than two
⁻16	Negative nine increased by nine	⁻3	Six above seven
5	Which is greater? ⁻11 or ⁻14	⁻20	Seven less than negative ten
20	Two greater than negative one	38	Three subtract ten
⁻2	The opposite of negative 108	0	Three more than negative four
13	Negative two plus negative twenty	⁻27	Eight less than negative eight
⁻1	Four left of negative twenty	⁻4	Five less than twenty five
⁻24	Six to the right of negative three	⁻14	The sum of negative two and 40
⁻6	Negative twenty increased by six	⁻22	Two decreased by eight

Practice:

❶ Place <, > or =.

   a) ⁻5 ◯ ⁻6   **b)** 11 ◯ ⁻11   **c)** ⁻22 ◯ 2

❷ Which integer is the correct answer to the following?

   a) The greatest integer less than zero _____

   b) The integer before ⁻30 _____

   c) The opposite of 7 _____

   d) One greater than ⁻5 _____

   e) Two less than ⁻12 _____

❸ Answer the following using integers from ⁻6 to 6.

   a) The integers less than 3 _____

   b) The integers greater than ⁻3 _____

   c) The integers less than ⁻1 _____

   d) The integers greater than ⁻2 _____

❸ Cars need good batteries, especially during the cold Canadian winters. Battery A is guaranteed to start at a temperature of ⁻40°C and battery B at a temperature of ⁻52°C. Scott thinks battery A is better in cold weather than battery B, because ⁻40 is greater than ⁻52. Do you agree? Why or why not?

Adding Integers

RULE #1

- If the signs are the same, pretend they are not there, add the numbers and put the sign of the numbers in the question with the answer

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

RULE #2

- If the signs are different, find the difference (subtract the smaller number from the larger number), and the sign of the answer is which ever there is more of in the question

$$(+8) + (-5) = +3$$

$$(-15) + (+6) = -9$$

- Integers of the same absolute value cancel each other out to equal zero

$$(+7) + (-7) = 0$$

Practice: Add.

❶ $^-7 + 5 =$ ❷ $21 + ^-14 =$ ❸ $^-80 + 90 =$

❹ $^-16 + ^-2 =$ ❺ $^+2 + ^+6 =$ ❻ $^-13 + ^-2 =$

❼ $40 + (^-5) =$ ❽ $(^-4) + 4 =$ ❾ $(^-9) + (^-9) =$

Subtracting Integers

Whenever we subtract integers, we *ADD* the *OPPOSITE*

Example: ① $^+5 - ^+3 =$ Example: ③ $7 - ^+6 =$

                 $^+5 + ^-3 = 2$ $7 + ^-6 = 1$

Example: ② $^-9 - ^-7 =$ Example: ④ $^-8 - 2 =$

                 $^-9 + ^+7 = ^-2$ $^-8 + ^-2 = ^-10$

Practice:

❶ ⁻7 − 5 =   ❷ 21 − ⁻14 =   ❸ ⁻80 − 90 =

❹ ⁻16 − (⁻2) =   ❺ ⁺2 − ⁺6 =   ❻ 5 − 11 =

❼ 18 − (⁻7) =   ❽ ⁻15 − (⁺9) =   ❾ (⁻3) − (⁻3) =

Multiplying Integers

- o   positive X   positive = positive
- o   negative X   negative = positive
- o   positive X   negative = negative
- o   negative X   positive = negative

Example: (⁻7) x (⁺2)

(-)   x   (+) = (-)

7 x 2 = 14

Therefore,   (⁻7) x (⁺2) = (-14)

If there is more than two numbers multiplied together:

Example: (⁻4) X (⁻3)   x 2 • ⁻3

⁺12 X 2 • (-3)

• means multiply

⁺24 • (⁻3) = - 72

Practice:

❶ ⁻7 x 5 =   ❷ 21 x ⁻14 =   ❸ ⁻80 x 90 =

❹ ⁻16 x ⁻2 =   ❺ ⁺2 • ⁺6 =   ❻ 4 x ⁻8 =

❼ 11• ⁻3 =   ❽ (⁻9) • (⁻3) =   ❾ 2 x ⁻2 • ⁻1 x (⁻4) x 3 =

Dividing Integers

The rules to follow are the same as multiplying:

- o   positive ÷ positive = positive
- o   negative ÷ negative = positive
- o   positive ÷ negative = negative
- o   negative ÷ positive = negative

Example: (⁻16) ÷ (⁺2)

(-) ÷ (+) = (-)

16 ÷ 2 = 8

Therefore, (⁻16) ÷ (⁺2) = (⁻8)

If there is more than two numbers divided together

Example: (⁻12) ÷ (⁻3) ÷ 2 ÷ ⁻1

(⁺4) ÷ 2 ÷ ⁻1

(⁺2) ÷ ⁻1 = (⁻2)

Practice:

❶ ⁻70 ÷ 5 =   ❷ 21 ÷ ⁻3 =   ❸ ⁻80 ÷ 10 =

❹ ⁻16 ÷ ⁻2 =   ❺ ⁺24 ÷ ⁺6 =   ❻ 12 ÷ ⁻4 =

❼ (⁻28) ÷ (⁻4) =   ❽ (27) ÷ ⁻9 =   ❾ ⁻36 ÷ 9 ÷ ⁻2 =

❿ 54 ÷ ⁻6 ÷ 3 =

⓫ Beth, Anne, and Scott guessed the temperature one cold morning. Beth's guess was 3°C too high. Anne guessed ⁻4°C. Scott's guess was 2°C lower than Anne's. Beth's guess was 1°C lower than Scott's. What was the temperature?

Integers and the Order of Operations (BEDMAS)

Follow the rules of BEDMAS (brackets, exponents, [division, multiplication], [addition, subtraction]).

If an integer is in the problem, first follow BEDMAS. When it is time to work with the integer, follow the rule for that integer.

Example: $21 \div (^-3) + (^-6)^2$

$^-6 \times {}^-6 = 36$

$21 \div (^-3) + 36$

$(^-7) + 36$

29

Practice:

❶ $22 - (^-2^2 \div {}^-2) \times {}^+6 \div 4 + {}^-10$

❷ $2 \bullet {}^-11 + {}^-5 - 8 \div {}^-4$

❸ $^-13 + (^-3^3 - 7) \div {}^+17 + {}^-18^0$

❹ $5 - 12 \div 2 + (^-36) + 37$

❺ $^-28 \div {}^-4 \bullet {}^-3 - (^-9 + {}^-9)$

❻ $^-5^2 \div (^-14 + 9) - 15 + (^+5)$

Integers & BEDMAS

Find the _mistakes_ and correct them by redoing each problem to the side.

a) 12 ● ⁻3 + 4 ● ⁻9

       36   ⁻36

          0

b) ⁻11 + ⁻3 + ⁻12 - 9

      ⁻14 + ⁻12 -9

        ⁻26 – 9

         ⁻17

c) ⁻15 ● ⁻3 ÷ ⁻5

      ⁻45 ÷ ⁻5

        9

d) ⁻10 ● 3 + 6 - 4

     ⁻10 ● 9 - 4

    ⁻10 ●   5

      ⁻50

Integer Review

Chris, Melodi, Jenna and Evan are waiting for their movie to start. They amused themselves by trying to express the number 24 in different ways. Which one of them was correct? **Show the work.**

    a)   Chris says : $2 + 8 \times 2 + 4$

    b)   Melodi says : $18 + (-2) - 8 \times 3$

    c)   Jenna says : $3 \times 6 + 12 \div 2$

    d)   Evan says : $(12 - 4) + 4 \times 2$

❷ Solve:

$$^-12 + (^-3) - (^-7) - 5$$

❸ Which number is the result of the following chain of operations?

$$^-2 + 3 \times 4 - 2$$

   **a)** -6   **b)** 8   **c)** 2   **d)** -14

❹ On the number line, which two integers are the same distances (**equidistant**) from **2**?

a)	-1 and 3	**b)**	-5 and 7
c)	-2 and 6	**d)**	-8 and 4

Show the number line.

❺ Gina operates the elevator in a large department store. She starts on the ground floor **(1ˢᵗ)** and takes her first group of shoppers to the **3rd floor**. Next she takes 2 shoppers **down 4 floors**; then she goes back **up 5 floors** with 5 shoppers and finally takes 1 shopper **down 4 floors.**

Which chain of operations will allow you to find the floor where Gina let off her last shopper?

5ᵗʰ floor	
4ᵗʰ floor	
3ʳᵈ floor	
2ⁿᵈ floor	
1ˢᵗ floor	
Ground floor	
1ˢᵗ basement	
2ⁿᵈ basement	
3ʳᵈ basement	
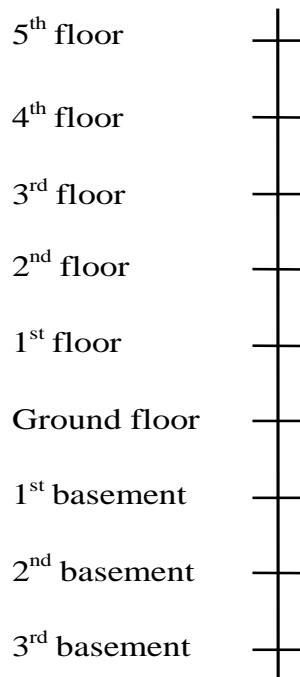
a) 3 + (-4) + 5 + (-4)
c) 3 + 4 + 5 + (4)

b) 3 + (-2) + (-4) + 5 + 5 + (-1) + (-4)
d) 3 + (-4) + 5 + (-1)

Where does Gina end up?

❻ A submarine, 52 metres below sea level, descends another 25 metres. A missile is fired 165 metres straight up from the submarine. Which of the following mathematical expressions best describes how many metres **above** the **ocean surface** the missile reaches?

a) -52 +165
c) -25 + 165

b) -52 + -25 + 165
d) 165

❼ Classify the following numbers into the appropriate column.

½ , 0, 0.25, -5, 45, 4 , -33, 3^3, $(-5)^2$, 3.6

Integers	Not integers

❽ The table below shows the maximum temperatures recorded on June 20 at different places in Canada.

Places	Maximum Temperature (°C)
LG2	-7
Inukjak	-3
Outaouais	20
Gaspé	13
Labrador	0

Which of the following lists the places in order from the coldest maximum temperature to the warmest?

a)   LG2, Inukjak, Outaouais, Gaspé, Labrador

b)   Outaouais, Gaspé, Labrador, Inukjak, LG2

c)   Inukjak, LG2, Labrador, Gaspé, Outaouais

d)   LG2, Inukjak, Labrador, Gaspé, Outaouais

❾ With words and numbers give an example of an integer in your daily life.
   Example: It is twelve degrees below zero. It is -12° C.
      A) An example of a positive integer (you cannot use temperature)

      B) An example of a negative integer (you cannot use temperature)

⑩ Draw a number line below (use a ruler) and label the positive and negative side. Show where the numbers **5, -13, 0 and -5** lie.

⓫ Solve the following expressions. **No calculator.**

42 + 63	⁻23 – 10
12 x 7	8 ÷ (⁻2)
(⁻8) x 6	-40 + 52
15 – 28	64 ÷ 4
12 – (⁻8)	37 + (⁻13)
(⁻25) ÷ (⁻5)	(⁻13) x (⁻5)
32 – (13)	13 + ⁻40
20 x (⁻20)	(⁻36) ÷ 6
(⁻5)³	40 ÷ (⁻2)²
13 + (⁻12) – 5	(⁻12) x (⁻6) ÷ (⁻3)
(3 + 2) × (⁻24 ÷ 6 – 2) ÷ ⁻6	(⁻2 + 4) + ⁻3 + (7 + ⁻9)

⓬ Write the appropriate symbol (<, > or =) in the circle.

A) ⁺5 ◯ ⁻2	B) ⁻20 ◯ ⁻22	C) 41 ◯ ⁻42
D) (⁻5) – (⁻4) ◯ 0	E) (⁻3) x 4 ◯ -5	F) 2² ◯ (⁻2)³

❶❷ Last December, Beth kept a record of the outdoor temperature taken at the same time each day for five days and gave it to her Science teacher Mr. Ross. Here are her results :

DAY OF THE WEEK	TEMPERATURE (in °C)
Monday	-5
Tuesday	-2
Wednesday	0
Thursday	3
Friday	-1

Explain why Monday has the largest number, 5 (ignoring the negative sign), yet is the coldest day.

❶❸ Create a BEDMAS problem with an **answer of ⁻3**

You must include:

✓ At least one set of brackets

✓ At least one exponent

✓ All four operations (+, -, x, ÷) at least once

You must solve the problem to show that it works.

Integer Assignment

Designing a Mathlete Jersey

o Your task is to create a mathlete jersey sporting a chosen number

o You must choose a number between ⁻75 and 75

o The number will be on the front of your jersey

o On different locations of the jersey (back, arms, collar, etc.) describe properties of your number

o Examples of properties: factors, multiples, and divisibility

o Somewhere on the jersey, you must create a mathematical sentence (a BEDMAS problem), where the answer is your number. Your sentence must include at least one (can be more) of each of the following:

   ✓ Brackets
   ✓ Exponent
   ✓ Each operation (+, -, x, ÷)
   ✓ A decimal or a fraction

	Descriptive Evaluation Chart for Competency 3			
	Communicates by Using Mathematical Language			
	Observable Indicators of Student Behaviour			
	Level 5	**Level 4**	**Level 3**	**Level 2**
Cr2 **Production of a message suited to the context, using appropriate mathematical terminology and following mathematical rules and conventions**	• Produces a jersey that includes all given criteria. • Extra properties may be given • Level of complexity (difficulty) of the mathematical sentence is beyond expectations. • Perfectly observes the rules and conventions of mathematical operations.	• Produces a clear, well-organized jersey that includes the given criteria. • Level of complexity of the mathematical sentence is somewhat difficult. • Observes the rules and conventions of mathematical operations with a few minor mistakes or omissions.	• Produces a jersey that includes some of the given criteria. • Level of complexity of the mathematical sentence is basic, giving one of each requirement. • Makes some errors or lacks precision in applying the rules and conventions of mathematical operations.	• Produces a jersey that includes few of the given criteria. • Level of complexity of the mathematical sentence is elementary, with a few requirement missing • Makes many errors related to the rules and conventions of mathematical language.