

Unit 1

Integers and Algebraic Expressions

Grade 8

Lesson Outline

BIG PICTURE

Students will:

- review adding and subtracting of integers in context;
- develop estimation skills for solving everyday problems;-
- develop an understanding of multiplication and division by and of integers (making use of both manipulatives and algorithms);
- solve problems requiring an understanding of integers and their arithmetic manipulation;
- evaluate arithmetic and algebraic expressions involving integers and including brackets and exponents, emphasizing the need for knowing and following the order of operations.

Day	Lesson Title	Math Learning Goals	Expectations
1	A Positive Attitude Toward Negative Numbers	<ul style="list-style-type: none"> • Re-establish necessary conceptual understanding and skills required for this unit. • Mastery of adding and subtracting integers and contextualizing these operations in real life. • Show that addition and subtraction are inverse operations. 	8m18, 8m22 CGE 2b, 7b
2	Living with Negatives	<ul style="list-style-type: none"> • Solve a variety of application questions requiring the choosing of operations and the applying of skills (adding/subtracting) with integers. 	8m18, 8m22 CGE 3c
3	Unfamiliar Territory	<ul style="list-style-type: none"> • Explore and investigate multiplication of integers with opposite signs using a variety of approaches, e.g., patterns in a multiplication table; multiplication as repeated addition of sets. • Investigate multiplication of integers within everyday contexts to deepen understanding. 	8m18, 8m22 CGE 3c, 7b
4	Getting Used to the Territory	<ul style="list-style-type: none"> • Solve simple problems requiring the multiplication of integers with opposite signs. • Explore multiplication of integers with the same sign, utilizing the approaches from the previous day. 	8m21, 8m22 CGE 5b
5	Writing Letters in Math Class	<ul style="list-style-type: none"> • Review the use of algebra in real life and evaluate algebraic expressions with integers. 	8m59, 8m62 CGE 3c, 7b
6	It's the Inverse	<ul style="list-style-type: none"> • Investigate division of integers. • Connect the operation of division as the inverse of the operation of multiplication. Provide examples where division is either partitive or quotative, i.e., How big is one share? How many equal shares? 	8m21 CGE 4b, 4f, 5a
7	Dividing It Up	<ul style="list-style-type: none"> • Solve simple problems requiring the division of integers. 	8m21, 8m22 CGE 5b, 7b
8	But Is It Useful?	<ul style="list-style-type: none"> • Solve problems requiring multiplication and division of integers, utilizing estimation as well as calculation. 	8m18, 8m21, 8m22 CGE 3c, 5b
9	Now, What Did BEDMAS Stand For?	<ul style="list-style-type: none"> • Operate with integers by evaluating arithmetic expressions requiring the application of Order of Operations. 	8m20, 8m23 CGE 3c, 5b

Day	Lesson Title	Math Learning Goals	Expectations
10	Putting It Together	<ul style="list-style-type: none"> Evaluate algebraic expressions requiring the multiplication and division of integers. 	8m62 CGE 4b, 4f
11	Life's Full of Numbers	<ul style="list-style-type: none"> Solve problems requiring operating with integers and explaining the thinking behind the solutions. 	8m18, 8m21, 8m22, 8m23 CGE 2b, 2c
12	Summative Assessment		



Math Learning Goals

- Students will re-establish necessary conceptual understanding and skills required for this unit.
- Students will gain mastery of adding and subtracting integers and contextualizing these operations in real life.
- Students will show that addition and subtraction are inverse operations

Materials

- BLM 1.1.1
- BLM 1.1.2
- BLM 1.1.3
- Decks of cards for pairs of students
- Paper and pencil
- Wall Anchor poster

Minds On...

Whole Class → Investigation

Students play Integer Football:

Have the classroom or large area (gymnasium or outdoor area) marked out as a football field. The centre line is 0, while one end is the +50 goal line and the other end is the -50 goal line. You will need to mark off 5 unit increments on each side. Any position on the field is determined by a signed number between +50 and -50.

Break students into two teams: positive and negative. The positive team moves towards the positive goal line and the negative team moves towards the negative goal line.

If the negative team starts on the -20 yard line and has a loss of 20 yards, it will be on the +5 yard line.

Use the changes on BLM 1.1.1 to move the teams around the field; have a QB come and pick a change for their team. Have a designated student from each team be the “ball” for that turn, allowing every student a turn, and have three downs. After three downs, the other team takes the field. Have the team members tell the student where to go on the field.

Play continues until a team scores a touchdown or teacher feels enough time has passed for students to have grasped the concept.

Teacher Tip:

Look for students who find patterns in the game.

Action!

Whole Class → Connecting

Lead the class into a discussion about the most important ideas/rules/patterns discovered during the game.

- What happened when the negative team GAINED (added) yards?
- What happened when the positive team GAINED (added) yards?
- What happened when the negative team LOST (subtracted) yards?
- What happened when the positive team LOST (subtracted) yards?

In groups, have the class come up with rules or patterns for adding and subtracting integers. Go over each groups’ conclusions.

As a class, create class rules for adding and subtracting integers and put them, along with illustrations, on a pre-made Wall Anchor poster. Give students BLM 1.1.2 to make notes on.

Content Expectations/Observation/Mental Note: Circulate to assess whether or not students can make connections to the patterns in the football game. The recognition and understanding of these patterns is key to success in this unit.

Consolidate Debrief

Small Group → Integer game

Students work in groups of two and play the Integer WAR game.

Students are given a deck of cards: red cards are positive integers from 1-13 and black cards are negative integers from 1-13. Decks are shuffled and two cards are turned over at the same time. Students write down an addition or subtraction expression using the numbers shown. The person to make the largest number by adding or subtracting wins a point.

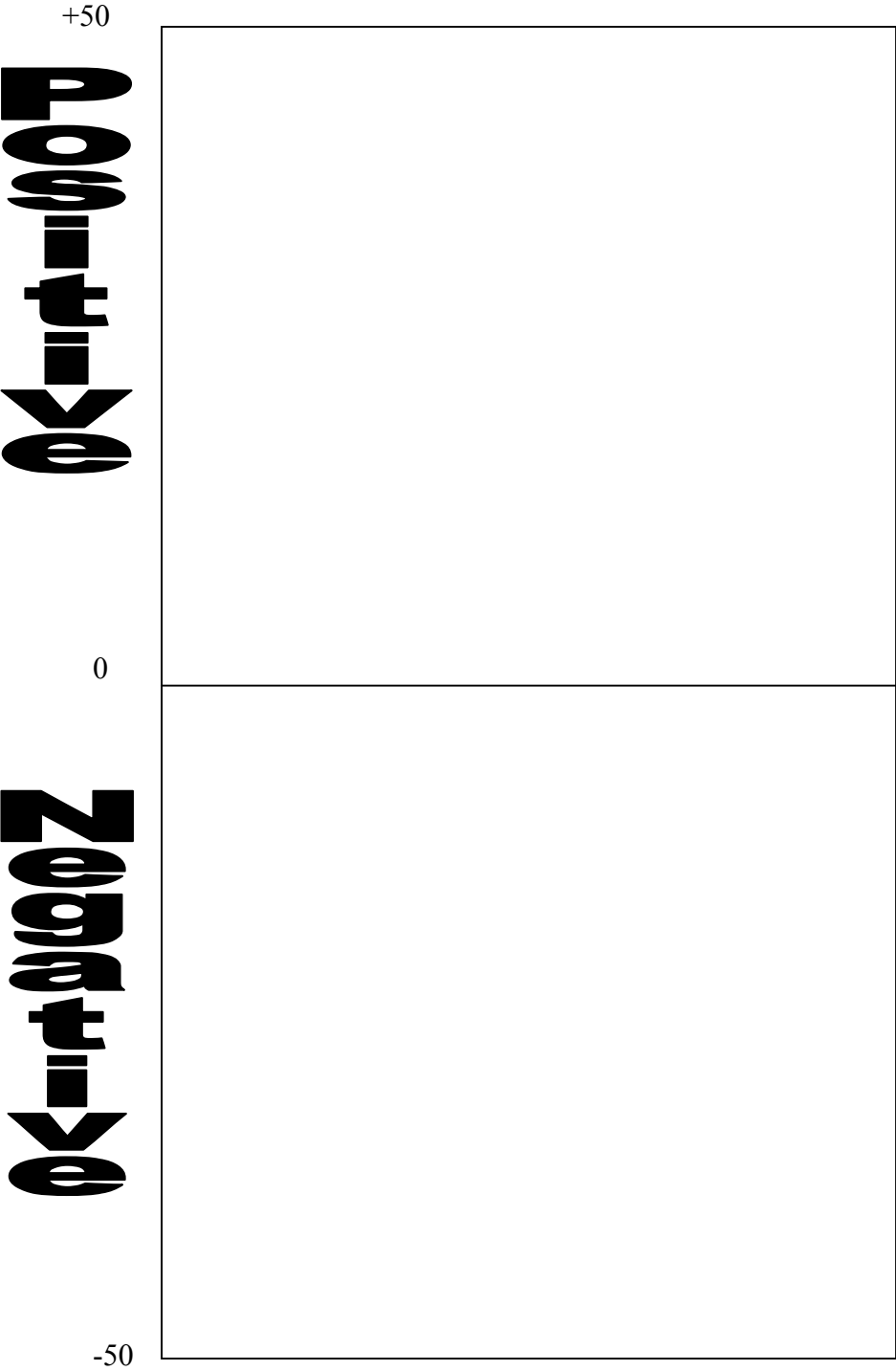
Exploration Reflection

Home Activity or Further Classroom Consolidation

Students complete BLM 1.1.3

1.1.1: Possible Football Moves**Grade 8**

Gain of 10 yards	Loss of 10 yards	Gain of 2 yards	Loss of 2 yards	Gain of 20 yards
Loss of 20 Yards	Gain of 1 yard	Loss of 1 yard	Gain of 19 yards	Loss of 19 yards
Gain of 15 yards	Loss of 15 yards	Gain of 5 yards	Loss of 5 yards	Gain of 30 yards
Loss of 30 yards	Gain of 35 yards	Loss of 35 yards	Gain of 12 yards	Loss of 12 yards
Gain of 50 yards	Loss of 50 yards	Gain of 80 yards	Loss of 80 yards	Gain of 100 yards



1.1.3: Inverse Operations Take Home Activity Grade 8

How could the ball get from the +40 yard line to the -10 yard line if the negative team had the ball? What if the positive team had the ball?

If the positive team had a gain of 20 yards and a loss of 30 yards and ended up at the -20 yard line, where did they start?

$10 - 20 =$	$10 + -20 =$
$-30 + 40 =$	$-30 - -40 =$
$-40 - 10 =$	$-40 + -10 =$



Math Learning Goals

- Students will solve a variety of application questions requiring the choosing of operations and the applying of skills (adding/subtracting) with integers.

Materials

- BLM 1.2.1, 1.2.2, 1.2.3
- Algebra tiles
- Coloured counters
- Number line
- Thermometer
- Calculator

Minds On...

Whole Class → Problem Solving

Have a big problem on the board for when students enter the classroom. The problem should address concerns with notation (e.g. Owed money is represented using a negative sign) and allow for incorrect notations to be discussed (representing owing money with a positive amount).

Example Problem: Emmanuelle owes her brother \$20 for a CD he bought for her and is getting \$10 from her grandmother for mowing the lawn. If she started out with \$25, how much money will she have now? Have students share solutions and discuss any discrepancies.

Action!

Small Group → Connecting

Set up five stations around the classroom and break students into groups around each station. See BLM 1.2.1 for activities for each station.

Recommended manipulatives:

Station A: algebra tiles, Station B: coloured counters/ two-colour discs, Station C: number line, Station D: thermometer, Station E: calculator.

Give students BLM 1.2.2. Allow students sufficient time at each station to discuss the problem and record their work.

Content Expectations/Observation/Mental Note: Circulate to assess whether or not students are understanding and using the rules discussed on Day 1. The recognition and understanding of these rules is key to success in this unit.

Consolidate Debrief

Whole Class → Discuss

As a class, summarize and discuss their results from the ‘Action!’ section. Have students put samples of their answers to each station on the board and discuss other possible representations. Discuss which manipulatives worked best for what situations.

Exploration Reflection

Home Activity or Further Classroom Consolidation

Students complete BLM 1.2.3

1.2.1: Activity Centers

Grade 8

Center A:

Jim is on the golf course. He has the following results for the first three holes: +3, par and -2. What is his total score at this point? Is the answer positive or negative? How do you know this? Model your work using the manipulative provided and then record your work on your record sheet.

Center B:

You are buying a barrel of 35 apples. As you pick up the barrel you notice there are some bad apples in the barrel. You remove the bad apples and have 20 apples left. How many bad apples were there? Is the answer positive or negative? How do you know this? Model your work using the manipulative provided and then record your work on your record sheet.

Center C:

You and your friends live on the same street. One friend lives to the East of you and the other lives to the West. You walk the three blocks West to pick up your first friend and then walk five blocks East to visit your other friend. How far does the second friend live from you? Is the answer positive or negative? How do you know this? Model your work using the manipulative provided and then record your work on your record sheet.

Center D:

A temperature gauge in an airplane measures the following changes in temperature after takeoff: + 2⁰ C, - 30⁰ C and +20⁰ C. If the plane landed in Montreal and the temperature there was 26⁰ C, what was the temperature when the plane took off? Is the answer positive or negative? How do you know this? Model your work using the manipulative provided and then record your work on your record sheet.

Center E:

Benny gets paid \$500 every two weeks. After his paycheck is deposited, he has to pay his cell phone bill of \$30 and buy a birthday gift for his girlfriend. If Benny has \$390 left in his account, how much did he spend on the gift? Is the answer positive or negative? How do you know this? Model your work using the manipulative provided and then record your work on your record sheet.

1.2.2: Student Work Sheet for Activity Centers Grade 8

Center A:
Center B:
Center C:
Center D:
Center E:

1.2.3: Living with Negatives

Grade 8

For each problem below, please indicate

- what operation(s) you will use to solve the problem and
- whether the result will be positive or negative

Choose TWO problems to solve completely.

Brent scores a -2 on Hole 1, +4 on Hole 2 and par on Hole 3. He forgets to write his score for Hole 4 but his friend has his total score as par for the course so far. What did Brent score on Hole four?

Marie is buying light bulbs for her Christmas decorations. She buys 12 but when she gets to the cash, she has to put back four because they are broken. How many light bulbs does Marie buy?

You are tracking the movements of an ant as he searches for food for a science project. You notice that he travels 10 m north of the colony and then moves 60 m south. How far away from the colony is the ant when he finally finds food?

Annie monitors the temperature in her swimming pool on a daily basis. On Monday it was 25°C and then it dropped two degrees before climbing five degrees by Friday. What was the temperature of the pool on Friday?

Phil gets paid \$500 every two weeks. After getting paid he had to pay \$30 for repairs to his skateboard, but then received a check from his grandparents for his birthday. If his balance is \$520, how much did he receive from his grandparents?

Students share their findings from BLM 1.1.1, record any corrections and add ideas to their definitions/models.

Lead the class in a discussion about the most important ideas/rules/patterns when multiplying integers. Add ideas to the class anchor chart from Day 1 (BLM 1.1.2).

Content Expectations/Observation/Mental Note: Circulate to assess whether or

Grade 8

Materials

1.1.3.1

1.1.3.2

Students who
struggle with the
calculations could
use a standard
multiplication table
calculator in
order to ensure
accuracy during
their class time
spent on looking
for patterns,
rather than
calculating.

1.3.1: Integer Multiplication Table

Grade 8

X	5	4	3	2	1	0	-1	-2	-3	-4	-5
5											
4											
3											
2											
1											
0											
-1											
-2											
-3											
-4											
-5											

What patterns do you see on the multiplication table?

1.3.1: Integer Multiplication Table Continued

Grade 8

Write a rule and draw a model to show what happens when:

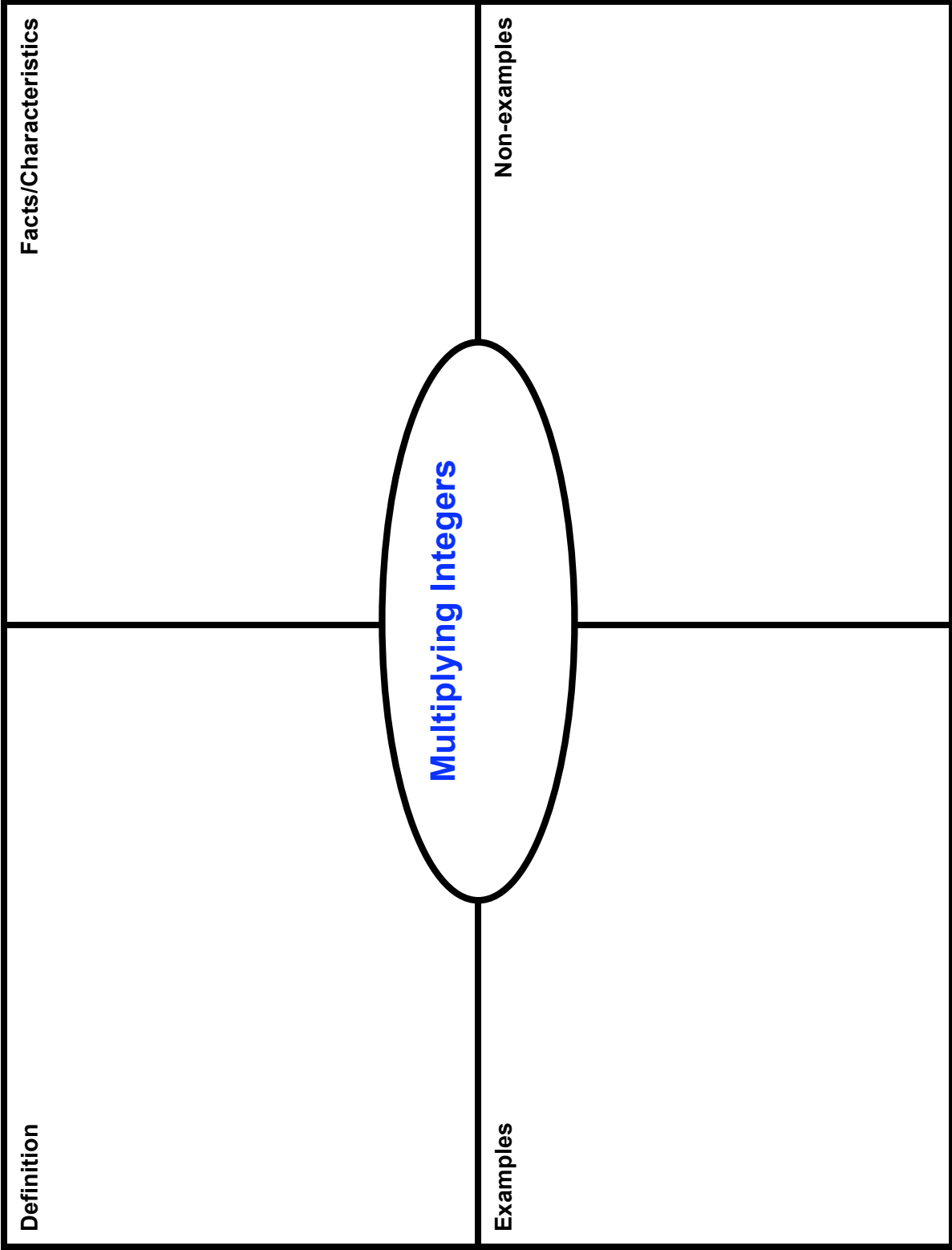
You multiply two positive integers:

You multiply a positive and negative integer:

You multiply two negative integers:

1.3.2: Frayer Model: Multiplying Integers

Grade 8





Math Learning Goals

- Students will solve simple problems requiring the multiplication of integers with opposite signs.
- Students will explore multiplication of integers with the same sign, utilizing the approaches from the previous day.

Materials

- BLM 1.4.1
- BLM 1.4.2
- Sets of materials for each station: three bags, cut out tags
- Optional: monopoly money

Minds On...

Whole Class → Discussion

Students will discuss examples they thought of during the Day 3 homework task. Put student examples on the board, making sure to expand on the examples and having the students explain HOW you would use multiplication each situation.

Action!

Small Groups → Connecting

Students are broken into small groups. Each group is sent to a “store”. At the store they find three bags: an item bag with a cost indicated, a quantity bag and a discount/penalty bag. Each shopper picks one tag from each bag and “buys” the item (s). Students will then perform the calculations on the Receipt page (BLM 1.4.2).

Every shopper starts with the same amount of money in his or her wallet. If available, use play money and act as the cashier for the students: have students present you with their worksheet and only give them their “purchase” and change if they calculated their total correctly.

The shopper who visits all stores and has the most money left is deemed the best shopper. Note: Some shoppers may be unable to purchase items because they do not have enough cash on them. They must prove that they are unable to purchase anything at this store and explain why. All students must visit all five stores.

■ Group students according to their ability level and change the money amounts (add decimals) to suit their skill level.

Consolidate Debrief

Individual → Journal

Students answer, in their journals, the questions:

- What was the hardest part of today’s activity?
- What was the easiest part? Why?

Exploration Reflection

Home Activity or Further Classroom Consolidation

In your journal answer the following question:

- How do you know whether an integer multiplication expression will give you a positive or negative product?
- Give five examples of each type. Show some with same and some with opposite signs.

1.4.1: Smart Shoppers' Store Information

Grade 8

Bag 1: Item with Price

Store A: Electronics

1 pack of batteries: \$3	1 mp3 player: \$80	1 pair of ear buds: \$20	1 battery charger: \$10	1 video game: \$15
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Store B: Clothing

1 T-shirt \$5	1 pair of socks: \$2	1 pair of jeans: \$20	1 pair of shorts: \$15	1 pair of shoes: \$50
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Store C: Groceries

12 pack of pop: \$5	1 bag of chips: \$2	1 box of chocolates: \$20	1 bag of apples: \$10	1 carton of ice cream: \$8
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Store D: Fast Food

Small Fry: \$1	Cheeseburger: \$3	Slice of Pizza: \$2	Large Pop: \$4	Salad: \$7
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Store E: Accessories

1 pair of earrings: \$10	1 purse: \$20	Gift wrap and card: \$10	1 wallet: \$10	1 hat: \$15
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Bag 2: Quantities

1	1	2	2	3
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Bag 3: Discount/Penalty

\$10 off ENTIRE purchase	\$1 off each item	OOPS! Add \$2 to the price of the item	\$20 off your purchase	Add \$20 in taxes
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Amount	Item and Price	Discount/Penalty	Cost	Balance



Math Learning Goals

- Students will review the use of algebra in real life and evaluate algebraic expressions with integers.

Materials

- Computers with access to either www.explorelearning.net (subscription) or www.nlvms.usu.edu (free)
- BLM 1.5.1

Minds On...

Partner → Reflection

Post an algebraic expression on the board. Students will work with a partner to reflect on the following reflection questions in their math journals:

- What does the letter in the algebraic expression represent?
- Why do we use letters in algebraic expressions?
- Describe what each symbol in the expression means in everyday language (e.g. = means “the same as”)

Depending on student readiness, provide several examples of varying difficulty levels and allow students to choose one.

Action!

Individual → Technology Exploration

Option A: If your board has a subscription, students can login to www.explorelearning.com, click on the ‘algebra’ link in the grade 6-8 box and begin with the “Modeling One-Step Equations” Gizmo. Students can complete and print the self-check quiz. Students will follow-up with the “Modeling two-step Equations” Gizmo and quiz.

Option B: If your board does not subscribe to ExploreLearning, or you would like further practice, students can use the applet from the National Library of Virtual Manipulatives at www.nvlm.usu.edu. Click on the grade 6-8 algebra link. Students can explore the “Algebra Balance Scales-Negatives” applet. Create reflection questions if further information is needed for assessment purposes.

Content Expectations/Observation//Mental Note: Circulate while students work on the computers and note any confusions/areas needed for remediation. If needed, use one of the “Instructional Jazz” days to remediate

Teacher Tip: Before taking a class to the lab, make sure school computers will open one of the two sites and activities. If not, your board may subscribe to a suitable substitute.

Consolidate Debrief

Whole Class → Discussion

Review the online tools and discuss how the applications are helpful. This is an ideal opportunity to address any questions and/or misconceptions that came up while working on the computers.

Exploration Reflection

Home Activity or Further Classroom Consolidation

Complete the practice questions on BLM 1.5.1.

1.5.1: Thinking Algebraically

Grade 8

For each of the following word problems, write an algebraic expression that represents the problem. Choose THREE of them to solve completely.

1. You are selling drinks at the school dance. You have a cooler, which holds 35 cups. The canteen gets busy and you lose track of how many cups you sold. You check and see that there are 17 cups left in the cooler. How many drinks must you have sold?
2. You are visiting a friend and their dog gets loose. You chase the dog to try and catch it. You chase it 2 blocks east; it turns and goes 5 blocks west, then 8 blocks east, then another 2 blocks east, 7 blocks west and 1 block east before you finally catch the dog. Use positive numbers to represent east blocks, and negative numbers to represent west blocks. How far are you from your friend's house when you catch the dog?
3. You buy tickets to a concert for you and your friends. You buy ten tickets at \$12 each. Some of your friends pay you back. You are still owed \$36 in the end. How many of your friends paid you back?
4. Your school is having an open house. They decide to make bumper stickers with the school logo. The school budgeted \$220 for the stickers. It costs \$40 to make the design and another \$2 for each sticker. How many stickers can the school buy?
5. You go grocery shopping for fruit and spend \$24. If you spent an equal amount on apples, bananas, oranges, kiwis, strawberries and pears, how much money did you spend on each type of fruit?



Math Learning Goals

- Students will investigate division of integers
- Students will connect the operation of division as the inverse of the operation of multiplication through examples where division is either partitive or quotative, i.e., How big is one share? How many equal shares?

Materials

- BLM 1.6.1
- BLM 1.6.2

Minds On...

Individual → Reflection

Post a division question on the board (5 people are sharing a 15 slice pizza). Students work on the following questions in their journals:

- Represent this situation using multiplication.
- Represent this situation using division.
- How are multiplication and division related?

Depending on student readiness, several examples of varying difficulty levels could be provided. Allow students to choose one or work in partners.

Action!

Individual → Knowledge/Understanding

Students complete BLM 1.6.1 individually.

After sufficient time has passed for students to attempt the work, group them with their partners and have them discuss their conclusions.

Content Expectations/Observation//Mental Note: Circulate while students work on the worksheet and note any confusions/areas needed for remediation. If needed, use one of the “Instructional Jazz” days to remediate.

Consolidate Debrief

Whole Class → Discussion

Review BLM 1.6.1, discussing any patterns observed and emphasizing that division is the inverse of multiplication and vice versa. Address any questions/misconceptions that came up while working on the sheet. As a class, discuss the rules the groups came up with and then decide as a class what the rule for multiplying and dividing integers is. Add this information to the Anchor Chart from previous lessons (BLM 1.1.2).

Exploration Reflection

Home Activity or Further Classroom Consolidation

Complete the following question in your journal:

- How many DIFFERENT ways can you show 24 as a quotient?
- How many DIFFERENT ways can you show -24 as a quotient?
- Compare your results for both numbers.

Complete BLM 1.6.2.

Teacher examples of Fact trees are provided at the end of BLM 1.6.2. You may want to work with students through a few examples before assigning BLM 1.6.2

1.6.1: Fact Families

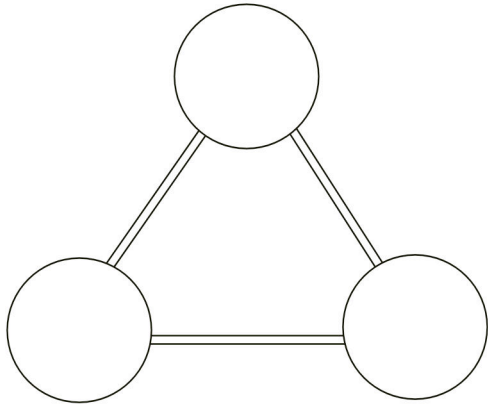
Grade 8

$3 \times 4 =$ $12 \div 4 =$ $12 \div 3 =$	$-3 \times 4 =$ $-12 \div -3 =$ $-12 \div 4 =$
$5 \times -3 =$ $-15 \div 5 =$ $-15 \div -3 =$	$-4 \times -5 =$ $20 \div -4 =$ $20 \div -5 =$
$-6 \times -4 =$ $24 \div -6 =$ $24 \div -4 =$	$-2 \times 8 =$ $-16 \div -2 =$ $-16 \div 8 =$
$-3 \times -10 =$ $30 \div -3 =$ $30 \div -10 =$	$-4 \times 8 =$ $-32 \div -4 =$ $-32 \div 8 =$

1.6.2: Fact Family Trees

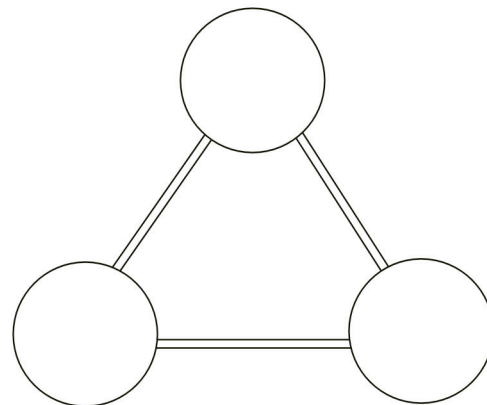
Grade 8

Choose a fact family that we haven't explored yet (it should include at least one negative number), and put each number in a corner of the triangle. Write the related multiplication and division expressions that can be represented by these numbers.



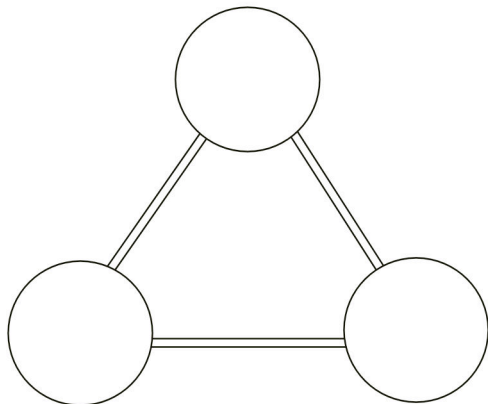
Fact Family:

- 1.
- 2.
- 3.



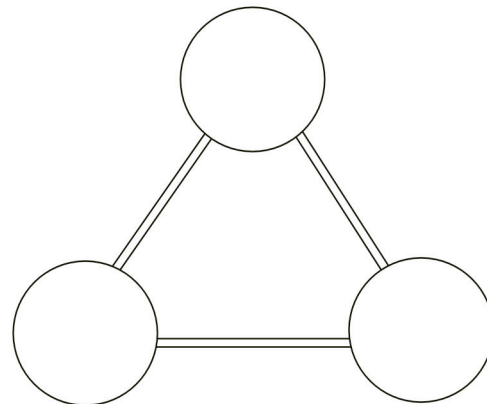
Fact Family:

- 1.
- 2.
- 3.



Fact Family:

- 1.
- 2.
- 3.



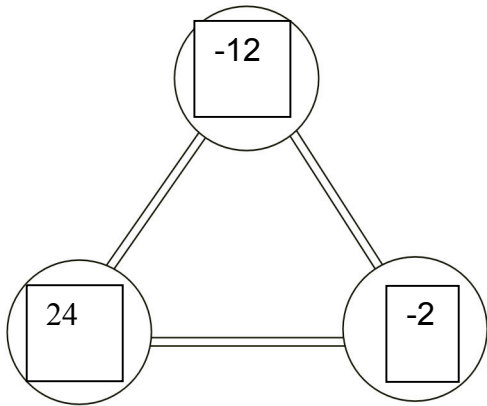
Fact Family:

- 1.
- 2.
- 3.

1.6.2: Fact Family Trees Solutions

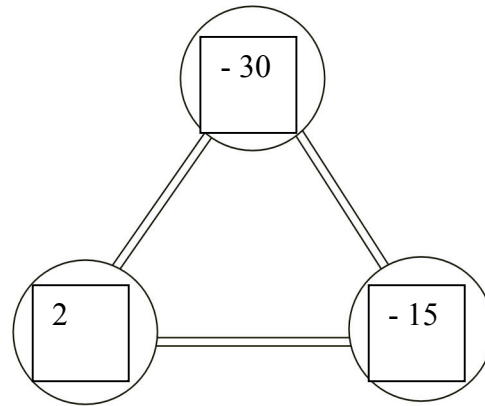
Grade 8

Teacher Example of Fact Family Trees from BLM 1.6.2



Fact Family:

1. $-12 \times -2 = 24$
2. $24 \div -12 = -2$
3. $24 \div -2 = -12$



Fact Family:

1. $-30 \div 2 = -15$
2. $-30 \div -15 = 2$
3. $-15 \times 2 = -30$



Math Learning Goals

- Students will solve simple problems requiring the division of integers

Materials

- BLM 1.7.1
- Chart Paper
- Chart Markers
- Manipulatives

Minds On...

Whole Class → Discussion

Discuss and review the work from the *At Home Activity* assigned on Day 6, re-emphasizing the main concepts (rules for dividing and multiplying integers).

Action!

Small Groups → Problem Solving

Students are broken into small groups of three. Each group is given a Big Problem Sheet (see BLM 1.7.1). Each group works through the problem together, using whatever manipulatives they may need and documenting their thought process on Chart Paper. When they are satisfied with their work, each group can post their chart paper in the classroom.

Consolidate
Debrief

Whole Class → Discussion

Review the chart papers as a class and group them according to similarities in problem solving technique, manipulative used, answer etc. (BANSHO) Address any questions/misconceptions that may be evident on the papers. As a class, discuss the method/manipulative that seems the most effective, the most creative, etc. Make sure students have a good understanding of the basics of operations with integers.

Exploration
Reflection

Home Activity or Further Classroom Consolidation

Complete the practise questions.

Provide students with appropriate practice questions showing multiple ways of representing division of integers.

1.7.1: Big Problem Sheet

Grade 8

Jimmy is planning on making a new deck in his backyard this spring.

1. He must wait until the ground reaches a temperature of 6 degrees Celsius before he can begin building. Jimmy knows that, on average, the temperature increases 2 degrees Celsius per week in the spring. If the temperature is -12 now, how long must Jimmy wait before he can begin work?
2. Jimmy's deck is going to be 100 m². He has calculated that it will cost him \$50/m² for all the materials needed to build his deck. Jimmy has \$5500 on his credit card for this project. Does he have enough money to complete this project?
3. The Housing Depot offers Jimmy a great deal: no interest on his project, if he pays it off in a year. How much will Jimmy have to pay each month so that he is debt free in a year?
4. Jimmy has a BBQ to celebrate the completion of his deck. He needs to buy hot dogs for 20 people. Hot dogs come in packs of 8 and hot dog buns come in packs of 12. How many of each does he need? Does he have any leftovers? How much?



Math Learning Goals

- Students will solve problems requiring multiplication and division of integers, utilizing estimation as well as calculations

Materials

- BLM 1.8.1

Minds On...

Whole Class → Brainstorming

Brainstorm the possible real life examples of multiplication and division of integers as a group, listing them on the board.

Review the process of estimation. E.g. Measure the length of your hand and then use that to estimate the width of your desk.

Action!

Small Groups → Problem Solving

Students are broken to teams of two. The teams will move around to workstations set up around the classroom. At each station, each partner will complete a question: one involving estimation and the other involving calculation (BLM 1.8.1). The students switch the question they answer at every station; if they answered by estimating at Station 1, they will answer by calculation at Station 2. After all stations have been completed, partners compare answers and discuss the results.

**Consolidate
Debrief**

Whole Class → Discussion

Review the results and discuss the processes used to solve the problems at each station. Discuss when estimation was a good tool to use and when it was not. Why did different people get different answers when they estimated?

*Exploration
Reflection*

Home Activity or Further Classroom Consolidation

Answer the following in your journal:

- When would estimation be a good tool to use?
- When would it not be a good tool to use? Why?

1.8.1: Action Stations

Grade 8

<p>Find the width of your baby finger and use that measurement to estimate the length of this line:</p> <hr/>	<p>Use a ruler to measure the length of this line:</p> <hr/>
<p>If potatoes cost \$2.99/kg, estimate how much it costs to buy a 5 kg bag of potatoes.</p>	<p>How much does a 5 kg bag of potatoes cost if the price is \$2.99/kg?</p>
<p>You want to paint the wall behind your bed. It has an area of 120m^2. If one can of paint covers 35m^2, estimate how many cans you will need.</p>	<p>You know the area of the wall behind your bed is 120m^2. If one can of paint covers 35m^2, how much paint will you need?</p>
<p>If Andy pays \$10 a month to his parents for a bicycle they bought him, estimate how long it will take him to pay them back if the bicycle cost \$126.</p>	<p>A bicycle cost \$126. If Andy pays \$10 a month, how long will it take for him to pay off the bicycle?</p>
<p>Your American cousin wants to know how cold Canada gets in the winter. Our coldest temperature this past winter was -40 degrees Celsius. Your mother tells you to double it and add thirty to convert to Fahrenheit. What temperature do you tell your cousin?</p>	<p>Convert – 40 degree Celsius to Fahrenheit by doing the following:</p> <ul style="list-style-type: none">- add 32- multiply by 9- divide by 5



Math Learning Goals

- Students will operate with integers by evaluating arithmetic expressions requiring the application of Order of Operations

Materials

- BLM 1.9.1
- BLM 1.9.2
- BLM 1.9.3
- Calculators

Minds On...

Individual → Reflection

Hand out BLM 1.9.1 to each student. Have them complete it individually. When enough time has passed, have students' volunteer to present their problems. Have the class evaluate the process, making sure that everyone understands and uses the correct Order of Operations. Ask why the Order of Operations is important.

Action!

Partners → Problem Solving

Students are broken into teams of two and given BLM 1.9.2. Each person in the team will create five problems similar to the one just completed as a class. Then they will pass their problems to their partner and attempt to complete the partner's problems.

Consolidate Debrief

Individual → Reflection

Students complete BLM 1.9.3 individually.

Exploration Reflection

Home Activity or Further Classroom Consolidation

Complete BLM 1.9.3 if it not completed by the end of class.

- Possible Answers
1. $3 + 2 \times (6^2 - 4)$
 2. $(3 + 2) \times (6^2 - 4)$
 3. $(3 + 2) \times 6^2 - 4$
 4. $3 + 2 \times 6^2 - 4$
- Other possibilities may come up

1.9.1: Mystery Operations

Grade 8

Fill in the blanks with a mathematical operation (addition, subtraction, multiplication and division) to make the integer equation true. Don't forget to use brackets if you need to!

1. $3 _ 2 _ 6^2 _ 4 = 67$

2. $3 _ 2 _ 6^2 _ 4 = 160$

3. $3 _ 2 _ 6^2 _ 4 = 176$

4. $3 _ 2 _ 6^2 _ 4 = 71$

How is it possible that the SAME four numbers can give such DIFFERENT results?

1.9.2: Jumbled Operations

Grade 8

Using the numbers provided, create an integer expression with one of the numbers as an answer. Remember to follow the rules of BEDMAS!

Group 1: -1, 2, -3, 4, -5

Group 2: 0, -2, 3, 9, 1

Group 3: -10, -2, 5, 2, 20

Group 4: -20, 20, 2, 1

Group 5: 1, 2, 3, 4

1.9.3: Missing Operations

Grade 8

Fill in the blanks to make the following Integer Equations true statements.

$3 \times \underline{\quad} = -12$

$-48 \underline{\quad} -12 = 4$

$4 \underline{\quad} -7 = -3$

$12 \underline{\quad} -4 = 16$

$12 + \underline{\quad} = -4$

$-4 \underline{\quad} 5 = -20$

$25 \div \underline{\quad} = -5$

$14 - \underline{\quad} = 18$

$12 \times 2 - \underline{\quad} = 21$

$20 \div \underline{\quad} + 5 = 0$

$14 + -5 \times \underline{\quad} = 4$

$14 + \underline{\quad} \times -2 = 24$

$\underline{\quad} - (-5) \times 3 = 5$

$20 + -2 \times -3 \div -6 = \underline{\quad}$

$(-3)^2 + -3 \times \underline{\quad} = -18$

$(\underline{\quad})^2 - 4 \times 2 = 17$

Now make up an equation of your own:



Math Learning Goals

- Students will evaluate algebraic expressions requiring the multiplication and division of integers

Materials

- Chart paper
- BLM 1.10.1
- BLM 1.10.2
- Playing cards

Minds On...

Whole Class → Four Corners

Cut up BLM 1.10.1 before class. Give each student a card. Students travel to the chart paper with the matching solution to their equation written in the middle of their card (the four sheets of chart paper should be labelled 24, 12, -24, -12). Once students are at their chart paper, they work together to create as many different algebraic expressions as possible with the same answer as the number on their sheet. If time permits, students could rotate to each sheet of chart paper and add their own expressions.

Observe students as they solve their card and create their expressions. Intervene and provide support, as needed. Make note of students who may need further assistance.

Content of cards can be differentiated based on student readiness in order to ensure students are working in their zone of proximal development.

Action!

Partner → Building Algorithmic Skills

Have students work in homogeneous pairings. Each group needs a stack of playing cards (not necessarily a whole deck, not face cards or jokers). Students take the top three cards and place them face up on the table. They record the three cards on BLM 1.10.2 and work together to create an algebraic expression using the cards (red cards are positive, black cards are negative). Each expression must include either division or multiplication and the steps to solving the expression.

Specific decks can be modified to include smaller numbers, or students could be allowed to reshuffle or trade in cards if they struggle to create their expression. Students who are stronger could flip four or five cards instead of three for a greater challenge.

**Consolidate
Debrief**

Whole Class → Discussion

Share examples and challenge students to create different expressions using the same cards as the examples provided.

Discussion Questions:

- *What was most difficult about this task?*
- *What was easiest about this task?*
- *Did you make any new discoveries about multiplying and dividing integers that would make you more successful if you repeated this task?*

*Exploration
Reflection*

Home Activity or Further Classroom Consolidation

Write several algebraic equations on the board. Ask the students to write a word problem for each algebraic equation (thinking about the real life situations that are represented by integers).

1.10.1: Four Corner Cards

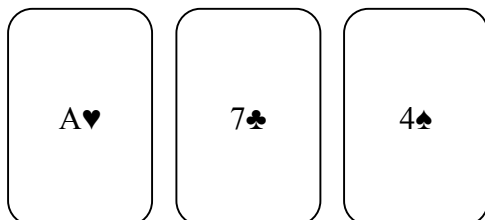
Grade 8

$a = 2 \times 12$	$-2 \times a = -24$	$a = -2 \times 12$	$2 \times a = -24$
$-12 = a \div -2$	$36 \div 3 = a$	$12 = a \div -2$	$-36 \div 3 = a$
$a \div -2 = -12$	$a \div 2 = 6$	$a \div 2 = -12$	$a \div -2 = 6$
$48 = a \times 2$	$-24 \div a = -2$	$-48 = a \times 2$	$24 \div a = -2$
$a = -48 \div -2$	$-3 \times a = -36$	$a = 48 \div -2$	$-3 \times a = 36$
$6 \times 4 = a$	$-24 \div -2 = a$	$6 \times -4 = a$	$24 \div -2 = a$

1.10.2: Playing Card Expressions

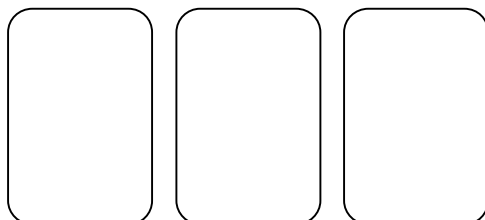
Grade 8

Work with your partner to create algebraic expressions using your playing cards. Turn up three cards and use them to create your expression. Red cards are positive and black cards are negative. Record your expression and solution for each expression. *The first example has been done for you.*



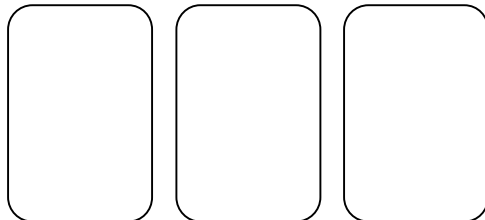
Numbers: 1, -7, -4

Expression: $(-4)a + 1 = -7$
 $(-4)a + 1 - 1 = -7 - 1$
 $(-4)a = -8$
 $(-4)a \div -4 = -8 \div -4$
 $a = 2$



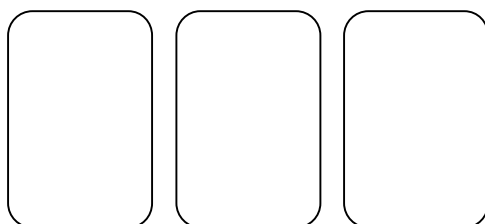
Numbers:

Expression:



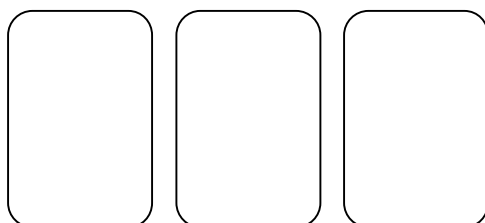
Numbers:

Expression:



Numbers:

Expression:

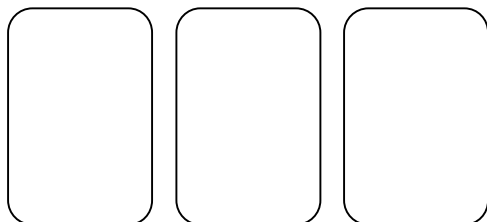


Numbers:

Expression:

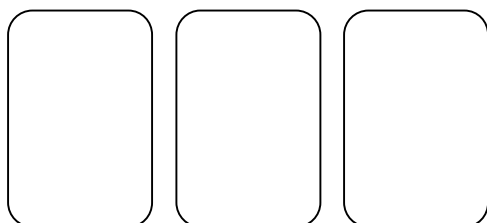
1.10.2: Playing Card Expressions Continued

Grade 8



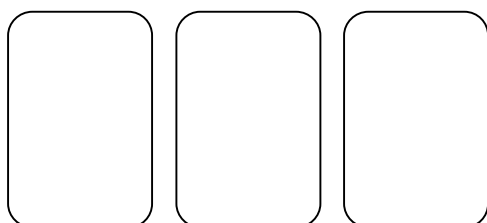
Numbers:

Expression:



Numbers:

Expression:




Numbers:

Expression:

Which number combination was the most difficult to make an expression for? Why?

Which number combination was the easiest to make an expression for? Why?

	<p>Math Learning Goals</p> <ul style="list-style-type: none"> Students will solve problems requiring operating with integers and explaining the thinking behind the solutions. 	<p>Materials</p> <ul style="list-style-type: none"> Chart paper Computers BLM 1.11.1 BLM 1.11.2 BLM 1.11.3 BLM 1.11.4 BLM 1.11.5
<p>Minds On...</p>	<p>Small Groups → Placement</p> <p>Students work on a sheet of chart paper with “Integers on the Internet” written in the middle. They work together to think of as many different places they can find integers on the net.</p>	<p>■ This piece could be used as a final assessment task for the unit. More data may be needed for the individual summative assessment piece (1.12.1)</p>
<p>Action!</p>	<p>Individual → Research/Practice (Day 11)</p> <p>Distribute copies of BLM 1.11.1, BLM 1.11.2, and BLM 1.11.3 evenly amongst students in the class (next day groups will be formed with a student who completed each of the different BLMs). If you have the ability to distribute the file digitally, students can use the hyperlinks in the document, rather than type in the addresses for the sites, and type their responses into the documents.</p> <p>Students complete the research necessary to solve the problems on their BLMs using the websites provided on their BLM.</p> <p>Collect work at the end of Day 11. Make copies in order to assess individual student work to prevent the Day 12 groups from making mistakes.</p>	<p>■ If needed, BLMs can be modified according to student readiness. For example, BLM 1.11.1 could have simpler numbers than the other BLMs (if one of the Day 11 activities is changed, it will alter the responses for Day 12). In their current form, 1.11.2 has the smallest numbers and 1.11.3 has the largest numbers.</p>
<p>Consolidate Debrief</p>	<p>Small Groups → Practice/Consolidation (Day 12)</p> <p>Students gather in small groups such that each group member completed a different BLM on Day 11. Groups work together to use their data to solve the problems in BLM 1.11.4. Once they have solved the first clue, they can obtain BLM 1.11.5.</p>	
<p><i>Concept practice</i></p>	<p>Home Activity or Further Classroom Consolidation</p> <p>Complete the practice questions.</p>	<p>Provide students with appropriate practice questions showing multiple ways of representing linear patterns.</p>

1.11.1: The Amazing Math Race – Europe

Grade 8



Welcome to the Amazing Math Race! You and your team will be travelling around the world, gathering data you will need to win the competition. You will be visiting Europe to gather data for your group.

You have been asked to keep track of the distances between the cities you visit. Please use <http://goeurope.about.com/library/bl-europe-distance-maps.htm> to find the distance of each trip.

Trip	Distance travelled (in kilometres)
1. London to Paris	
2. Paris to Hamburg	
3. Hamburg to Berlin	
4. Berlin to Munich	
5. Munich to Rome	
6. Rome to Madrid	

Use the above data to solve the following questions. For each one, write out the equation needed and the solution to the equation.

7. What is the difference between the distance from London to Paris and the distance from Berlin to Munich?
8. What is half of the difference found in #7?
9. You need to take four trips the length of Hamburg to Berlin off of your itinerary.
10. You need to take away a trip a fifth the length of your trip from Paris to Hamburg.

Start at <http://unstats.un.org> to answer the following questions:

On the right-hand side of the page there is a search box you can use to find your information, once the next page comes up, you can filter by country and year.

Population 2005

Country	Female population	Male population	Total population	Difference between male and female populations
France				
Germany				
Switzerland				
Norway				

Use the data you gathered above to complete the following calculations. Make sure to write out the equation needed to solve the equation:

11. Divide the total population of France by -2.

12. What would the population of females in Germany be if it tripled?

13. Divide the population difference between males and females in Switzerland by 5.

14. Multiply the male population of Norway by -3.

Since you use the Internet so much in your travels, you are curious about Internet usage in the countries you are visiting. Use the following website to help you gather information about Internet usage in Europe www.internetworldstats.com. Click on the link for your continent to pull up your Internet statistics. Scroll down on the page to find the numbers for Internet usage.

Country	Number of Internet Users
Poland	
Slovakia	
Austria	
Denmark	

Use the data you gathered above to complete the following calculations. Make sure to write out the equation needed to solve to equation:

15. What is the difference between the number of Internet users in Slovakia and Austria?

16. Divide the total number of Internet users in Denmark by -50.

17. What would you need to multiply the number of Internet users in Poland by for a sum of -40 040 724?

You need to keep a budget of your trip and show your calculations. Along the way you have the opportunity to earn money, but will also need to spend some.

You and your partner have \$1000 to start with. Keep track of your work carefully, as each calculation relies on the previous calculation being accurate. **Remember that spending should be represented by a negative number.**

Spending	Calculations	Balance
18. You spend $\frac{1}{4}$ of your money on your tickets from London to Paris.	$1000 \div 4 = 250$ $1000 - 250 = 750$	\$750
19. You meet friends for lunch and buy 3 meals for \$14.00 each.		
20. You visit the Louvre for a clue for your trip. You and your partner each pay \$14 for admission, but you complete a filling task for the museum and each earn \$45.		
21. You have supper with your partner and another pair from the show. Your total bill is \$88.		
22. Your hotel room costs \$172 for the night, but they give you a 50% refund for being part of the show.		
23. You spend \$7 each on breakfast.		
24. You take the train to Hamburg. The tickets are \$103 each, but you each pay an extra \$50 to take the express.		
25. You need to get back on the train right away and stop at your last 4 cities. Each trip costs you and your partner \$36, and at each stop you need to buy a \$9 souvenir to prove you were there. Will you have enough money?		

1.11.1: The Amazing Math Race – Europe Teacher Copy

Grade 8



Welcome to the Amazing Math Race! You and your team will be travelling around the world, gathering data you will need to win the competition. You will be visiting Europe to gather data for your group.

You have been asked to keep track of the distances between the cities you visit. Please use <http://goeurope.about.com/library/bl-europe-distance-maps.htm> to find the distance of each trip.

Trip	Distance travelled (in kilometres)
1. London to Paris	414 km
2. Paris to Hamburg	880 km
3. Hamburg to Berlin	291 km
4. Berlin to Munich	604 km
5. Munich to Rome	969 km
6. Rome to Madrid	2099 km

Use the above data to solve the following questions. For each one, write out the equation needed and the solution to the equation.

11. What is the difference between the distance from London to Paris and the distance from Berlin to Munich?

$$414 - 604 = -190$$

12. What is half of the difference found in #7?

$$-190 \div 2 = -95$$

13. You need to take four trips the length of Hamburg to Berlin off of your itinerary.

$$-291 \times 4 = -1164$$

14. You need to take away a trip a fifth the length of your trip from Paris to Hamburg.

$$-880 \div 5 = -176$$

Start at <http://unstats.un.org> to answer the following questions:

On the right-hand side of the page there is a search box you can use to find your information, once the next page comes up, you can filter by country and year.

Population 2005

Country	Female population	Male population	Total population	Difference between male and female populations
France	31 272 664	29 717 880	60 990 544	-1 554 784
Germany	42 263 757	40 388 612	82 652 369	-1 875 145
Switzerland	3 804 652	3 619 737	7 424 389	-184 915
Norway	2 337 083	2 301 753	4 638 836	-35 330

Use the data you gathered above to complete the following calculations. Make sure to write out the equation needed to solve the equation:

11. Divide the total population of France by -2.

$$60\,990\,544 \div -2 = -30\,495\,272$$

12. What would the population of females in Germany be if it tripled?

$$42\,263\,757 \times 3 = 126\,791\,271$$

13. Divide the population difference between males and females in Switzerland by 5.

$$-184\,915 \div 5 = -36\,983$$

14. Multiply the male population of Norway by -3. $2\,301\,753 \times -3 = -6\,905\,259$

Since you use the Internet so much in your travels, you are curious about Internet usage in the countries you are visiting. Use the following website to help you gather information about Internet usage in Europe www.internetworldstats.com. Click on the link for your continent to pull up your Internet statistics. Scroll down on the page to find the numbers for Internet usage.

Country	Number of Internet Users
Poland	20,020,362
Slovakia	3,018,400
Austria	5,601,700
Denmark	4,408,100

Use the data you gathered above to complete the following calculations. Make sure to write out the equation needed to solve to equation:

15. What is the difference between the number of Internet users in Slovakia and Austria?

$$3\,018\,400 - 5\,601\,700 = -2\,583\,300$$

16. Divide the total number of Internet users in Denmark by -50.

$$4\,408\,100 \div (-50) = -88\,162$$

17. What would you need to multiply the number of Internet users in Poland by for a sum of -40 040 724? $-40\,040\,724 \div 20\,020\,362 = -2$

You need to keep a budget of your trip and show your calculations. Along the way you have the opportunity to earn money, but will also need to spend some.

You and your partner have \$1000 to start with. Keep track of your work carefully, as each calculation relies on the last being accurate. **Remember that spending should be represented by a negative number.**

Spending	Calculations	Balance
18. You spend $\frac{1}{4}$ of your money on your tickets from London to Paris.	$1000 \div 4 = 250$ $1000 - 250 = 750$	\$750
19. You meet friends for lunch and buy 3 meals for \$14.00 each.	$-14 \times 3 = -42$ $750 - 42 = 708$	\$708
20. You visit the Louvre for a clue for your trip. You and your partner each pay \$14 for admission, but you complete a filling task for the museum and each earn \$45.	$2(-14) + 2(45) = 62$ $708 + 62 = 770$	\$770
21. You have supper with your partner and another pair from the show. Your total bill is \$88.	$-88 \div 2 = -44$ $770 - 44 = 726$	\$726
22. Your hotel room costs \$172 for the night, but they give you a 50% refund for being part of the show.	$172 \div 2 = 86$ $726 - 86 = 640$	\$640
23. You spend \$7 each on breakfast.	$-7 \times 2 = -14$ $640 - 14 = 626$	\$626
24. You take the train to Hamburg. The tickets are \$103 each, but you each pay an extra \$50 to take the express.	$2(-103) + 2(-50)$ $-206 + (-100) = -306$ $626 - 306 = 320$	\$320
25. You need to get back on the train right away and stop at your last 4 cities. Each trip costs you and your partner \$36, and at each stop you need to buy a \$9 souvenir to prove you were there. Will you have enough money?	$8(-36) + 4(-9)$ $-288 + (-36) = -324$ $320 - 324 = -4$	\$-4

1.11.2: The Amazing Math Race – Central America

Grade 8



Welcome to the Amazing Math Race! You and your team will be travelling around the world, gathering data you will need to win the competition. You will be visiting Central America to gather data for your group.

You have been asked to keep track of the distances between the cities you visit. Please use <http://www.indo.com/cgi-bin/dist> to find the distance of each trip.

Trip	Distance travelled (in kilometres)
1. Guatemala City to San Salvador	
2. San Salvador to Tegucigalpa	
3. Tegucigalpa to Managua	
4. Managua to San Jose	
5. San Jose to Panama City	

Use the above data to solve the following questions. For each one, write out the equation needed and the solution to the equation.

6. What is the difference between the distance from San Salvador to Tegucigalpa and the distance from Tegucigalpa to Managua?
7. What is half of the difference found in #6?
8. You need to take four trips the length of Guatemala City to San Salvador off of your itinerary.
9. You need to take away a trip a fifth the length of your trip from San Jose to Panama City.

Start at <http://unstats.un.org> to answer the following questions:

On the right-hand side of the page there is a search box you can use to find your information, once the next page comes up, you can filter by country and year.

Population 2005

Country	Female population	Male population	Total population	Difference between male and female populations
Costa Rica				
Guatemala				
Panama				
Honduras				

Use the data you gathered above to complete the following calculations. Make sure to write out the equation needed to solve the equation:

10. Divide the total population of Panama by -2.
11. What would the population of females in Honduras be if it tripled?
12. Divide the population difference between males and females in Guatemala by 5.
13. Multiply the male population of Costa Rica by -3.

Since you use the Internet so much in your travels, you are curious about Internet usage in the countries you are visiting. Use the following website to help you gather information about Internet usage in the Americas www.internetworldstats.com. Click on the link for your continent to pull up your Internet statistics. Scroll down on the page to find the numbers for Internet usage.

Area	Number of Internet Users
North America	
Central America	
South America	
The Caribbean	

Use the data you gathered above to complete the following calculations. Make sure to write out the equation needed to solve to equation:

14. What is the difference between the number of Internet users in South and North America?
15. Divide the total number of Internet users in Central America by -50.
16. What would you need to multiply the number of Internet users in the Caribbean by for a sum of -17 788 600?

You need to keep a budget of your trip and show your calculations. Along the way you have the opportunity to earn money, but will also need to spend some.

You and your partner have \$1000 to start with. Keep track of your work carefully, as each calculation relies on the previous calculation being accurate. **Remember that spending should be represented by a negative number.**

Spending	Calculations	Balance
17. You spend $\frac{1}{4}$ of your money on your tickets from Guatemala City to San Salvador.	$1000 \div 4 = 250$ $1000 - 250 = 750$	\$750
18. You meet friends for lunch and buy 3 meals for \$13.00 each.		
19. You visit the Museo David J Guzman for a clue for your trip. You and your partner each pay \$15 for admission, but you complete a filling task for the museum and each earn \$40.		
20. You have supper with your partner and another pair from the show. Your total bill is \$96.		
21. Your hotel room costs \$162 for the night, but they give you a 50% refund for being part of the show.		
22. You spend \$7 each on breakfast.		
23. You take the train to Tegucigalpa. The tickets are \$103 each, but you each pay an extra \$50 to take the express.		
24. You need to get back on the train right away and stop at your last 4 cities. Each trip costs you and your partner \$36, and at each stop you need to buy a \$9 souvenir to prove you were there. Will you have enough money?		

1.11.2: The Amazing Math Race – Central America –Teacher Copy

Grade 8



Welcome to the Amazing Math Race! You and your team will be travelling around the world, gathering data you will need to win the competition. You will be visiting Central America to gather data for your group.

You have been asked to keep track of the distances between the cities you visit. Please use <http://www.indo.com/cgi-bin/dist> to find the distance of each trip.

Trip	Distance travelled (in kilometres)
1. Guatemala City to San Salvador	181 km
2. San Salvador to Tegucigalpa	209 km
3. Tegucigalpa to Managua	234 km
4. Managua to San Jose	324 km
5. San Jose to Panama City	525 km

Use the above data to solve the following questions. For each one, write out the equation needed and the solution to the equation.

10. What is the difference between the distance from San Salvador to Tegucigalpa and the distance from Tegucigalpa to Managua?

$$209 - 234 = -25$$

11. What is half of the difference found in #6?

$$-25 \div 2 = -12.5$$

12. You need to take four trips the length of Guatemala City to San Salvador off of your itinerary.

$$-181 \times 4 = -724$$

13. You need to take away a trip a fifth the length of your trip from San Jose to Panama City.

$$-525 \div 5 = -105$$

Start at <http://unstats.un.org> to answer the following questions:

On the right-hand side of the page there is a search box you can use to find your information, once the next page comes up, you can filter by country and year.

Population 2005

Country	Female population	Male population	Total population	Difference between male and female populations
Costa Rica	2 127 444	2 199 784	4 327 228	-2 055 104
Guatemala	6 507 932	6 201 632	12 709 564	-306 300
Panama	1 601 395	1 630 107	3 231 502	28 712
Honduras	3 441 247	3 392 863	6 834 110	-48 384

Use the data you gathered above to complete the following calculations. Make sure to write out the equation needed to solve to equation:

10. Divide the total population of Panama by -2.

$$3\,231\,502 \div -2 = -1\,615\,751$$

11. What would the population of females in Honduras be if it tripled?

$$3\,441\,247 \times 3 = 10\,323\,741$$

12. Divide the population difference between males and females in Guatemala by 5.

$$-306\,300 \div 5 = -61\,260$$

13. Multiply the male population of Costa Rica by -3. $2\,199\,784 \times -3 = -6\,599\,352$

Since you use the Internet so much in your travels, you are curious about Internet usage in the countries you are visiting. Use the following website to help you gather information about Internet usage in the Americas www.internetworldstats.com. Click on the link for your continent to pull up your Internet statistics. Scroll down on the page to find the numbers for Internet usage.

Area	Number of Internet Users
North America	251,290,489
Central America	32,339,500
South America	132,385,340
The Caribbean	8,894,300

Use the data you gathered above to complete the following calculations. Make sure to write out the equation needed to solve the equation:

14. What is the difference between the number of Internet users in South and North America?

$$132\,385\,340 - 251\,290\,489 = -118\,905\,149$$

15. Divide the total number of Internet users in Central America by -50.

$$32\,339\,500 \div (-50) = -646\,790$$

16. What would you need to multiply the number of Internet users in the Caribbean by for a sum of -17 788 600? $-17\,788\,600 \div 8\,894\,300 = -2$

You need to keep a budget of your trip and show your calculations. Along the way you have the opportunity to earn money, but will also need to spend some.

You and your partner have \$1000 to start with. Keep track of your work carefully, as each calculation relies on the last being accurate. **Remember that spending should be represented by a negative number.**

Spending	Calculations	Balance
17. You spend $\frac{1}{4}$ of your money on your tickets from Guatemala City to San Salvador.	$1000 \div 4 = 250$ $1000 - 250 = 750$	\$750
18. You meet friends for lunch and buy 3 meals for \$13.00 each.	$-13 \times 3 = -39$ $750 - 39 = 705$	\$705
19. You visit the Museo David J Guzman for a clue for your trip. You and your partner each pay \$15 for admission, but you complete a filling task for the museum and each earn \$40.	$2(-15) + 2(40) = 50$ $705 + 50 = 770$	\$755
20. You have supper with your partner and another pair from the show. Your total bill is \$96.	$-96 \div 2 = -48$ $755 - 48 = 722$	\$707
21. Your hotel room costs \$162 for the night, but they give you a 50% refund for being part of the show.	$162 \div 2 = 81$ $707 - 81 = 626$	\$626
22. You spend \$7 each on breakfast.	$-7 \times 2 = -14$ $626 - 14 = 612$	\$612
23. You take the train to Tegucigalpa. The tickets are \$103 each, but you each pay an extra \$50 to take the express.	$2(-103) + 2(-50)$ $-206 + (-100) = -306$ $612 - 306 = 306$	\$306
24. You need to get back on the train right away and stop at your last 4 cities. Each trip costs you and your partner \$36, and at each stop you need to buy a \$9 souvenir to prove you were there. Will you have enough money?	$8(-35) + 4(-10)$ $-280 + (-40) = -320$ $306 - 320 = -2$	\$-2

1.11.3 The Amazing Math Race – Asia

Grade 8



Welcome to the Amazing Math Race! You and your team will be travelling around the world, gathering data you will need to win the competition. You will be visiting Asia to gather data for your group.

You have been asked to keep track of the distances between the cities you visit. Please use http://www.mapcrow.info/asian_travel_distance.html to find the distance of each trip. Round to the nearest km.

Trip	Distance travelled (in kilometres)
1. Shanghai to Seoul	
2. Seoul to Jakarta	
3. Jakarta to Tokyo	
4. Tokyo to Baghdad	
5. Baghdad to Delhi	

Use the above data to solve the following questions. For each one, write out the equation needed and the solution to the equation.

6. What is the difference between the distance from Tokyo to Baghdad and the distance from Jakarta to Tokyo?
7. What is half of the difference found in #6?
8. You need to take four trips the length of Shanghai to Seoul off of your itinerary.
9. You need to take away a trip a fifth the length of your trip from Seol to Jakarta City.

Start at <http://unstats.un.org> to answer the following questions:

On the right-hand side of the page there is a search box you can use to find your information, once the next page comes up, you can filter by country and year.

Population 2005

Country	Female population	Male population	Total population	Difference between female and male populations
Japan				
China				
India				
Malaysia				

Use the data you gathered above to complete the following calculations. Make sure to write out the equation needed to solve the equation:

- Divide the total population of Japan by -2.
- What would the population of females in Malaysia be if it tripled?
- Divide the population difference between males and females in India by 5.
- Multiply the male population of China by -3.

Since you use the Internet so much in your travels, you are curious about Internet usage in the countries you are visiting. Use the following website to help you gather information about Internet usage in the Americas www.internetworldstats.com. Click on the link for your continent to pull up your Internet statistics. Scroll down on the page to find the numbers for Internet usage.

Area	Number of Internet Users
South Korea	
Philippines	
Vietnam	
Azerbaijan	

Use the data you gathered above to complete the following calculations. Make sure to write out the equation needed to solve to equation:

- What is the difference between the number of Internet users in Azerbaijan and the Philippines?
- Divide the total number of Internet users in South Korea by -50.
- What would you need to multiply the number of Internet users in Vietnam by for a sum of -17 788 600?

You need to keep a budget of your trip and show your calculations. Along the way you have the opportunity to earn money, but will also need to spend some.

You and your partner have \$1000 to start with. Keep track of your work carefully, as each calculation relies on the last being accurate. **Remember that spending should be represented by a negative number.**

Spending	Calculations	Balance
17. You spend $\frac{1}{4}$ of your money on your tickets from Shanghai to Seoul.	$1000 \div 4 = 250$ $1000 - 250 = 750$	\$750
18. You meet friends for lunch and buy 3 meals for \$11.00 each.		
19. You visit the Seoul Museum of Art for a clue for your trip. You and your partner each pay \$13 for admission, but you complete a filling task for the museum and each earn \$47.		
20. You have supper with your partner and another pair from the show. Your total bill is \$38.		
21. Your hotel room costs \$86 for the night, but they give you a 50% refund for being part of the show.		
22. You spend \$5.50 each on breakfast.		
23. You take a flight to Jakarta. The tickets are \$96 each, but you each pay an extra \$47 to charter a plane to leave sooner.		
24. You need to get back on the plane right away and stop at your last 4 cities. Each stop costs you and your partner \$57, and at each stop you need to buy a \$2 souvenir to prove you were there. Will you have enough money?		

1.11.3: The Amazing Math Race – Asia Teacher Copy

Grade 8



Welcome to the Amazing Math Race! You and your team will be travelling around the world, gathering data you will need to win the competition. You will be visiting Asia to gather data for your group.

You have been asked to keep track of the distances between the cities you visit. Please use http://www.mapcrow.info/asian_travel_distance.html to find the distance of each trip. Round to the nearest km.

Trip	Distance travelled (in kilometres)
1. Shanghai to Seoul	868 km
2. Seoul to Jakarta	5 290 km
3. Jakarta to Tokyo	5 782 km
4. Tokyo to Baghdad	8 344 km
5. Baghdad to Delhi	3 155 km

Use the above data to solve the following questions. For each one, write out the equation needed and the solution to the equation.

10. What is the difference between the distance from Tokyo to Baghdad and the distance from Jakarta to Tokyo?

$$8\,344 - 5\,782 = -2\,562$$

11. What is half of the difference found in #6?

$$-2\,562 \div 2 = -1\,281$$

12. You need to take four trips the length of Shanghai to Seoul off of your itinerary.

$$-868 \times 4 = -3\,472$$

13. You need to take away a trip a fifth the length of your trip from Seol to Jakarta City.

$$-5\,290 \div 5 = -1\,058$$

Start at <http://unstats.un.org> to answer the following questions:

On the right-hand side of the page there is a search box you can use to find your information, once the next page comes up, you can filter by country and year.

Population 2005

Country	Female population	Male population	Total population	Difference between female and male populations
Japan	65 410 837	62 485 903	127 896 740	2 924 934
China	634 803 326	678 175 529	1 312 978 855	-43 372 203
India	546 785 113	587 618 028	1 134 403 141	-40 832 915
Malaysia	12 616 745	13 036 240	25 652 985	-419 495

Use the data you gathered above to complete the following calculations. Make sure to write out the equation needed to solve the equation:

10. Divide the total population of Japan by -2.

$$127\,896\,740 \div -2 = -63\,948\,370$$

11. What would the population of females in Malaysia be if it tripled?

$$12\,616\,745 \times 3 = 37\,850\,235$$

12. Divide the population difference between males and females in India by 5.

$$-40\,832\,915 \div 5 = -8\,166\,583$$

13. Multiply the male population of China by -3. $678\,175\,529 \times -3 = -2\,034\,526\,587$

Since you use the Internet so much in your travels, you are curious about Internet usage in the countries you are visiting. Use the following website to help you gather information about Internet usage in the Americas www.internetworldstats.com. Click on the link for your continent to pull up your Internet statistics. Scroll down on the page to find the numbers for Internet usage.

Area	Number of Internet Users
South Korea	36,794,800
Philippines	20,650,000
Vietnam	20,993,374
Azerbaijan	1,500,000

Use the data you gathered above to complete the following calculations. Make sure to write out the equation needed to solve the equation:

14. What is the difference between the number of Internet users in Azerbaijan and the Philippines?

$$1\,500\,000 - 20\,650\,000 = -19\,150\,000$$

15. Divide the total number of Internet users in South Korea by -50.

$$36\,794\,800 \div (-50) = -735\,896$$

16. What would you need to multiply the number of Internet users in Vietnam by for a sum of -17 788 600? $-41\,986\,748 \div 20\,993\,374 = -2$

You need to keep a budget of your trip and show your calculations. Along the way you have the opportunity to earn money, but will also need to spend some.

You and your partner have \$1000 to start with. Keep track of your work carefully, as each calculation relies on the last being accurate. **Remember that spending should be represented by a negative number.**

Spending	Calculations	Balance
17. You spend $\frac{1}{4}$ of your money on your tickets from Shanghai to Seoul.	$1000 \div 4 = 250$ $1000 - 250 = 750$	\$750
18. You meet friends for lunch and buy 3 meals for \$11.00 each.	$-11 \times 3 = -33$ $750 - 33 = 717$	\$717
19. You visit the Seoul Museum of Art for a clue for your trip. You and your partner each pay \$13 for admission, but you complete a filling task for the museum and each earn \$47.	$2(-13) + 2(47)$ $-26 + 94 = 68$ $717 + 68 = 785$	\$785
20. You have supper with your partner and another pair from the show. Your total bill is \$38.	$-38 \div 2 = -19$ $775 - 19 = 756$	\$756
21. Your hotel room costs \$86 for the night, but they give you a 50% refund for being part of the show.	$86 \div 2 = 43$ $756 - 43 = 713$	\$713
22. You spend \$5.50 each on breakfast.	$-5.50 \times 2 = -11$ $713 - 11 = 702$	\$702
23. You take a flight to Jakarta. The tickets are \$96 each, but you each pay an extra \$47 to charter a plane to leave sooner.	$2(-96) + 2(-47)$ $-192 + (-94) = -286$ $702 - 286 = 416$	\$416
24. You need to get back on the plane right away and stop at your last 4 cities. Each stop costs you and your partner \$57, and at each stop you need to buy a \$2 souvenir to prove you were there. Will you have enough money?	$8(-57) + 4(-2)$ $-456 + (-8) = -320$ $416 - 320 = -48$	\$-48

1.11.5: The Amazing Math Race – Day 12 Group Clue #2

Grade 8

Use the problems on the back to help eliminate provinces and find the location of your final clue. Be the first group to find the location to win *The Amazing Math Race*!



Province/Territory	Value	Province/Territory	Value
Yukon Territory	42 320	Ontario	-703
Northwest Territories	-54	Quebec	-37 106 593
Nunavut	834 787	Newfoundland	1 479
British Columbia	-107	New Brunswick	-112
Alberta	15 747 500	Nova Scotia	-787 051 032
Saskatchewan	-177	P.E.I.	-123
Manitoba	-59 760 310		

1.11.5: The Amazing Math Race – Day 12 Group Clue #2 Continued

Grade 8

Show the steps to your work! *Take turns calculating, recording and checking.*

1. (distance from Berlin to Munich)(-2) + (distance from Tegucigalpa to Managua)(-2) + (distance from Baghdad to Delhi)
2. (difference between male and female population of Norway)(2) + (difference between male and female population of Honduras)(2) + (difference between male and female population of Malaysia) ÷ -2
3. final products for (#10 Asia) + (#12 Central America)(-100) + (#14 Europe)(-3)
4. (number of internet users in the Philippines) ÷ (-5) + (number of internet users in Poland)(-5) + (number of internet users in Caribbean)(-5) ÷ (-5)
5. Total plane ticket cost (Asia #24) + (Europe #25) + (Central America #24)
6. Sum of money left for all three groups.
7. (total #18 Asia) - (total #23 Central America)(-2) + (total #21 Europe)(-2)
8. (distance between San Jose and Panama city) – (distance from Rome to Madrid) + (distance from Shanghai to Seoul)

1.11.5: The Amazing Math Race – Day 12 Group Clue #2 Continued

Grade 8

9. (number of internet users Central America) (number of internet users in Slovakia) (number of internet users in Azerbaijan)

10. Male population of (Panama) (India) (Germany)

11. Final products for (Europe #9) $\div 4$ + (Central America #6)(10) + (Asia #8) $\div 8$

12. Final products for (Asia #7) (Europe #7) (Central America #8)

1.11.4: The Amazing Math Race – Day 12

Group Clue #1 – Teacher Copy

Grade 8



Welcome back! Yesterday, your group worked hard to gather data as you travelled around the world. Today, you will use your data to help figure out where the final stop on your trip will be. *If you have problems, you may want to double-check your.*

Start by solving the puzzle below.

a	b	c	d	e	f	g	h	i	j	k	l	m
-5×2	$-8 \div 2$	3×2	-1×5	$-4 \div -2$	-6×2	-1×-1	$-8 \div -2$	-7×-4	$-6 \div 3$	-4×6	-9×2	8×-4
n	o	p	q	r	s	t	u	v	w	x	y	z
-7×5	-5×5	-3×2	-7×4	$-5 \div 5$	-3×-8	-5×-2	-9×-2	-6×-2	-8×-4	-7×-5	$-6 \div 2$	-5×-5

Fill letters in the chart below to find your next clue.

a	s	k		y	o	u	r		t	e	a	c	h	e	r		f
-10	24	-24		-3	-25	18	-1		10	2	-10	6	4	2	-1		-12
o	R		a		m	a	p		o	f		C	a	n	a	d	a
-25	-1		-10		-32	-10	-6		-25	-12		6	-10	-35	-10	-5	-10
	s	o	l	v	e		t	h	e		p	r	o	b	l	e	m
	24	-25	-18	12	2		10	4	2		-6	-1	-25	-4	-18	2	-32
s		o	n		t	h	e		b	a	c	k		t	o		e
24		-25	-35		10	4	2		-4	-10	6	-24		10	-25		2
l	l	m	i	n	a	t	e		p	r	o	v	i	n	c	e	s
-18	28	-32	28	-35	-10	10	2		-6	-1	-25	12	28	-35	6	2	24
	y	o	u	r		f	i	n	a	l		d	e	s	t	i	n
	-3	-25	18	-1		-12	28	-35	-10	-18		-5	2	24	10	28	-35
a	T	i	o	n		i	s		t	h	e		c	a	p	i	t
-10	10	28	-25	-35		28	24		10	4	2		6	-10	-6	28	10
a	L		c	i	t	y		o	f		t	h	e		l	a	s
-10	-18		6	28	10	-3		-25	-12		10	4	2		-18	-10	24
t		p	r	o	v	i	n	c	e								
10		-6	-1	-25	12	28	-35	6	2								

1.11.5: The Amazing Math Race – Day 12

Group Clue #2 – Teacher Copy

Grade 8

Use the problems on the back to help eliminate provinces and find the location of your final clue. Be the first group to find the location to win *The Amazing Math Race*!



Province/Territory	Value	Province/Territory	Value
Yukon Territory	42 320	Ontario	-703
Northwest Territories	-54	Quebec	-37 106 593
Nunavut	834 787	Newfoundland	1 479
British Columbia	-107	New Brunswick	-112
Alberta	15 747 500	Nova Scotia	-787 051 032
Saskatchewan	-177	P.E.I.	-123
Manitoba	-59 760 310		

1.11.5: The Amazing Math Race – Day 12 Grade 8 Group Clue #2 – Teacher Copy Continued

Show the steps to your work! *Take turns calculation, recording and checking.*

1. (distance from Berlin to Munich)(-2) + (distance from Tegucigalpa to Managua)(-2) + (distance from Baghdad to Delhi)

$$(604)(-2) + (234)(-2) - 3155 = -1208 + (-468) + 3155 = 1479$$

2. (difference between male and female population of Norway)(2) + (difference between male and female population of Honduras)(2) + (difference between male and female population of Malaysia) \div -2

$$(-35\ 330)(2) + (-48\ 384)(2) + (-419\ 496) \div -2 = (-70\ 660) + (-96\ 768) + (209\ 748) = 42\ 320$$

3. final products for (#10 Asia) + (#12 Central America)(-100) + (#14 Europe)(-3)

$$(-63\ 948\ 370) + (-61\ 260)(-100) + (-6\ 905\ 259)(-3) = -37\ 106\ 593$$

4. (number of internet users in the Philippines) \div (-5) + (number of internet users in Poland)(-5) + (number of internet users in Caribbean)(-5) \div (-5)

$$(20\ 650\ 000) \div (-5) + (20\ 020\ 362)(-5) + (8\ 894\ 300)(5) \div (-5) = (-4\ 130\ 000) + (-100\ 101\ 810) + (44\ 471\ 500) = -59\ 760\ 310$$

5. Total plane ticket cost (Asia #24) + (Europe #25) + (Central America #24)

$$(-456)(-1) + (-280) + (-288) = -112$$

6. Sum of money left for all three groups.

$$(-48) + (-2) + (-4) = -54$$

7. (total #18 Asia) - (total #23 Central America)(-2) + (total #21 Europe)(-2)

$$(717) - (306)(-2) + (726)(-2) = (717) - (-612) + (-1\ 452) = -123$$

8. (distance between San Jose and Panama city) - (distance from Rome to Madrid) + (distance from Shanghai to Seoul)

$$(525) - (2099) + (868) = -703$$

1.11.5: The Amazing Math Race – Day 12 Grade 8 Group Clue #2 – Teacher Copy Continued

9. (number of internet users Central America) (number of internet users in Slovakia) (number of internet users in Azerbaijan)

$$(32\,339\,500) + (3\,018\,400)(-5) - (1\,500\,000) = 15\,747\,500$$

10. Male population of (Panama) (India) (Germany)

$$(1\,630\,107)(-100) + (587\,618\,028) + (40\,388\,612)(-30) = (-163\,010\,700) + (587\,618\,028) + (-12\,116\,583\,600) = -787\,051\,032$$

11. Final products for (Europe #9) $\div 4$ + (Central America #6)(10) + (Asia #8) $\div 8$

$$(-1164) \div 4 + (-25)(10) + (-3472) \div (-8) = (-291) + (-250) + (434) = -107$$

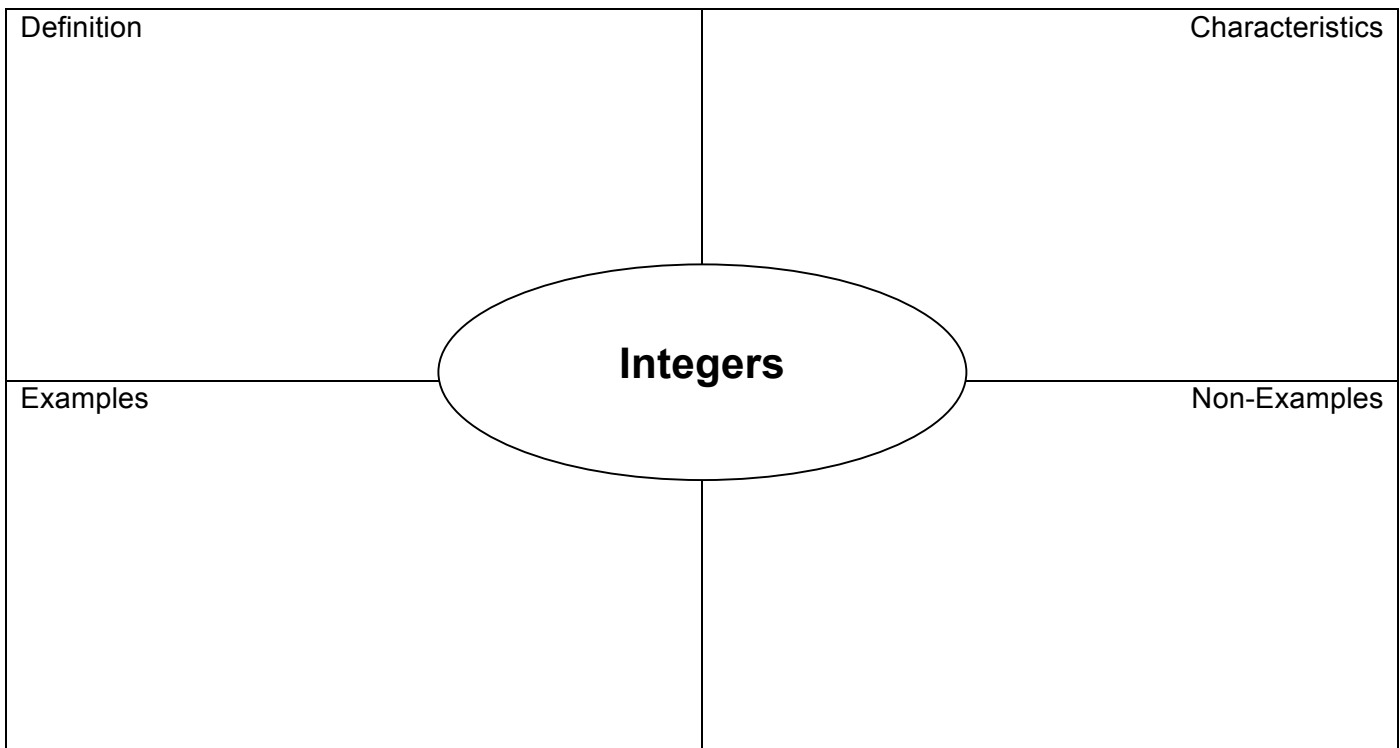
12. Final products for (Asia #7) (Europe #7) (Central America #8)

$$(-1\,281) + (-190)(-2) - (-724) = -177$$

1.12.1 Summative Assessment

Summative Assessment – Integers

Name : _____



Match each term with an example:

1. zero principal

2. opposite integers

3. positive integer

4. negative integer

a. answer to $(-5) \times (-4)$

b. $15 + (-15) = 0$

c. -20 and 20

d. -2 and 4

e. answer to $(-15) \div 3$

1.12.1 Summative Assessment Continued

Grade 8

5. Solve

a. $5 + 7 =$

b. $-13 + 13 =$

c. $-5 + (-12) =$

d. $8 + (-15) =$

e. $-17 + 9 =$

f. $-3 + (-6) =$

6. The table shows the change in the population of Jonestown at each census since 1971.

Year	Change
1971	-30 000
1976	-71 000
1981	+31 000
1986	-9 000
1991	+22 000
1996	+18 000
2001	-43 000

What was the overall change in population? Show your work.

What does it mean to have a change in population that is negative?

7. Evaluate each expression.

a. $10 - 15 =$

b. $-5 - 7 =$

c. $-14 - (-22) =$

d. $-53 - 42 - (-25) =$

8. The table shows each city's time zone relative to GMT, or Greenwich Mean Time.

a) How many hours behind Hong Kong is Hawaii?

City	Time Zone
Hawaii	GMT -10
Abu Dhabi	GMT +4
Hong Kong	GMT +8
Las Vegas	GMT -7

b) How many hours ahead of Las Vegas is Abu Dhabi?

9. Multiply

a. $7 \times (-2)$

b. $-3 \times (-6)$

c. -10×7

d. $15 \times (-4)$

10. What happens when you . . . (*show your work using pictures, numbers and words*)

a) . . . multiply a positive number by a positive number? Why?

b) . . . multiply a positive number by a negative number? Why?

c) . . . multiply a negative number by a negative number? Why?

11. Explain how you can tell the sign of a product of more than two integers.

1.12.1 Summative Assessment Continued

Grade 8

12. The average change in the sea turtle population over the past 60 years is -800 nests per year.

a) What was the total change in the number of sea turtle nests?

b) What was the change in the number of nests between 1960 and 1990?

13. Create a triangle to illustrate the following multiplication sentences, and write the related multiplication and division statements.

$-4 \times (-3) = 12$	$-5 \times (-7) = 35$
-----------------------	-----------------------

14. Divide (think opposite of multiplication)

a) $35 \div (-5) =$

b) $-64 \div (-4) =$

c) $-72 \div 9 =$

e) $-56 \div (-8) =$

15. Write an expression involving integer division for each situation.

Situation	Expression
a) While scuba diving, Alex dove 32m in 8 stages. What was the mean depth of her dive per stage?	
b) The temperature dropped 18°C over 6h. What was the mean hourly temperature drop?	
c) A parachutist descended a total of 100m in 5 s. What was the unit rate of descent (metres per second)?	

1.12.2 Integer Summative Assessment Rubric Grade 8

Name: _____ Overall Level: _____

	Level One	Level Two	Level Three	Level Four
Frayer Model	-provides a definition of Integers that needs much clarification	-provides a definition of Integers that needs some clarification	-provides clear definition of Integers	-provides clear, concise definition of Integers
	-provides few logical examples of Integers	-provides some logical examples of Integers	-provides several logical examples of Integers	-provides many logical, clear examples of Integers
	-provides few logical non-examples of Integers	-provides some logical non-examples of Integers	-provides several logical non-examples of Integers	-provides many logical, clear non-examples of Integers
	-provides few logical features of Integers	-provides some logical features of Integers	-provides several logical features of Integers	-provides many logical, clear features of Integers
#1 -4	-defines few key terms correctly	-defines some key terms correctly	-defines most key terms correctly	-defines all key terms correctly
#5	-adds integers with major errors/omissions	-adds integers with some minor errors/omissions	-adds integers with minor errors/omissions	-adds integers with no major errors/omissions
#6	-solution uses few logical computations	-solution uses some logical computations	-solution uses logical computations	-solution uses clear, logical computations
	-few computations are correct	-some computations are correct	-most computations are correct	- all computations are correct
#7	-subtracts integers with major errors/omissions	-subtracts integers with some minor errors/omissions	-subtracts integers with minor errors/omissions	-subtracts integers with no major errors/omissions
#8	-solution uses few logical computations	-solution uses some logical computations	-solution uses logical computations	-solution uses clear, logical computations
	-few computations are correct	-some computations are correct	-most computations are correct	- all computations are correct
#9	-multiplies integers with major errors/omissions	- multiplies integers with some minor errors/omissions	- multiplies integers with minor errors/omissions	- multiplies integers with no major errors/omissions
#10a	-provides an explanation of + times + that needs much clarification	-provides an explanation of + times + that needs some clarification	-provides clear explanation of + times +	-provides clear, concise explanation of + times +
#10b	-provides an explanation of + times - that needs much clarification	-provides an explanation of + times - that needs some clarification	-provides clear explanation of + times -	-provides clear, concise explanation of + times -
#10c	-provides an explanation of - times - that needs much clarification	-provides an explanation of - times - that needs some clarification	-provides clear explanation of - times -	-provides clear, concise explanation of - times -
#11	-provides an explanation of how to determine the product of two integers that needs much clarification	-provides an explanation of how to determine the product of two integers that needs some clarification	-provides clear explanation of how to determine the product of two integers	-provides clear, concise explanation how to determine the product of two integers
#12	-solution uses few logical computations	-solution uses some logical computations	-solution uses logical computations	-solution uses clear, logical computations
	-few computations are correct	-some computations are correct	- most computations are correct	- all computations are correct
#13	-triangles show limited understanding of multiplication/division relationships with major errors/omissions	-triangles show some understanding of multiplication/division relationships with some errors/omissions	-triangles show clear understanding of multiplication/division relationships with minor errors/omissions	-triangles show clear understanding of multiplication/division relationships without errors/omissions
#14	-divides integers with major errors/omissions	-divides integers with some minor errors/omissions	-divides integers with minor errors/omissions	-divides integers with no major errors/omissions
#15	-integer expressions are illogical logical and use few logical computations	-integer expressions are somewhat logical and use some logical computations	-integer expressions are logical and uses logical computations	-integer expressions are clear, logical and uses logical computations