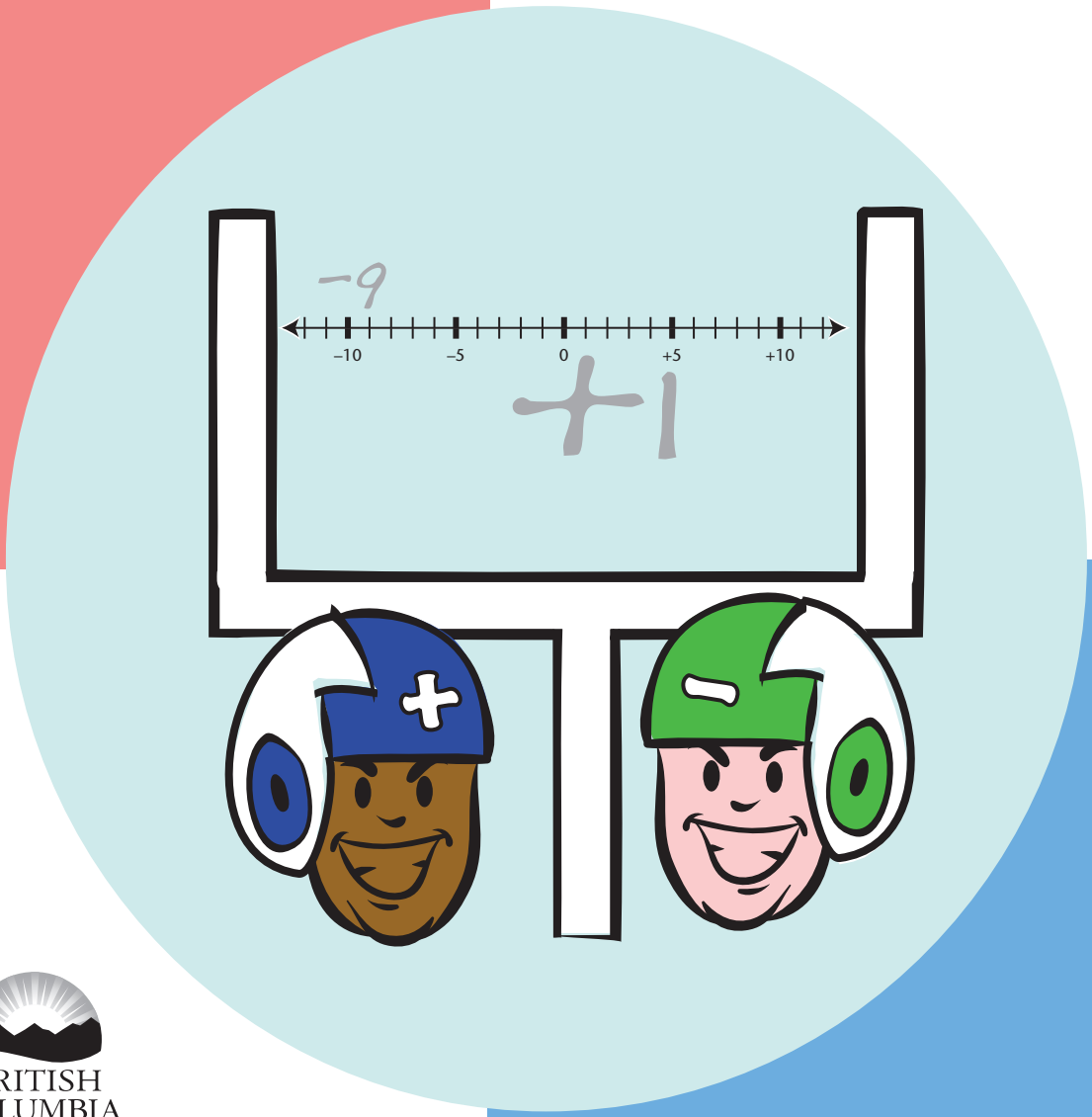
Module 1
Version 03
Sections 1–3

Math 7

Module 1

Numbers and Operations



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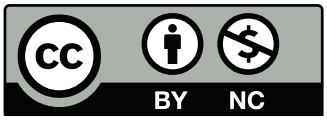

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Module 1 Table of Contents

Course Overview

Welcome to Mathematics 7!

In this course you will continue your exploration of mathematics. You'll have a chance to practise and review the math skills you already have as you learn new concepts and skills. This course will focus on math in the world around you and help you to increase your ability to think mathematically.

Organization of the Course

The Mathematics 7 course is made up of seven modules. These modules are:

Module 1: Numbers and Operations

Module 2: Fractions, Decimals, and Percents

Module 3: Lines and Shapes

Module 4: Cartesian Plane

Module 5: Patterns

Module 6: Equations

Module 7: Statistics and Probability

Organization of the Modules

Each module has either two or three sections. The sections have the following features:

Pretest	This is for students who feel they already know the concepts in the section. It is divided by lesson, so you can get an idea of where you need to focus your attention within the section.
Section Challenge	This is a real-world application of the concepts and skills to be learned in the section. You may want to try the problem at the beginning of the section if you're feeling confident. If you're not sure how to solve the problem right away, don't worry—you'll learn all the skills you need as you complete the lessons. We'll return to the problem at the end of the section.

Each section is divided into lessons. Each lesson is made up of the following parts:

Student Inquiry	Inquiry questions are based on the concepts in each lesson. This activity will help you organize information and reflect on your learning.
Warm-up	This is a brief drill or review to get ready for the lesson.
Explore	This is the main teaching part of the lesson. Here you will explore new concepts and learn new skills.
Practice	These are activities for you to complete to solidify your new skills. Mark these activities using the answer key at the end of the module.

At the end of each module you will find:

Resources	Templates to pull out, cut, colour, or fold in order to complete specific activities. You will be directed to these as needed.
Glossary	This is a list of key terms and their definitions for the module.
Answer Key	This contains all of the solutions to the Pretests, Warm-ups and Practice activities.

Thinking Space

The column on the right hand side of the lesson pages is called the Thinking Space. Use this space to interact with the text using the strategies that are outlined in Module 1. Special icons in the Thinking Space will cue you to use specific strategies (see the table below). Remember, you don't have to wait for the cues—you can use this space whenever you want!

	Just Think It: Questions	Write down questions you have or things you want to come back to.
	Just Think It: Comments	Write down general comments about patterns or things you notice.
	Just Think It: Responses	Record your thoughts and ideas or respond to a question in the text.
	Sketch It Out	Draw a picture to help you understand the concept or problem.
	Word Attack	Identify important words or words that you don't understand.
	Making Connections	Connect what you are learning to things you already know.

More About the Pretest

There is a pretest at the beginning of each section. This pretest has questions for each lesson in the sections. Complete this pretest if you think that you already have a strong grasp of the topics and concepts covered in the section. Mark your answers using the key found at the end of the module.

If you get all the answers correct (100%), you may decide that you can omit the lesson activities.

If you get all the answers correct for one or more lessons, but not for the whole pretest, you can decide whether you can omit the activities for those lessons.

Materials and Resources

There is no textbook required for this course. All of the necessary materials and exercises are found in the modules.

In some cases, you will be referred to templates to pull out, cut, colour, or fold. These templates will always be found near the end of the module, just in front of the answer key.

You will need a calculator for some of the activities and a geometry set for Module 3 and Module 7.

If you have Internet access, you might want to do some exploring online. The Math 7 Course Website will be a good starting point. Go to:

http://www.openschool.bc.ca/courses/math/math7/mod1.html

and find the lesson that you're working on. You'll find relevant links to websites with games, activities, and extra practice. Note: access to the course website is not required to complete the course.

Icons

In addition to the thinking space icons, you will see a few icons used on the left-hand side of the page. These icons are used to signal a change in activity or to bring your attention to important instructions.

Explore Online

Warm-up

Explore

Practice

Answer Key

Use a Calculator

Module 1 Overview

Module 1 consists of three sections on numbers and number operations. You'll learn all about adding and subtracting integers, you'll work with decimals and you'll explore some patterns related to divisibility. You will have plenty of opportunities to review what you already know about numbers and operations and to practise the new skills you learn. You'll try some hands-on activities and practice questions.

Module 1 is a special module. In this module you will be introduced to the Thinking Space strategies that you will use throughout Math 7. It may seem like a lot of information at first, but don't worry – you'll see these strategies in action and before long you'll be filling up the Thinking Space with all of your thoughts and ideas!

Section Overviews

Section 1.1: Integers

This first section builds on your knowledge of integers. You will use number lines and concrete materials to compare, add and subtract integers. Once you have some practice with integers, you'll explore some strategies to solve word problems.

There are two Thinking Space strategies introduced in this section. *Just Think It* is introduced in Lesson 1.1A and *Sketch It Out* is introduced in Lesson 1.1B. Read through the information carefully and then watch how the Thinking Space is used throughout these lessons. Start using the Thinking Space to interact with the text as soon as you feel comfortable with it.

Section 1.2: Operations on Decimals

In the second section, you'll perform operations on decimal numbers. You will have a chance to practise your addition, subtraction, multiplication, division, and estimation skills with decimals, but the focus of this section is on solving problems. You'll use your knowledge of decimals to work through a variety of word problems. A number of problem solving strategies will be presented along the way.

There are two Thinking Space strategies introduced in this section. *Word Attack* is introduced in Lesson 1.2A and *Making Connections* is introduced in Lesson 1.2B. Continue to use the Thinking Space strategies you already know, and pay close attention to how the new strategies are used in these lessons. Start using the new strategies as soon as you're comfortable with them.

Section 1.3: Divisibility

How can you tell if a number is divisible by another number? This section is all about divisibility rules. You'll explore patterns in sets of numbers and create some rules for figuring out if a number is divisible by 2, 3, 4, 5, 6, 8, 9, or 10. Learning these rules will help you sharpen your mental math skills and enable you to create and solve number games and puzzles!

Section 1.1: Integers

Section 1

Contents at a Glance

Learning Outcomes

By the end of this section you will be better able to:

- compare integers
- use a number line
- add and subtract integers
- solve problems that involve integers

Pretest 1.1

Complete this pretest if you think that you already have a strong grasp of the topics and concepts covered in this section. Mark your answers using the key found at the end of the module.

If you get all the answers correct (100%), you may decide that you can omit the lesson activities.

If you get all the answers correct for one or more lessons, but not for the whole pretest, you can decide whether you can omit the activities for those lessons.

Lesson 1.1A

1. Write an integer to represent each quantity.

   a. A temperature of 17 degrees above zero.

   b. A debt of $300.

   c. A depth of 75 m below sea level.

2. Circle the least integer.

   a. –3 or –2

   b. –27 or +4

   c. +21 or 0

Lesson 1.1B

1. Calculate.

   a. (–4) + (–2) =

   b. (+6) + (–9) =

   c. (+10) + (–4) =

   d. (–1) + (–8) =

2. Solve.

   a. (+29) + (–3) =

   b. (–150) + (+72) =

   c. (+127) + (–6) =

   d. (–397) + (–50) =

3. James owes his mom $25. He paid back $15. Then he borrowed another $7.

   a. Write an expression describing James' transactions.

   b. Use your expression to figure out how much James owes his mom now.

Lesson 1.1C

1. Solve.

   a. (+3) – (+7) =

   b. (+20) – (–8) =

   c. (–16) – (+10) =

   d. (+3) – (+7) =

2. Complete.

   a. ( ) – (+2) = (–8)

   b. (+12) – ( ) = (+24)

Turn to the Answer Key at the end of the Module and mark your answers.

Section Challenge

GOLF TERM	NUMBER OF STROKES ABOVE OR BELOW PAR
Double Bogey	+2
Bogey	+1
Par	0
Birdie	–1
Eagle	–2

David and Paul are taking their mom, Jane, golfing for Mother's Day.

- David made 12 pars, 3 birdies and 3 bogeys.
- Jane made 10 pars and 8 birdies.
- Paul made 7 pars, 2 birdies and 6 bogeys.

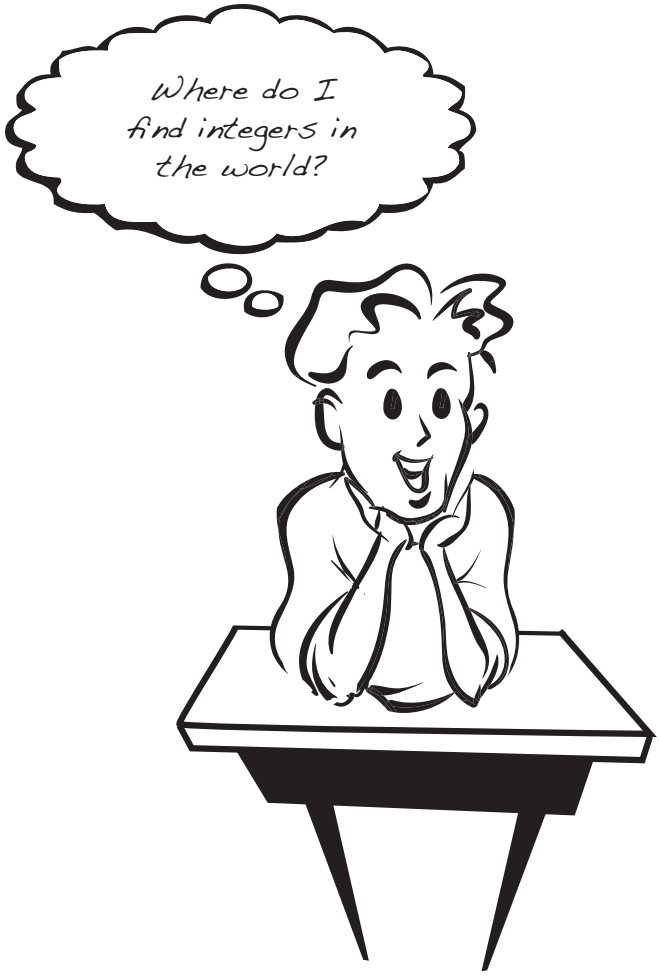
1. If the best score is the lowest under par, which golfer won?

2. If par for the course is 72, how many strokes did each golfer take?

If you're not sure how to solve the problem now, don't worry. You'll learn all the skills you need to solve the problem in this section. Give it a try now, or wait until the end of the section – it's up to you!

Lesson 1.1A: Integers

Student Inquiry



This activity will help you get ready for, learn, and review the information in the upcoming lesson.

When you turn this page over, you will find a chart containing the inquiry outcomes for this lesson. You may be able to answer some of these questions already! Start by writing down your thoughts before the lesson.

When you finish the lesson, answer each question and give an example.

Student Inquiries	BEFORE THE LESSON What I already know about this question:	AFTER THE LESSON What I thought at the end: My final answer, and examples:
What is an integer?		answer
		example
What words will help me decide if an integer is positive or negative?		answer
		example
How do I order integers from least to greatest and/or greatest to least?		answer
		example
How can I use a number line to help me order, compare and measure integers?		answer
		example

Thinking Space Strategy #1
Just Think It

The Thinking Space is the column on the right-hand side of the lessons. It's there to help you interact with the text - kind of like a conversation.

Throughout Module 1 you'll be introduced to four strategies to use in the Thinking Space. Here's the first one.

How do I *just think it*?

Record your questions, thoughts, and responses to questions in the thinking space to help you interact with the text to make it a conversation.

Remember, only you know when you have questions and comments. Don't wait for the Questions and Comments icons to use these strategies—you can use them anytime!

Throughout this lesson, take a look and see how a student used *Just Think It* to help understand the math content. You can use the space as well when you want to make comments, ask questions, and respond to questions in the text.

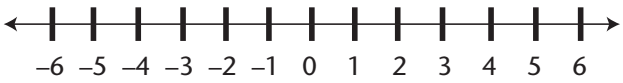
Lesson 1.1A: Integers

Introduction

We all know how to count forward. Think about your birthday; every year you get 1 year older. If this was written as an integer, it would be +1.

But what do we do when we count backwards? It seems simple enough, until we get to zero. Then what do we do?

Take a look at the number line to see what **integers** include.



Now that you know what integers look like, think about all the different ways integers are used in the world. Any time that we express a value as either a positive number or a negative number, we use integers. Try using your thinking space to answer these questions.

What do I already know about integers?

Where do I find integers in the world?

Great job! So many things in our world rely on integers to help us understand, compare, and order information in our heads. Sports depend on integers when comparing teams, players and stats. For example, have you ever golfed? The best scores are when players shoot under par. Or how about hockey statistics? Wayne Gretzky won the plus/minus score award in the NHL 4 times. Plus/minus is an ice hockey statistic that measures a player's goal difference when he is on the ice. Players' plus/minus stat goes up by one every time their team scores and down by one when the team is scored against, but only while the player is on the ice playing. How do you think this statistic helps coaches?

Without integers it would be hard to compare things like time zones, temperatures, and sport statistics.

Integers are all around us, and in this lesson you will learn about **clue words** to help you determine **integer signs**, and how to use a **number line** to compare, measure and order information which uses integers.

Thinking Space

This looks like a definition. Integers are a set of numbers that includes:

- *zero*
- *all the natural numbers (1, 2, 3...)*
- *the opposite of each natural number (-1, -2, -3...)*

Those words are in bold, that must mean they're important. They might be clues for things I will see later on.

Warm-up

Let's get our brains ready by practicing some common integer questions that we already know how to do.

1. Temperature is an example of using integers. Temperature is recorded using a scale that includes positive and negative numbers.

   Mark the following temperatures on the thermometer.

   a. +7°C

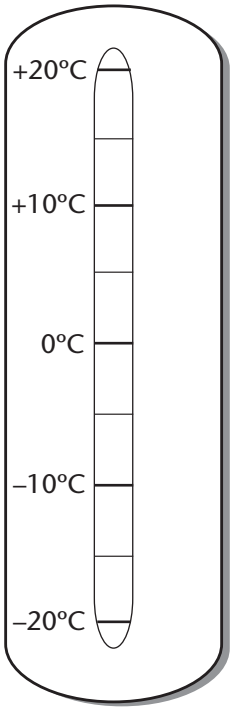
   b. –13°C

   c. +18°C

   d. –19°C

   e. –3°C

   f. +1°C



2. Number lines are great tools for organizing integers. Place these integers on the number line below., just like you recorded the temperatures on the thermometer.

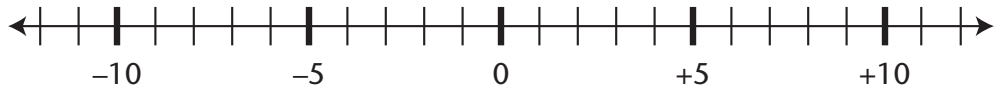
   a. +5

   b. +7

   c. –4

   d. +2

   e. –8



3. Write 3 integers less than zero.

   a. _____

   b. _____

   c. _____

Turn to the Answer Key at the end of the Module and mark your answers.

Explore

Introduction to Integers - Using Clue Words

When we read questions about integers, there are words that we can use as clues to help us know whether an integer is positive or negative.

When you see a negative sign, what does it mean to you?

It is used to represent anything that is taken away, subtracted, or lost. A positive sign represents things being added together, or increasing in value.

Look at this example:

10 degrees below zero.

When I read this, the clue word that stands out to me is "below." I use this clue to help me decide what sign to attach to the number. I know "below" means negative, so:

10 degrees below zero = –10°

Read the following statements and find the clue word that will help you understand if the integer is positive or negative. Fill in the chart with other thinking that helps you determine if the integer is positive or negative. The first one is done for you.

STATEMENT	CLUE WORD	POSITIVE OR NEGATIVE?	INTEGER
10 below zero	*below*	*negative*	–10
25 meters above sea level			
a gain of 5 kilograms			
a debt of 11 dollars			
a loss of 6 dollars			

"Above" and "gain" are clue words that mean *positive*. "Debt" and "loss" are clue words that mean *negative*. Keep thinking about this idea until your answers match these: –10, +25, +5, –11, –6.

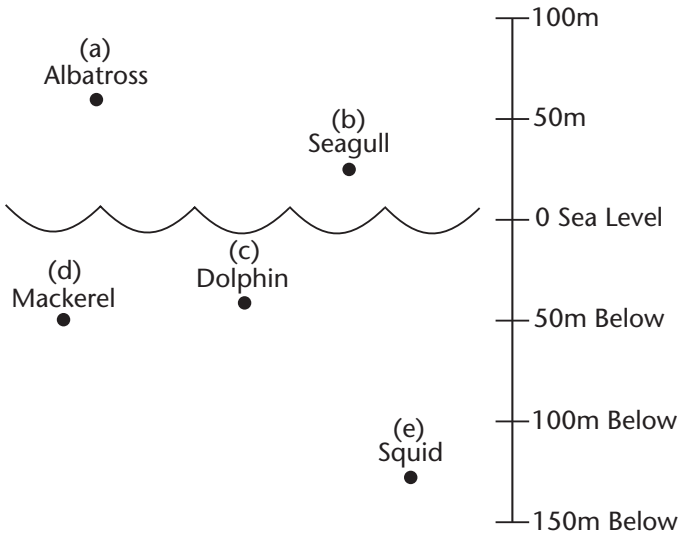
Thinking Space

Other clue words...

Positive (+):
- *above*
- *gain*

Negative (–):
- *below*
- *loss*
- *debt*

Practice 1



1. Write an integer for the level at which each animal flies or swims.

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

2. Write an integer to represent each quantity.
   a. A temperature of 50 degrees below zero _____
   b. A temperature of 10 degrees above zero _____
   c. A depth of two hundred meters below sea level _____
   d. A library fine of three dollars _____
   e. A gain of five kilograms _____
   f. A loss of six dollars _____

Turn to the Answer Key at the end of the Module and mark your answers.

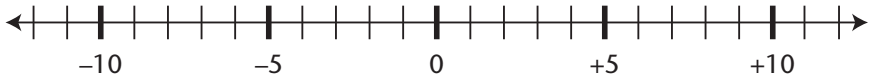
Explore

Introduction to Integers - Using a Number Line

Thinking Space

Number lines are useful tools to help us "see" integers. Just like a thermometer, we can see both positive and negative numbers on the number line.

Number lines can help us put integers in order. You have lots of experience with positive integers. But how do we put negative integers in order?



Look at the number line above. Write 3 numbers that are GREATER than zero.

1.

2.

3.

Look at the number line and write 3 numbers that are LESS than zero.

1.

2.

3.

What do you notice about each? Is there a rule that you can come up with to help you determine how to put positive and negative integers in order?

Compare your answers and the things you noticed with the example below. *Notice how the thinking space has been used in this example.*

An integer is GREATER THAN another integer the FURTHER RIGHT it is on the number line.

1. 3
2. 9
3. 11

An integer is LESS THAN another integer the FURTHER LEFT it is on the number line.

1. –1
2. –4
3. –17

Now that we know the rules, we can use them to solve integer questions involving value.

Example: Comparing Integers

Circle the LEAST integer in the pair, and write down your thinking as you go.

–3 or +5

Now you try one.

Circle the LEAST integer in the pair, and write down your thinking as you go.

–7 or –2

Did you circle –7? You are ready to practice some on your own.

Remember: If you are having trouble, your thinking space is a great place to ask questions and make comments which might help you understand it better.

Thinking Space

Numbers greater than zero are to the right of zero.

Numbers less than zero are to the left of zero. Also, they're negative!

Okay, so –3 is on the left side of the number line. +5 is on the right. I know that the further right I go, the greater the number is. This must mean +5 is GREATER THAN –3. And –3 is LESS THAN +5.

Practice 2

1. Circle the greatest integer.

   a. –3 or +5

   b. +9 or –3

   c. –7 or –2

1. Circle the least integer.

   a. +3 or +8

   b. –7 or –11

   c. –21 or –3

3. Put these integers in order from least to greatest.

   +5, –2, +12, 0, –8

Turn to the Answer Key at the end of the Module and mark your answers.

Lesson 1.1B: Adding Integers

Student Inquiry

This activity will help you get ready for, learn, and review the information in the upcoming lesson.

When you turn this page over, you will find a chart containing the inquiry outcomes for this lesson. You may be able to answer some of these questions already! Start by writing down your thoughts before the lesson.

When you finish the lesson, answer each question and give an example.

Student Inquiries	BEFORE THE LESSON What I already know about this question:	AFTER THE LESSON What I thought at the end: My final answer, and examples:
How do I add Integers?		answer
		example
What is the sum of opposite pairs, and how can I use this concept to help me add?		answer
		example
How can I use a number line to help me add integers?		answer
		example

Thinking Space Strategy #2
Sketch It Out

How do I *sketch it out*?

Authors use clues when they write to help us readers make movies in our minds. There are certain words that help us "see" all around us. It is just a matter of paying attention to those words, and making them come to life. This can be especially helpful when we are reading something that we need to learn. Many students learn better when they can "see" what they are learning. This strategy is another way to interact with the text.

Throughout this lesson, take a look and see how a student used *Sketch It Out* to help them understand the math content they were working through. Use the Thinking Space when you want to *Sketch It Out*.

Lesson 1.1B: Adding Integers

Thinking Space

Introduction

In this lesson we're going to explore how to add integers. We'll look at a variety of methods you can use to help make adding integers as easy as possible! As you go through the lesson, think about which methods work best for you.

The key to adding integers is to know about a few little hints. There are some basic rules that we follow when working with integers that will help us when we need to add them. These rules are slightly different from the rules we normally follow when adding, so let's look at these helpful hints before we go further.

I need to remember these hints!

Hint #1: The sign leads the way!

You might notice when adding integers, that there seems to be signs everywhere! It helps to keep them organized. First, figure out which signs are stuck to which number. If you can remember that the sign leads the way, it helps make the questions and **equations** seem a little less crazy!

$$-2 + -3$$

In this example, the + sign is in front of the 2. We know that it is stuck to the 2 because the sign leads the way.

In this example the 3 has "+" and "–" signs in front of it. The sign leads the way: we know that the sign that sticks to the 3 is the one right in front. The value of the 3 is (–3).

The + sign in the middle means add.

Hint #2: Brackets keep it all together!

The second important hint to remember when working with integers is knowing how to keep the signs organized.

	WHAT IS IT?	EXAMPLE
Integer signs	Integer signs are the signs that tell us whether an integer is negative or positive. Think of a number line; the sign tells us which direction to go. Right for positive, or left for negative.	(+2) (–3) Think of your own example here:
Operation signs	Operation signs tell us what to do. Addition and Subtraction are both operations signs.	2 + 5 = 10 – 8= Think of your own example here:

Once we know which sign is attached to which number, the brackets keep it all together. The brackets keep the numbers and signs together, just like the drawer in your dresser is a place to keep all your socks together.

Thinking Space

This is confusing, I think I will read it again...

Hey! brackets are kind of like hamburger buns, they keep all the filling inside! OK, it makes more sense the second time!

Thinking Space

$$+2 + -3 =$$

We need to figure out which signs are integer signs and which are **operation signs**. Remember the hints?

1. The sign leads the way
2. Brackets keep it all together. Put the brackets around each integer. This includes the sign directly in front of the number. The number and the sign are stuck together.

If we follow these hints, we can rewrite the equation to look like this:

$$(+2) + (-3) =$$

Hint #3: Be positive that it's positive!

The last thing to remember about integers is that sometimes questions look like they're missing signs. You might see questions that look like this:

$$2 + (-3) =$$

At first glance it looks like the 2 doesn't have a sign because there's no sign in front leading the way. When there is no sign, it means that the integer is positive. So another way to write this equation would be:

$$(+2) + (-3) =$$

If it looks like there is no sign, then it's automatically positive.

These concepts become extra helpful when there are several integers. For example:

$$7 + -3 + 2 =$$

$$(+7) + (-3) + (+2) =$$

It can be helpful to add brackets and positive signs when they are missing to keep things organized when you are working.

Take a look at all 3 hints. Remember, you can always come back and check on them if you are stuck or feel like you need a hint.

1. The sign leads the way—the sign immediately in front of a number is the sign that is stuck to it.
2. Brackets keep it all together—brackets go around a number and the sign in front of it.
3. Be positive that its positive—when a number has no sign leading it, it means that the number is (+).

Explore Online

Looking for more practice or just want to play some fun games? If you have internet access, go to the Math 7 website at:
http://www.openschool.bc.ca/courses/math/math7/mod1.html
Look for *Lesson 1.1B: Adding Integers* and check out some of the links!

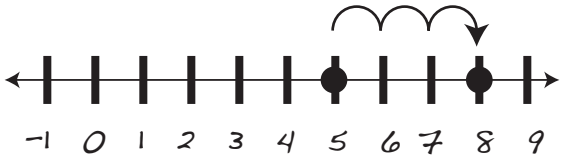
Thinking Space

These are all the hints; I am going to remember where they are so I can come back if I need them.

Warm-up

1. Answer the following questions by using a number line. First, mark your starting point, then mark the change. The first one is done for you.

   a. 5 + 3 = 8



   b. 6 – 2 =

   c. 10 – 4 =

   d. 5 + 7 =

2. Practice writing brackets around the integers in these sums.

   a. –6 + – 2 =

   b. 7 + –3 =

   c. 9 + –6 =

   d. –12 + 3 + –7 =

   e. –64 + 32 + 11 =

Turn to the Answer Key at the end of the Module and mark your answers.

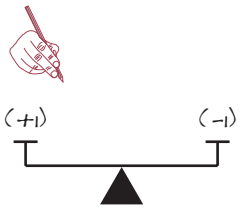
Explore

Adding Integers - Using the Zero Principle

Thinking Space

There are lots of ways that we can add integers. One is by following the **zero principle**: the **sum** of two **opposite integers** will always be zero. What does that mean? Let's break it apart.

LOOK AT THE WORD:	I KNOW IT MEANS:
Sum	This means "to add."
Opposite integers	Opposite integers have opposite signs. Also, they are the same distance from zero on the number line, but in opposite directions. Examples: (+1) and (–1) are opposite integers. (–4) and (+4) are opposite integers.
Always be zero	I know that "always" means it's a rule. And "be zero" means that it will equal zero.



For example, look at the following equation:

$$(1) + (-1) = 0$$

The opposite integers are (+1) and (–1). And when we add them together, it will equal zero. This pair of opposite integers is sometimes called a **zero pair.**

Write the zero principle in your own words. If it helps, draw a picture in your thinking space.

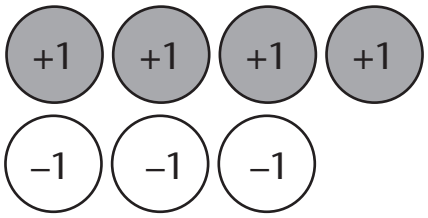
Drawing pictures is a great way to understand the zero principle. Let's sketch it out!

We can use coloured chips to represent positive and negative numbers. Here we'll use grey chips to represent positive numbers and white chips to represent negative numbers. (You could choose other colours if you want.)

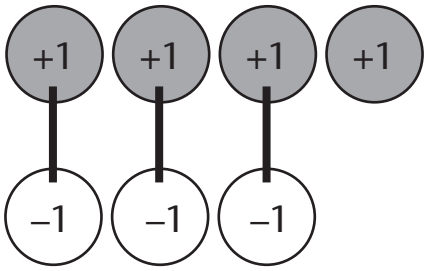
The zero principle says that every zero pair equals zero.

Look at the chips above. Let's add them together following the zero principle.

Step 1: Line the chips up into zero pairs



Step 2: Now let's draw lines between all the zero pairs



Thinking Space

Grey = (+)
White = (–)

This reminds me of mixing ingredients...
Example:
-3 + +4
Once you mix it all together there is +1 left over.

Step 3: Now see what's left over

We have 1 positive chip left over.

If we were to write this example as an equation, it would be:

$$(+4) + (-3) = (+1)$$

Thinking Space

Summary of Steps (Zero Principle):

Step 1: Line the chips up into zero pairs

Step 2: Draw lines between all the zero pairs

Step 3: See what's left over

Practice 1

1. Use the zero principle to find the sums.

   a. (+5) + (–3) =

   b. (–2) + (+3) =

   c. (–3) + (+2) =

   d. (–2) + (–1) =

   e. (–4) + (+3) =

   f. (+1) + (–3) + (+4) =

2. Find the sums. Remember to put in brackets first.

   a. –4 + 5 =

   b. 2 + –3 =

   c. +4 + –2 =

   d. –3 + –1 =

Turn to the Answer Key at the end of the Module and mark your answers.

Explore
Adding Integers - Using a Number Line

Look at this example again:

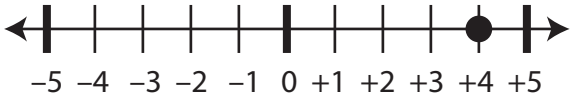
$$(+4) + (-3) =$$

This time we will use a number line to solve it.

Step 1: Draw the number line

Step 2: Mark the starting point on the number line (this is the first integer)

Look at the first integer, +4, and mark that with a dot on a number line.



Step 3: Now mark the change. How does the next integer affect the first one?

Okay, now let's add –3. Usually when we add, we move to the right on the number line. With integers, we have to be careful. The integer sign is a hint: the sign is negative, so we move the other way, in the negative direction. Start at the starting point, +4 and move 3 units left.

Thinking Space

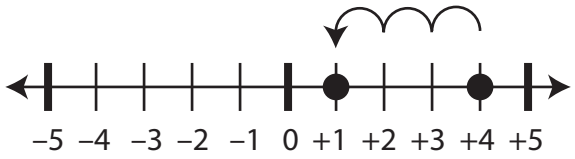
?

What things should I think about when I draw a number line?

- *where would the zero sit?*
- *what interval should I use?*
- *make sure the numbers increase from left to right*

Thinking Space

Remember: When we are deciding which way to draw the arrow, (+) means in the positive direction or right. When an integer is (–), we go in the negative direction, or left on the number line.

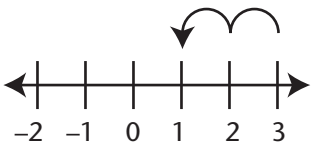


Step 4: See where we end up

On the number line we can see that after adding the second integer, we end up at (+1). Just like when we used the chips! Which method do you like? Have a look at the next example and decide which method works for you.

Example: Adding Integers

$$(+3) + (-2) =$$

Zero Principle:	Number Line:
(+1) (+1) (+1) (+3) (–1) (–1) (–2) +1 left over	 +1

Excellent job! Which method did you like best? Why did you choose it? Thinking about *why* you do things is a good way to learn.

Summary of Steps (Number Line):

Step 1: Draw the number line

Step 2: Mark the first integer on the number line

Step 3: Now mark the change

Step 4: See where we end up

Practice 2

1. a. (–4) + (–1) =

   b. (+2) + (+6) =

   c. (+8) + (–3) =

   d. (–7) + (+4) =

   e. (+6) + (–3) =

   f. (–9) + (+4) =

2. a. (–2) + (–3) + (–2) =

   b. (+2) + (–4) + (+3) =

3. a. ( ) + (–5) = +5

   b. ( ) + (–8) = –6

4. The sum of two integers is –7. Give four possible equations.

Turn to the Answer Key at the end of the Module and mark your answers.

Explore
Adding Integers - Far From Zero

Thinking Space

The same methods can be used when adding integers with larger values. We can use the zero pair principle or a number line to solve these equations just as we did before. Take a look at this example; we will use the zero pair principle to solve it.

Using the Zero Pair Principle

Let's use this example:

$$(+40) + (-30) =$$

The steps for this method are:

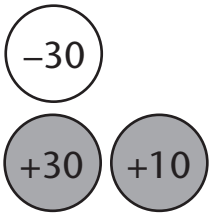
Step 1: Line the chips up into zero pairs

Step 2: Draw lines between all the zero pairs

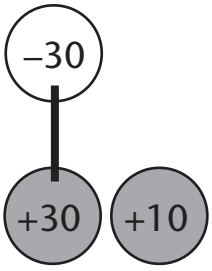
Step 3: See what's left over

Step 1: Line up integer chips into zero pairs

We don't need to draw 40 positive chips and 30 negative chips. We need 30 positive chips to cancel out all the negative chips. Break up the (+40) into (+30) and (+10).



Step 2: Draw a line to each zero pair



Every zero pair equals zero.

Step 3: See what is left over

(+10) is left over after cancelling out the zero pairs.

$$(+40) + (-30) = (+10)$$

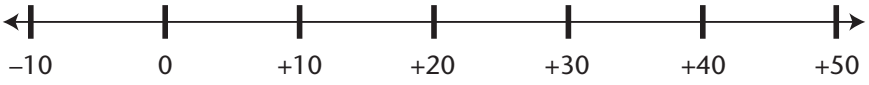
We didn't need to draw every chip for the zero pairs method, and we don't need to mark every number on the number line. Make a number line with +10, +20, etc.

Now let's try the same question using a number line.

Using a Number Line

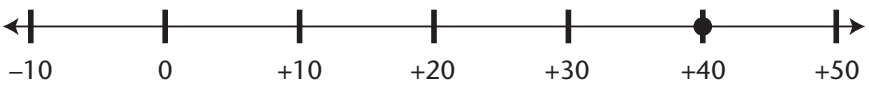
Step 1: Draw the number line

$$(+40) + (-30) =$$



Step 2: Mark the first integer on the number line as the starting point

Mark +40 with a dot on a number line.



Thinking Space

The steps for this method are:

Step 1: Draw the number line

Step 2: Mark the first integer on the number line

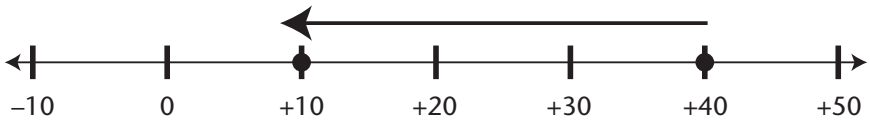
Step 3: Now mark the change

Step 4: See where we end up

Thinking Space

Step 3: Now mark the change

OK, now let's add –30. Remember: the integer sign is a hint. Which direction should we move?



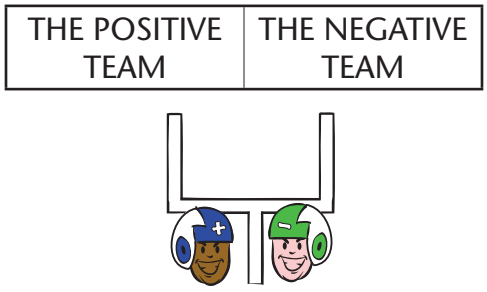
Step 4: Where do we end up?

On the number line we can see that after adding the second integer, we end up on (+10).

Just like smaller integers, we can add larger numbers on a number line. We just have to create a number line that includes the larger values in the question.

Adding Integers Far From Zero - The Scoreboard Method

Here is another method to try. It is called the scoreboard method. You have seen scoreboards before. They are used in football games, hockey games, and other sports. Imagine there are two teams playing against each other:



An integer addition question is just like a scoreboard for a game. First you draw a score board, then record what happens in the game.

Let's try one:

Thinking Space

$$+14 + (-22) =$$

The Positive Team gets 14 points. The Negative Team gets 22 points.

THE POSITIVE TEAM	THE NEGATIVE TEAM
14	22

Who won? By how much did they win? In this example the Negative Team won by 8 points. So our answer would be -8.

Try this one:

$$(-15) + (-10) =$$

For this example, we have to record two integers in the Negatives. Imagine they had to play two periods and those were the scores. It would look like this:

THE POSITIVE TEAM	THE NEGATIVE TEAM
0 0	15 10

The Negatives won again, but this time they got a shut out! Add up all the scores from the periods, and you will get the answer (–25).

Thinking Space

Now you give these a try:

$$(-4) + (7) =$$

THE POSITIVE TEAM	THE NEGATIVE TEAM

$$(-25) + 45 =$$

THE POSITIVE TEAM	THE NEGATIVE TEAM

Check your answers using one of the other methods.

Did you get these answers?

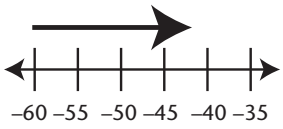
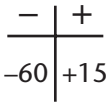
$$(-4) + (+7) = +3$$

$$(-25) + (+45) = +20$$

Example: Adding Integers

Thinking Space

$$(-60) + (+15) =$$

1. Choose a method.		
Zero Principle: 1. Line up integer chips into zero pairs. Colour the positive chips red and the negative chips blue, if it helps. 2. Draw a line between each zero pair. 3. See what is left over.	Number Line: 1. Make the number line. -where is the zero? -what is the interval? 2. Mark the first integer on the number line. 3. Mark the change using an arrow. 4. See where you end up.	The Scoreboard: 1. Draw the scoreboard 2. Report the scores for each team game 3. Find out which team won and by how much
2. Solve.		
Once you have chosen a method, solve the equation here. Compare your answer to the solutions below.		
3. Compare your solution.		
Zero Principle: (-15) (-45) (-60) (+15) (+15) -45 left over	Number Line:  -45 left over	The Scoreboard:  The Negative Team won by 45 points.

How did you do? Which method works best for you?

Are you ready to try some on your own? Look back at these examples if you are stuck or need a hint.

Practice 3

1. Predict whether the sum will be positive or negative.
   a. (–50) + (–20) will be
   b. (–50) + (+20) will be

2. Calculate.
   a. (+5) + (+3) =
   b. (–5) + (–3) =
   c. (–60) + (+20) =
   d. (–10) + (–15) =

3. Calculate.
   a. (–25) + (+35) =
   b. (–15) + (+38) =

4. Arrange the temperatures in order from coldest to warmest.
   –17°C, 27°C, –6°C, 0°C, 16°C, 2°C, 22°C

5. If the temperature is –15°C, what will the temperature be if it:

   a. increases 20°C

   b. increases 15°C

   c. increases 5°C

6. Ryan walks up and down a staircase. He starts on the 5th step and walks:

- up 2 steps
- down 3 steps
- up 4 steps
- down 5 steps

What step does he finish on?

Turn to the Answer Key at the end of the Module and mark your answers.

Lesson 1.1C: Subtracting Integers

Student Inquiry

This activity will help you get ready for, learn, and review the information in the upcoming lesson.

When you turn this page over, you will find a chart containing the inquiry outcomes for this lesson. You may be able to answer some of these questions already! Start by writing down your thoughts before the lesson.

When you finish the lesson, answer each question and give an example.

Student Inquiries	BEFORE THE LESSON	AFTER THE LESSON
	What I already know about this question:	What I thought at the end: My final answer, and examples:
How do I subtract integers?		answer
		example
How can I use skills I learned about adding integers to help me with subtracting integers?		answer
		example

Lesson 1.1C: Subtracting Integers

Introduction

The great news about this lesson is that you will learn about how we can make subtraction disappear! Well, it still exists, but we're going to look at it in a new way.

In this lesson you will learn about how to use integers to turn all subtraction questions into addition questions.

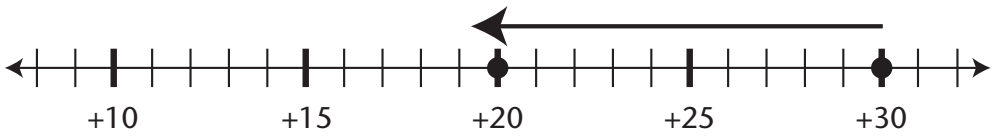
Explore Online

Looking for more practice or just want to play some fun games? If you have internet access, go to the Math 7 website at:
http://www.openschool.bc.ca/courses/math/math7/mod1.html
Look for *Lesson 1.1C: Subtracting Integers* and check out some of the links!

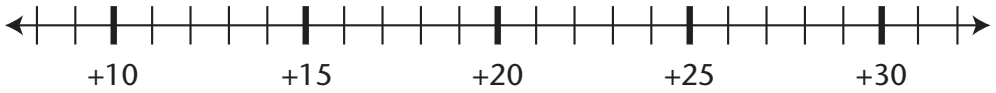
Warm-up

1. Use the number line to subtract. Look closely at the intervals on the number lines. The first one is done for you.

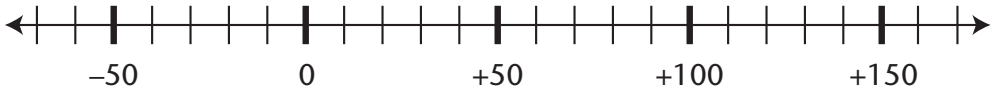
   a. 30 – 10 = 20



   b. 25 – 5 =



   c. 120 – 115 =



2. Subtract.

   a. 37 – 24 =

   b. 54 – 8 =

   c. 317 – 97 =

   d. 1072 – 67 =

   e. 47 – 39 =

   f. 515 – 11 =

Turn to the Answer Key at the end of the Module and mark your answers.

Explore
Subtracting Integers

Have you ever received a gift card for a birthday present? Gift cards are a perfect example of how subtracting integers works.

Imagine that you could spend the balance, and more than the balance, as long as you reloaded your gift card back to zero. Take a look at this example.

- Gift card balance is $10.00
- You buy a CD for $15.00
- Your new gift card balance is –$5.00 because you spent more than the original balance.

If you bought another CD for $15.00, you would be subtracting $15.00 from an already negative balance. In other words, we are subtracting $15.00 from the balance of the card.

$$(-5) - (+15) =$$

a 5 dollar debt minus 15 dollars

You can look at it another way:

$$(-5) + (-15) =$$

a 5 dollar debt plus another 15 dollar debt

There is already a negative balance and we are adding more debt.

$$(-5) - (+15) = (-5) + (-15) = -20$$

Thinking Space

Do you have any questions about this paragraph?

(+15) and (–15) are opposite integers.

Let's try some more examples:

$$(4) - (-6) =$$

For this example, the integer following the subtraction sign is (–6). When we change the operation sign from subtraction to addition, the sign of the integer must also change.

$$(4) + (+6) =$$

$$(4) + (+6) = +10$$

Thinking Space

So to subtract a negative integer, we just add its opposite!

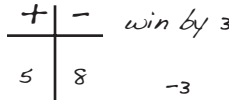
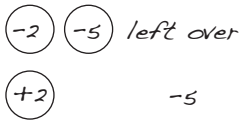
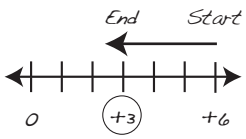
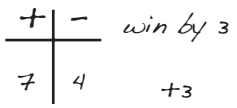
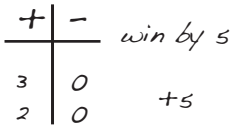
Practice turning these equations into addition questions.

	STEP 1	STEP 2	STEP 3
	Add brackets and integer signs, if necessary.	Do the switch (add the opposite).	Solve using addition. (Use any method you like: zero pairs, number lines, or the scoreboard.)
(5) – (+8) =	(+5) - (+8) =	(+5) + (–8) =	+ | – win by 3 5 | 8 -3
(–7) – (–2) =			
(6) – (3) =			
7 – (+4) =			
3 – 2 =			

Thinking Space

Which method is your favourite?

Great job, now compare your answers to the solutions below.

	STEP 1	STEP 2	STEP 3
	Add brackets and integer signs, if necessary.	Do the switch (add the opposite).	Solve using addition. (Use any method you like: zero pairs, number lines, or the scoreboard.)
(5) – (+8) =	(+5) – (+8) =	(+5) + (–8) =	
(–7) – (–2) =	(–7) – (–2) =	(–7) + (+2) =	
(6) – (3) =	(+6) – (+3) =	(+6) + (–3) =	
7 – (+4) =	(+7) – (+4) =	(+7) + (–4) =	
–3 – 2 =	(–3) – (+2) =	(–3) + (2) =	

Thinking Space

Practice

1. Solve.

   a. (+3) – (–2) =

   b. (–7) – (–3) =

   c. (–2) – (+6) =

   d. (–1) – (+4) =

2. Solve.

   a. (+9) – (+2) – (+4) =

   b. (–6) – (–4) – (–3) =

   c. (+3) – (–1) – (+4) =

   d. (–4) – (–2) – (+3) =

3. A valley is 200 metres below sea level and the top of a mountain is 2000 metres above sea level. Cullen says the difference is 2200 metres. Ann says the difference is 1800 metres. Who is right?

Turn to the Answer Key at the end of the Module and mark your answers.

Section Summary

Now that you have completed this section, try solving the Section Challenge that you saw at the beginning. When you are finished, compare your answer to the solution on the next page.

Section Challenge

GOLF TERM	NUMBER OF STROKES ABOVE OR BELOW PAR
Double Bogey	+2
Bogey	+1
Par	0
Birdie	–1
Eagle	–2

David and Paul are taking their mom, Jane, golfing for Mother's Day.

- David made 12 pars, 3 birdies and 3 bogeys.
- Jane made 10 pars and 8 birdies.
- Paul made 7 pars, 2 birdies and 6 bogeys.

1. If the best score is the lowest under par, which golfer won?

2. If par for the course is 72, how many strokes did each golfer take?

Section Challenge Solution

<table>
<tr><td colspan="2">STEP 1: UNDERSTAND THE PROBLEM</td></tr>
<tr><td>I understand by:
• drawing
• highlighting clue words
• underlining the question
• rewording the question</td><td>My way to understand:
• drawing

D 12 Pars = 0
3 Birdies = −1
3 Bogeys = +1

J 10 Pars = 0
8 Birdies = −1

P 7 Pars = 0
2 Birdies = −1
6 Bogeys = +1</td></tr>
<tr><td colspan="2">STEP 2: MAKE A PLAN
• Find the information I need
• Make an estimate</td></tr>
<tr><td>Information I need:
• David made 12 pars, 3 birdies, and 3 bogeys
• Jane made 10 pars and 8 birdies
• Paul made 7 pars, 2 birdies, and 6 bogeys

Clue words:
• Double bogey = +2
• Bogey = +1
• Par = 0
• Birdie = –1
• Eagle = –2</td><td>Information I don’t need:
• David and Paul are taking their mom, Jane, golfing for Mother’s Day.</td></tr>
<tr><td colspan="2">My Estimate: I estimate that Jane won because she got no scores above par.</td></tr>
</table>

STEP 3: CARRY OUT THE PLAN
Solve. David made 12 pars, 3 birdies and 3 bogeys. 12 pars: 12 x 0 = 0 3 birdies: 3 x (–1) = –3 3 bogeys: 3 x (+1) = +3 Total: 0 + (–3) + (+3) = 0 Jane made 10 pars and 8 birdies. 10 pars: 10 x 0 = 0 8 birdies: 8 x (–1) = –8 Total: 0 + (–8) = –8 Paul made 7 pars, 2 birdies and 6 bogeys. 7 pars: 7 x 0 = 0 2 birdies: 2 x (–1) = –2 6 bogeys: 6 x (+1) = +6 Total: 0 + (–2) + 6 = +4
Check: My estimate is correct.
STEP 4: ANSWER THE QUESTION
If the best score is the lowest under par, which golfer won? Jane with –8. *If par for the course is 72, how many strokes did each golfer take?* David: 72 + 0 = 72 Jane: 72 – 8 = 64 Paul: 72 + 4 = 76
Does the answer make sense?: Yes.

Section 1.2: Operations on Decimals

Section 2

Contents at a Glance

Learning Outcomes

By the end of this section you will be better able to:

- add, subtract, multiply and divide a variety of decimal numbers
- apply the correct order of operations to problems that involve more than one operation on decimal numbers
- estimate solutions in problems that involve decimals
- determine if your estimation is reasonable
- solve a variety of problems that involve decimals

Pretest 1.2

Complete this pretest if you think that you already have a strong grasp of the topics and concepts covered in this section. Mark your answers using the key found at the end of the module.

If you get all the answers correct (100%), you may decide that you can omit the lesson activities.

If you get all the answers correct for one or more lessons, but not for the whole pretest, you can decide whether you can omit the activities for those lessons.

Lesson 1.2A

1. Estimate.

   a. 2.67 + 6.24 =

   b. 65.331 + 21.951 =

   c. 55.213 + 26.543 + 38.222 =

   d. 0.236 + 1.897 =

   e. 22.65 – 11.20 =

   f. 258.688 – 23.126 =

   g. 159.32 – 62.15 =

Lesson 1.2B

1. Dilraj and Manny have $95. They want to buy a video game for $75.50, a controller for $16.99 and a memory card for $20.15. All prices include tax.

   a. Estimate the total cost. Do they have enough to buy all three items?

   b. Calculate how much they are short or the amount they would have left over.

Lesson 1.2C

1. Calculate.

   a. $0.2 \times 0.9 =$

   b. $0.6 \times 0.4 =$

2. Gas costs $1.25 per litre. Your car holds 40.5 L. How much do you pay for gas? Round your answer to the nearest cent.

Lesson 1.2D

1. Estimate then calculate.

   a. $(26.6 \times 6) + 25 - (3.2 \times 2.1) =$

   b. $(6.9 \div 3) + (4.6 \times 0.23) =$

Lesson 1.2E

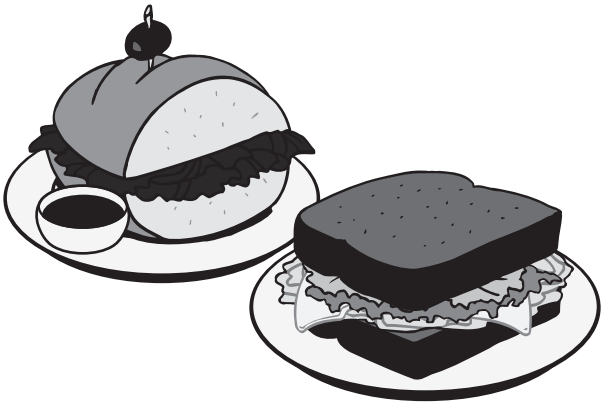
1. A single bus fare costs $3.25. A monthly pass costs $45.75.

   a. You plan to ride the bus 25 times this month.
   Should you buy a monthly pass?

   b. How many times would you have to ride the bus for it to be worth buying a monthly pass?

Turn to the Answer Key at the end of the Module and mark your answers.

Section Challenge



It's Friday night and you are out with your friends. You have $10 in your wallet. Although these days that doesn't seem to get you much, it will have to do. You stop at your favourite fast food joint. A sandwich is $5.59, and chips are another $1.99. But you are really hungry, so maybe you want a salad which is $3.45. Throw in a drink for $1.87. Wow, it adds up! We have all been in these situations. It's times like these when we need some good estimating skills!

1. Do you have enough for the salad?

2. If you get change, how much will it be?

If you're not sure how to solve the problem now, don't worry. You'll learn all the skills you need to solve the problem in this section. Give it a try now, or wait until the end of the section – it's up to you!

Lesson 1.2A: Estimating Decimals

Student Inquiry

This activity will help you get ready for, learn, and review the information in the upcoming lesson.

When you turn this page over, you will find a chart containing the inquiry outcomes for this lesson. You may be able to answer some of these questions already! Start by writing down your thoughts before the lesson.

When you finish the lesson, answer each question and give an example.

Student Inquiries	BEFORE THE LESSON What I already know about this question:	AFTER THE LESSON What I thought at the end: My final answer, and examples:
What is estimation?		answer
		example
How do I estimate using Front End Estimation?		answer
		example
How do I estimate using relative size?		answer
		example
How can estimation help me know where to put a decimal in an answer?		answer
		example

Thinking Space Strategy #3
Word Attack

How do I *word attack*?

There are different kinds of words to attack. The goal in all cases, however, is to understand what the words mean. The three kinds of words we are going to focus on are:

Vocabulary words - There are some words that are used throughout the lesson that are important terms to know. In other words, these words are crucial to understanding the content and working through the lesson. The words will often be in **bold type** or have definitions attached to them.

Math clue words - Words are often used to spread clues about what kind of mathematical operations to use, especially in word problems. For example, words like "around" could mean "perimeter," or a word like "together" could mean "to add." It is helpful to create a list of these words to help you so when you come across these math clue words, you know what to do to solve the problem. Take a look at some of these math clue word examples:

MATH CLUE WORD	MEANS
Give to...	Subtract
Combine	Add
Around	Perimeter
Left over	Remaining Total

Can you think of any others? Write them in the chart above.

Unknown words - Everyone encounters unknown words at some time or another. Sometimes we come across words that we either can't pronounce, or just don't know what they mean. When this happens, there are some strategies you can use to attack the words, so you can make sense of what you are reading.

UNKNOWN WORD ATTACK STRATEGIES	
Sound it out:	We all know this one; we have been doing it our whole lives. Saying words out loud will often help us know what words are because we may find that they are words we have heard before. It is used a lot because it is a good strategy, but it isn't the only one.
Skip it:	The first time you come across the word, try skipping it; you may not even need to know it. But don't forget to ask yourself if it makes sense after skipping the word!
Chunk it:	If you chunk the word into sections, sometimes you may find words that look like other words you know. For example, let's look at the word extraordinary: *extra / ordinary* Let's chunk it into 2 sections extra and ordinary. We know ordinary means normal, everyday. And we know extra means more. So we could say that extraordinary means more or better than normal.
Substitute it:	Words around the unknown word are very good clues to figuring out what a word means. Very often you can use those words to put in another word that you know. Look at this example; say we were stuck on the word spectacular in this sentence: *The painting was spectacular; I couldn't stop looking at it.* By using the words around the unknown word, we could use a word such as amazing or incredible instead.

It doesn't matter what strategy you choose to use to attack the words, it won't work unless you stop after you use it and ask yourself:

Does this make sense? If so, just keep on reading. If not, try a different strategy!

Throughout this lesson, take a look and see how a student used *Word Attack* to help understand the math content to be worked through. You can use the space as well when you want to identify and attack vocabulary words, clue words or words you don't know.

Lesson 1.2A: Estimating Decimals

Thinking Space

Introduction

Estimating is a skill we all need. How many times have you been sent you to the store with a list of things to pick up, and you secretly hope to have enough change to get a treat at the end? Estimating helps us do mental math, or math in our head. We don't always have access to a calculator or a pen and paper to scratch out problems. Estimating skills are what we need to get through situations like these.

Explore Online

Looking for more practice or just want to play some fun games? If you have internet access, go to the Math 7 website at:
http://www.openschool.bc.ca/courses/math/math7/mod1.html
Look for *Lesson 1.2A: Estimating Decimals* and check out some of the links!

Warm-up

Thousands, Hundreds, Tens, Ones . Tenths, Hundredths, Thousandths

1. Circle the digit in the place value given, using the place value system above.

   a. 218.1 Ones

   b. 24.19 Tenths

   c. 3007.01 Thousands

   d. 0.89 Ones

   e. 3942.91 Tens

   f. 411.02 Hundreds

2. Round the place value given. Use the poem below to help you. The first one is done for you.

   Find your target, look right next door
   4 or lower, just ignore
   5 or higher, add one more!

   a. 318.47 Hundreds

   The answer is 300.

b. 14.062 Tenths

c. 62.17 Ones

d. 461.78 Tenths

e. 2104.96 Tens

f. 1496.73 Hundreds

3. Estimate by rounding. The first one has been done for you.

a. $46 \times 3 \approx$ $50 \times 3 = 150$

b. $77 + 6 \approx$

c. $18 \div 5 \approx$

d. $6 \times 21 \approx$

e. $103 - 14 \approx$

f. $664 + 17 \approx$

Turn to the Answer Key at the end of the Module and mark your answers.

Explore
Front End Estimation

You have $150, and you want to buy a video game that costs $107.73. There is also a sale on controllers AND it's tax-free shopping this weekend only! You see that the controller is $33.21. Do you think you have enough money to buy both?

This is one of many examples of how estimation could help you out. It would be great to be able to have a calculator available whenever you need it, but instead we must rely on ways of doing math in our heads. This is estimation.

There are many ways to estimate or make a best guess of what the answer could be. We will try two different kinds of estimation in this lesson. Once you become familiar with both, you can choose which method works best for you.

The first method is called **front end estimation**. Let's use the example above to practice using front end estimation. We call it front end because we look at the front of the number to help us.

$$33.21 + 107.73 =$$

Step 1: Rounding

When front end estimating, the first step is to round the number to the place value of its first digit. For example:

33.21

The first digit is 3, and the 3 is in the tens column. This tells me to round it to the nearest ten. If I round 33.21 to the nearest ten, the number I get is 30.

Let's try it now with 107.73. What is the place value of the first digit? If you aren't sure, try making a place value chart like this to help you out.

Thousands	Hundreds	Tens	Ones	.	Tenths	Hundredths
	1	0	7	.	7	3

Thinking Space

Add together!

Estimation = a smart guess!

Thinking Space

After putting the number in the chart, can you see that the place value of the first digit is in the hundreds column? Something to keep in mind, however, is that as the numbers get bigger, our estimates get less precise. When we round 107.73 to the nearest hundred, we get 100. We can easily fix this problem. With larger numbers, use the first two digits as the "front end". Rounding 107.73 to the nearest ten gives 110. Can you see how including two digits is a more accurate estimate?

Step 2: Estimate

The question is asking us to add, so we do the same with our estimated numbers.

$$30 + 110 = 140$$

We know our answer will be around 140. Using this estimation, we could predict that you would have enough money to buy both the game and the controller.

Let's try another one together.

Example: Front End Estimation

$$41.30 - 14.17 =$$

Solution:

41.30 41 is the front, round to 40

14.15 14 is the front, round to 15

40 − 15 = 25

Great job! Try a few more until you are comfortable with front end estimation.

Practice 1

1. Estimate using Front End Estimation.

   a. 107.11 + 14.97

   b. 321.06 + 111.12

2. Place a decimal point in each sum without calculating.

   a. 62.57 + 28.41 = 9098

   b. 75.83 + 37.9 + 28 = 14173

3. Estimate.

   a. 1.458 + 1.319 + 1.2

   b. $9.14 + $6.99 + $0.49

Turn to the Answer Key at the end of the Module and mark your answers.

Explore
Relative Size Estimation

Thinking Space

We have learned how to estimate using front end, now let's try another way. This second method is called "estimating using **relative size**." We call it this because we are comparing or relating our numbers to a standard, which in this case is a number line. Let's use the same question as in our first example. This time, estimate using relative size.

$$33.21 + 107.73 =$$

Relative
I see the word 'relative' like we are relating/comparing this number in relation to something else.

Step 1: Build a number line

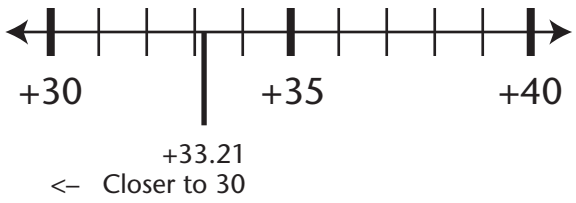
Remember to keep in mind the hints for building number lines from the previous section:

- Where is the zero?
- What is the interval?
- Are the units increasing from left to right?

Interval... I'm not sure what that is.

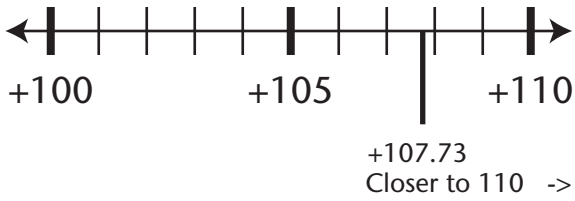
Now ask yourself, "what would this number fit between?"

33.21 would fit between 30 and 40. We use the front value to help us, just like we did in front end estimation. Our number line starts at 30 and ends at 40, using intervals of 1.



Oh yeah! It's the space between the units on a number line.

107.73 is between 100 and 110. The number line for this number starts at 100 and ends at 110 and uses intervals of 1.



Thinking Space

Step 2: What is it closest to?

This is where we ask ourselves, if I were to now put my number on the number line, which end would it be closest to?

33.21 is closest to 30 on our number line

107.73 is closet to 110 on our number line

Step 3: Estimate

Look back at our question. What operation are we using? It doesn't change. In this question we are adding, so we are going to add our estimates as well.

$$30 + 110 = 140$$

Our estimate is that 33.21 + 107.73 will be around 140.

Both types of estimates are considered good methods for finding the "best guesses" in problems involving decimals.

Are you ready to try some?

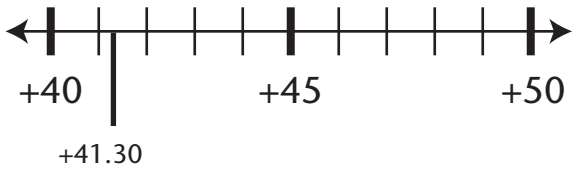
Example: Relative Size Estimation

$$41.30 - 14.17$$

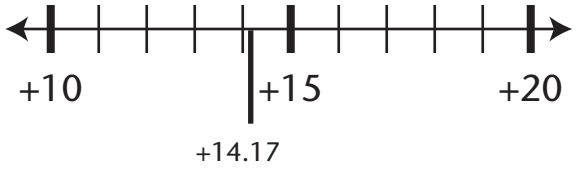
Thinking Space

Step 1: Build the number line

41.30



14.17



Step 2: What is it closest to?

Place the numbers on the number line and the end they are closest to.

41.30 is closest to 40 on our number line

14.17 is closet to 15 on our number line

Step 3: Estimate

$$40 - 15 = 25$$

Great job! Try a few more so you become really confident using this method of estimation.

Practice 2

1. Estimate using Relative Size Estimation.
   a. 60.14 + 11.22 =

   b. 124.08 – 15.64 =

   c. 247.0 + 83.14 =

   d. 11 + 90.12 =

2. Place a decimal point in each sum without calculating.
   a. 68.4 + 26.8 = 952

   b. $335.61 – $240 = $9561

   c. 4.831 + 2.765 = 7596

3. Estimate.
   a. 28.3 – 5.19 =

   b. $3402.50 + $4102.05 =

   c. 627 metres – 580.9 metres =

Turn to the Answer Key at the end of the Module and mark your answers.

Estimating Your Way

It doesn't matter which way you choose to estimate. You can pick which method works best for you.

Estimate using *either* relative size or front end estimation.

$485.20 + $35.19 + $11.16 =

Thinking Space

Why did you choose the method you did?

Compare your estimates with the ones below.

485.20 is close to 500

35.19 is close to 40

11.16 is close to 10

500 + 40 + 10 = 550

Remember: It is okay that the estimates are different depending on the method you choose to use. Estimates are our smart guesses. In the next lesson, we'll look at how estimates help us when we're finding exact answers.

Practice 3

1. One bicycle costs $248.90. The other costs $399.99.

   a. Estimate how much more the second bicycle costs.

   b. Estimate how much it would cost to buy both.

2. Estimate.

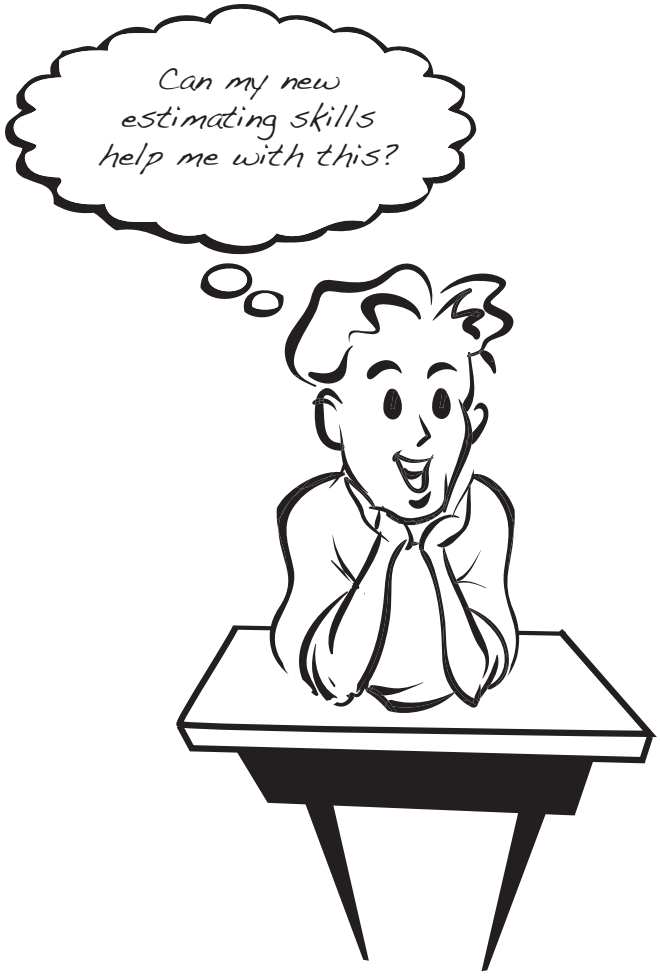
   a. 12.03 + 15.13 =

   b. $117.68 + $120.70 =

Turn to the Answer Key at the end of the Module and mark your answers.

Lesson 1.2B: Adding and Subtracting Decimals in Word Problems

Student Inquiry



This activity will help you get ready for, learn, and review the information in the upcoming lesson.

When you turn this page over, you will find a chart containing the inquiry outcomes for this lesson. You may be able to answer some of these questions already! Start by writing down your thoughts before the lesson.

When you finish the lesson, answer each question and give an example.

Student Inquiries	BEFORE THE LESSON	AFTER THE LESSON
	What I already know about this question:	What I thought at the end: My final answer, and examples:
What strategies can I use to solve word problems involving decimals?		answer
		example
What do I need to know in order to add or subtract decimals?		answer
		example
How can estimating help me solve a word problem?		answer
		example

Thinking Space Strategy #4
Making Connections

How do I use *connections?*

Making Connections

There are three kind of connections we make make while we are reading:

Connecting the text to ourselves - When you have a direct experience related to what you're reading, this is a text-to-self connection. Maybe you lived through a situation similar to the one you're reading about. Or maybe you've seen something similar, or learned the concept in another course. Whatever connection you have to the text, recognizing the connection will help you understand and learn what you're reading.

Connecting the text to the world - Sometimes there are things that you might not experience directly, but know about through someone or something else. You can connect to something you learned from someone else, or learned through the news, or even something you remember from movies you've watched. These types of connections are text-to-world connections.

Connecting the text to another text - When you connect the text you're reading to other texts you've read, this is a text-to-text connection. You may already know part of what you're reading from previous grades or from other books you've read. Combining old knowledge and new knowledge together helps you learn new things.

An important part about Making Connections is knowing when the connections are strong. Strong connections help us understand something new. A good question to ask yourself after you make a connection is:

SO WHAT?

In other words, "what about this connection helped me learn something new, or helped me understand this new information I'm learning about now?"

Congratulations, you have made it through all of the thinking strategies. Your job now is to use them! Good luck with the rest of your course. And happy thinking!

Lesson 1.2B: Adding and Subtracting Decimals in Word Problems

Introduction

Just like estimating helps us solve math problems throughout our day, estimating and problem solving will help us work through word problems on paper. Math is filled with all types of word problems. Our job is to understand the problem and use all the math skills we've learned together to solve them. In this lesson we'll be solving word problems involving adding and subtracting decimals.

Explore Online

Looking for more practice or just want to play some fun games?
If you have internet access, go to the Math 7 website at:
http://www.openschool.bc.ca/courses/math/math7/mod1.html
Look for *Lesson 1.2B: Adding and Subtracting Decimals in Word Problems* and check out some of the links!

Warm-up

1. Estimate. Solve. Check.
   Complete these questions without using a calculator.

   a. 16.2 + 4.6 =

   b. 4.7 + 3.2 =

   c. 20.5 – 16.2 =

   d. 120.6 – 18.3 =

   e. 21 – 4.7 =

   f. 137 + 14.3 =

   g. 43.21 + 16.24 =

   h. 137 + 14.3 =

i. 27.22 – 10.6 =

j. 621.03 + 7 =

k. 1210 + 16.7 =

l. 88.8 + 7.2 =

m. 14.72 – 4.2 =

n. 99 + 0.9 =

Turn to the Answer Key at the end of the Module and mark your answers.

Explore

Adding and Subtracting Decimals in Word Problems

We reviewed how to add and subtract decimals in our warm up; now we'll practice solving word problems involving addition and subtraction of decimals. We'll include the estimating skills we learned in the last lesson.

We practiced estimating decimals in two ways:

1. Front end estimation
2. The zero pair principle

Now we can include these skills in our word problem steps.

Step 1: Understand the problem

Here are some example strategies we can use to understand a problem.

1. Highlight clue words

   Remember when we highlight, we are looking for words that help us see and trying to find all the numbers for our number sentence. Using clue words is one of the best ways to understand math word problems. It's helpful to make a chart of clue words, or words that help us "see," and explain why they are clue words.

2. Drawing a picture

   Draw a picture of what is going on in the problem.

   See if you can figure out which operations we are going to use: addition, or subtraction, or both.

3. Underline the question(s)

   When we underline the question, it helps us make sure we've answered it. We wouldn't want to rush and get an answer only to realize later that we answered the wrong question!

   Can you think of some other strategies?

Thinking Space

We learned these estimating techniques in the last lesson.

I love drawing! I hope that it will help me understand

Step 2: Make a plan

Once you understand the problem, you need to figure out what mathematical operations you should use. It can be helpful to separate the information you need from the information you don't. Reread the question and pull out all the important information you need.

Another part of the plan is to include the estimating that we learned from the previous lesson. You can choose what method works for you. Which do you prefer?

Front end estimation

OR

Number line estimation

Step 3: Carry out the plan

Now that I understand the problem, I have to figure out what mathematical operations I am working with.

1. Calculate the answer.
2. Check with your estimate (does your answer make sense?).

Step 4: Answer the question

Remember that we underlined the questions in the problem. Go back and make sure your calculated answer addresses the question. Also, make sure you've answered all the questions (sometimes there are more than one) and that your answer makes sense.

Following these steps will help you solve word problems. We will use these steps together to work out some word problems involving adding and subtracting decimals. Then you can try one on your own.

Thinking Space

I know there is usually way more info than I need...I feel like I'm getting tricked sometimes.

Summary of Steps (Problem Solving):

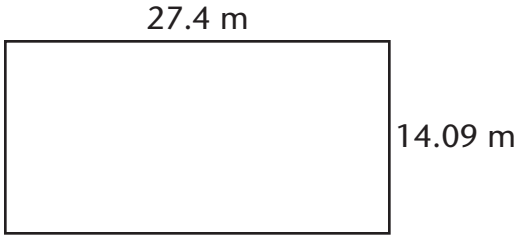
Step 1: Understand the problem

Step 2: Make a plan

Step 3: Carry out the plan

Step 4: Answer the question

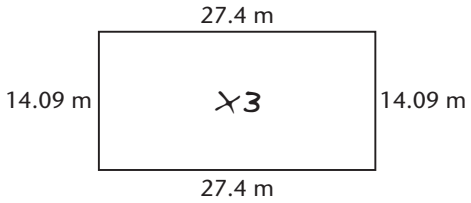
PROBLEM:
Robbie is training for a race by riding his bike **around** his block **3 times** every day. He measured the distance of his route (see the map below). *What distance does he ride each day?*



STEP 1: UNDERSTAND THE PROBLEM

I understand by:
- drawing
- highlighting clue words
- underlining the question
- rewording the question

My way to understand:
- drawing



STEP 2: MAKE A PLAN
- Find the information I need
- Make an estimate

Information I need:
- Riding his bike around his block 3 times every day

The distance of his route:
- Length = 27.4 metres
- Width = 14.09 metres

Clue words:
- Around = its perimeter
- 3 times = multiply by 3

Information I don't need:
- Robbie is training for a race

My Estimate: Using the clue words and info chart I understand the problem. I know that I need to add up all the sides of Robbie's bike route, then multiply by 3 because he rides around the perimeter of his block 3 times. First, I will make an estimate.

Perimeter of 1 block =
27.4 + 27.4 + 14.09 + 14.09
25 + 25 + 15 + 15 = 80
80 × 3 = 240 metres

STEP 3: CARRY OUT THE PLAN
Solve. 27.4 + 27.4 = 54.8 14.09 + 14.09 = 28.18 54.8 + 2818 = 82.98 m 82.98 m × 3 times around = 248.94 m Robbie rides 248.94 metres each day.
Check: My estimate is correct.
STEP 4: ANSWER THE QUESTION
What distance does he ride each day? Robbie rides 248.94 metres each day.
Does the answer make sense?: Yes.

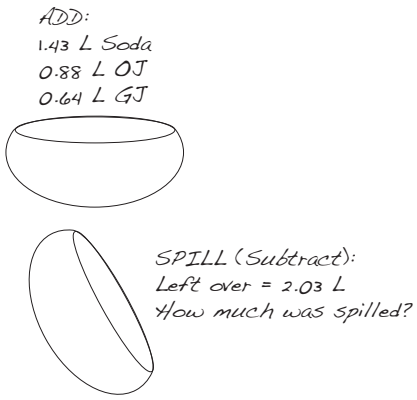
Once we put all the skills together, our estimating skills, our decimal skills and our word problem skills, solving word problems is easy! Let's try a few more.

PROBLEM:
Sonny made a punch for his birthday party on Saturday. He **combined** 1.43 L of soda **with** 0.88 L of orange juice **and** 0.64 L of grape juice. On the way to the table, Sonny tripped and **spilled** some punch. When it finally got to the table, there was 2.03 L **left**. *How much did he spill?*

STEP 1: UNDERSTAND THE PROBLEM

I understand by:
- drawing
- highlighting clue words
- underlining the question
- rewording the question

My way to understand:
- drawing



STEP 2: MAKE A PLAN
- Find the information I need
- Make an estimate

Information I need:
- Combined 1.43 L of soda with 0.88 L of orange juice and 0.64 L of grape juice
- Spilled
- There was 2.03 L left

Clue words:
- combined/with/and = adding
- spilled = subtract
- left = remaining total

Information I don't need:
- Sonny made a punch for his birthday party on Saturday
- On the way to the table, Sonny tripped
- When it finally go to the table

My Estimate:

1.43 round down to 1 L
0.88 round up to 1 L
0.64 round up to 1L
1 L + 1 L + 1L = 3 L

2.03 round down to 2 L

3 L – 2 L = 1 L left over

STEP 3: CARRY OUT THE PLAN
Solve. Soda + OJ + GJ = Total Punch 1.43 + 0.88 + 0.64 = 2.95 L Total Punch – Left = Spill 2.95 – 2.03 = Spill Spill = 0.92 L
Check: My estimate is correct.
STEP 4: ANSWER THE QUESTION
How much did he spill? Sonny spilled 0.92 L of punch.
Does the answer make sense?: Yes.

Take your time, focus on clue words, and follow your plan one step at a time, word problems will get easier every time you do them.

Now it's your turn. Try this one out, following the steps.

PROBLEM:
Justin is putting up a fence around his skate park, so his neighbours don't come in and break their body parts doing flips. He needs 17.9 m of wire fence. His dad gave him some left over pieces to use but they came as 3 separate pieces. One was 6.6 m long, the second was 7.3 m long and the third piece was 3.4 m long. Does Justin have enough wire fences to put around his park?

STEP 1: UNDERSTAND THE PROBLEM

I understand by:	My way to understand:
• drawing • highlighting clue words • underlining the question • rewording the question	

STEP 2: MAKE A PLAN
- Find the information I need
- Make an estimate

Information I need: Clue words:	Information I don't need:

My Estimate:

STEP 3: CARRY OUT THE PLAN
Solve.
Check:
STEP 4: ANSWER THE QUESTION
Does Justin have enough wire fences to put around his park?
Does the answer make sense?:

What is your answer? Did Justin have enough fencing? If you said no, you solved the problem correctly. Well done!

If you said yes, take a look at the solution and see where you can go back and make corrections. Compare your answer to the solution on the next page.

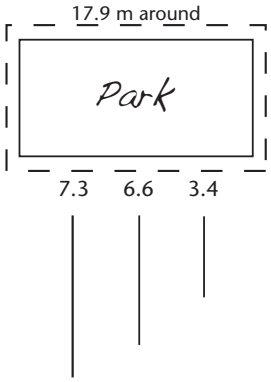
PROBLEM / SOLUTION:

Justin is putting up a fence **around** his skate park, so his neighbours don't come in and break their body parts doing flips. He **needs 17.9 m** of wire fence. His dad gave him some left over pieces to use but they came as **3 separate pieces**. One was 6.6 m long, the second was 7.3 m long and the third piece was 3.4 m long. *Does Justin have enough wire fences to put around his park?*

STEP 1: UNDERSTAND THE PROBLEM

I understand by:
- drawing
- highlighting clue words
- underlining the question
- rewording the question

My way to understand:
- drawing



STEP 2: MAKE A PLAN
- Find the information I need
- Make an estimate

Information I need:
- 17.9 m = perimeter
- Piece 1 = 6.6 m
- Piece 2 = 7.3 m
- Piece 3 = 3.4 m

Clue words:
- Around = perimeter
- Needs 17.9 m = this is the perimeter
- 3 separate pieces = add together

Information I don't need:
- Neighbours don't come in and break their body parts

My Estimate:

3 pieces together = perimeter?

6.6 round up to 7
7.3 round down to 7
3.4 round down to 3

7 + 7 + 3 = 17 m

He will not have enough wire.

STEP 3: CARRY OUT THE PLAN
Solve. 6.6 + 7.3 + 3.4 = 17.3 m Justin does not have enough wire, because he needs 17.9 m.
Check: My estimate is correct.
STEP 4: ANSWER THE QUESTION
Does Justin have enough wire fences to put around his park? Justin does not have enough wire.
Does the answer make sense?: Yes

You have done a great job so far. Keep practicing with the following questions. Solutions are in the Answer Key if you are stuck or need a hint.

Practice

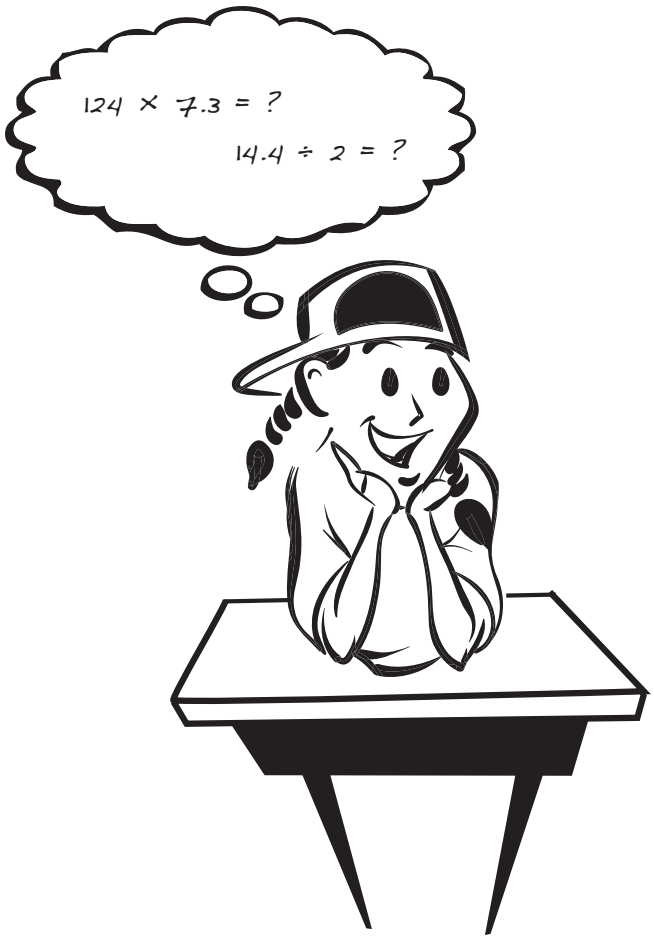
1. Scott bought 3 sport balls for $4.45, $5.99 and $9.60. He has $20 to pay the bill. Does Scott have enough money?

2. Box A is heavier than Box B by 1.5 kg. Box C is lighter than Box B by 2.65 kg. How heavy is Box A if Box C is 3.75 kg?

Turn to the Answer Key at the end of the Module and mark your answers.

Lesson 1.2C: Multiplying and Dividing Decimals in Word Problems

Student Inquiry



This activity will help you get ready for, learn, and review the information in the upcoming lesson.

When you turn this page over, you will find a chart containing the inquiry outcomes for this lesson. You may be able to answer some of these questions already! Start by writing down your thoughts before the lesson.

When you finish the lesson, answer each question and give an example.

Student Inquiries	BEFORE THE LESSON What I already know about this question:	AFTER THE LESSON What I thought at the end: My final answer, and examples:
How do I divide decimals?		answer
		example
How do I multiply decimals?		answer
		example
What strategies can I use to help me solve questions without a calculator?		answer
		example

Lesson 1.2C: Multiplying and Dividing Decimals in Word Problems

Introduction

Word problems can include more than just adding and subtracting. We can follow similar steps to solve different types of word problems, but we need to be the decision makers about which operations to use, and what strategies we need to understand the problem. The focus of this lesson is multiplying and dividing decimals. See if you can point out similar strategies and steps from other lessons we have worked in so far.

Warm-up

1. Estimate. Solve. Check.

   a. $6 \times 0.4 =$

   b. $12 \times 4.2 =$

   c. $8 \times 6.2 =$

   d. $8.6 \times 2 =$

   e. $3 \times 1.7 =$

   f. $1.8 \times 4 =$

   g. $9 \times 7.6 =$

   h. $20 \times 8.7 =$

i. $33 \times 4.6 =$

j. $14.4 \div 2 =$

k. $24 \times 0.4 =$

l. $124 \times 7.3 =$

Turn to the Answer Key at the end of the Module and mark your answers.

Explore

Thinking Space

Before we start solving word problems, let's review some strategies we can use in solving multiplication and division equations involving decimals.

If you can multiply or divide whole numbers, you can multiply or divide with decimals! You just need to know where to put the decimal in the answer. How do we know where it goes?

Estimating! All the practice we did in the first two lessons is really going to pay off. Estimating gives us an idea of where the final decimal is placed. Take a look at this example following the same steps as before:

$3.4 \times 2 =$

Step 1: Estimate

Front end estimation

OR

Relative size estimation

3.4 rounds down to 3

$3 \times 2 = 6$

Step 2: Solve

Multiply the digits together without the decimal. A quick way to know where a decimal goes in the product is to count the decimal places in the question.

Example:

3.4 has one decimal place

2 has none

$1 + 0 = 1$

Your answer will have one decimal place.

$3.4 \times 2 = 6.8$

Step 3: Check

Look at your estimate.

6

If you multiplied these numbers together without the decimal places, what would the answer be?

$$34 \times 2 = 68$$

Look at the digits 68 with the decimal in different places.

68.0, 6.8, 0.68, 0.068

Which answer seems the most reasonable? 6.8 is closest to the estimate. That is the right answer.

$$3.4 \times 2 = 6.8$$

Examples

$$1.2 \times 8 =$$

Estimate:

1.2 rounds down to 1

$1 \times 8 = 8$

Solve:

1.2 has one decimal place

8 has none

$1.2 \times 8 = 9.6$

Check:

Answer = 9.6 (one decimal place)

Thinking Space

Let's try a division question now.

$$80.44 \div 4 =$$

Estimate:

80.44 rounds down to 80

$80 \div 4 = 20$

Solve:

80.44 has two decimal places

4 has none

$80.44 \div 4 = 20.11$

Check:

$20.11 \times 4 = 80.44$

Great job!

Thinking Space

When I divide decimals, I have to make sure I line up the decimal in the quotient with the decimal in the dividend.

Explore

Thinking Space

Now we can include these multiplying and dividing skills in our word problem steps, just like we did in the lesson before:

Step 1: Understand the problem

1. Highlight clue words
2. Draw a picture
3. Underline the question(s)

Step 2: Make a plan

1. Find the information I need
2. Estimate the answer

Step 3: Carry out the plan

1. Solve
2. Check

Step 4: Answer the question

1. Does the answer make sense?

Let's look at an example on the next page.

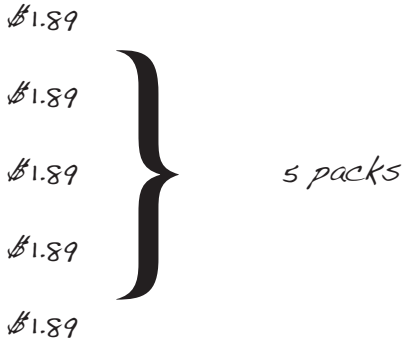
PROBLEM:
You have gone to the store to buy hockey cards and you see them on sale for **$1.89 a pack** including tax. You **want to buy 5** packs and have **$12.00**. You estimate the total cost to be $10.00.

a) How did you figure out the estimate?
b) Is the estimate over or under the actual price?
c) Could you buy more packs, or less? How many can you buy all together?

STEP 1: UNDERSTAND THE PROBLEM

I understand by:
- drawing
- highlighting clue words
- underlining the question
- rewording the question

My way to understand:
- drawing



STEP 2: MAKE A PLAN
- Find the information I need
- Make an estimate

Information I need:
- $1.89 a pack including tax
- Want to buy 5
- Have $12.00

Clue words:
- $1.89 a pack = cost
- Buy 5 = multiply by 5
- Have $12.00 = amount to subtract from

Information I don't need:
- You have gone to the store to buy hockey cards and you see them on sale.

My Estimate:

1.89 rounds up to 2
5 packs × $2 each = $10

Yes, I have enough money!

STEP 3: CARRY OUT THE PLAN
Solve. 1.89 has two decimal places 1.89 × 5 = $9.45 9.45 + 1.89 = $11.34 Yes, I can buy 1 more pack.
Check: My estimate is correct.
STEP 4: ANSWER THE QUESTION
a) How did you figure out the estimate? Front end estimation *b) Is the estimate over or under the actual price?* Under *c) Could you buy more packs, or less? How many can you buy altogether?* I can buy 6 packs altogether.
Does the answer make sense?: Yes

Now, let's try one together.

PROBLEM:
A fundraiser dinner raised $2056.80 from an event. A total of 30 tickets were sold. How much was each ticket?

STEP 1: UNDERSTAND THE PROBLEM

I understand by:	My way to understand:
• drawing • highlighting clue words • underlining the question • rewording the question	

STEP 2: MAKE A PLAN

- Find the information I need
- Make an estimate

Information I need: Clue words:	Information I don't need:

My Estimate:

STEP 3: CARRY OUT THE PLAN
Solve.
Check:
STEP 4: ANSWER THE QUESTION
How much was each ticket?
Does the answer make sense?:

Compare your answer to the solution on the next page.

PROBLEM / SOLUTION:
A fundraiser dinner raised **$2056.80** from an event. A total of **30 tickets** were sold.
*How much was **each** ticket?*

STEP 1: UNDERSTAND THE PROBLEM

I understand by:	My way to understand:
• drawing • highlighting clue words • underlining the question • rewording the question	• highlight clue words Raised $2056.80 30 tickets Each = divide (÷)

STEP 2: MAKE A PLAN
- Find the information I need
- Make an estimate

Information I need:	Information I don't need:
• Raised $2056.80 • 30 tickets were sold	• A fundraiser dinner • From an event

My Estimate:

2056.80 rounds down to 2000
2000 ÷ 30 = 60

Approximately 60 tickets were sold.

STEP 3: CARRY OUT THE PLAN

Solve.

2056.80 ÷ 30 = $68.56

Each ticket was $68.56.

Check: My estimate is correct.

STEP 4: ANSWER THE QUESTION

How much was each ticket?

$68.56

Does the answer make sense?: Yes

Great job! Practice solving the rest of these word problems using multiplication and division of decimal skills along with your problem solving steps.

Practice

1. Tickets at a concert cost $16.75. The number of tickets sold is 697. How much money was collected on ticket sales?

2. Theo runs 5.7 km a day. How far will he run in the month of January?

3. A kitten weighs 1.5 kg. An adult cat weighs 3 times more. What is the mass of an adult cat?

Turn to the Answer Key at the end of the Module and mark your answers.

Lesson 1.2D: Multi-step Problems

Student Inquiry

This activity will help you get ready for, learn, and review the information in the upcoming lesson.

When you turn this page over, you will find a chart containing the inquiry outcomes for this lesson. You may be able to answer some of these questions already! Start by writing down your thoughts before the lesson.

When you finish the lesson, answer each question and give an example.

Student Inquiries	BEFORE THE LESSON What I already know about this question:	AFTER THE LESSON What I thought at the end: My final answer, and examples:
What is order of operations and why is it important?		answer
		example
What is the difference between thousand and thousandths?		answer
		example
What are some strategies I can use to help me solve multi step word problems?		answer
		example
How will I know what operations (adding, subtracting, multiplying, dividing) to use when solving a word problem?		answer
		example

Lesson 1.2D: Multi-step Problems

Thinking Space

Introduction

You have probably worked with **order of operations** before. In this lesson you will use your knowledge of order of operations and your decimals skills together. Using order of operations and decimals together is just a matter of taking one step at a time.

You may remember using the Order of Operations from previous grades. When working through operations with multiple steps, the order to which we do them makes a difference. Let's review the order of operations.

B

D

M

A

S

Do you remember what each letter stands for?

The first operation we look for is Brackets. Anything with brackets around it is what we do first.

Next we look for operations involving Division and Multiplication.

Lastly, we do any operations with Addition and Subtraction. When you get to the dividing and multiplying step, or the adding and subtracting step, it is important to do these operations in the order that they appear.

Go back and fill in the letters of BDMAS above.

Explore Online

Looking for more practice or just want to play some fun games?
If you have internet access, go to the Math 7 website at:
http://www.openschool.bc.ca/courses/math/math7/mod1.html
Look for *Lesson 1.2D: Multi-step Problems* and check out some of the links!

Let's try an example.

$$(4 + 5) - 8 \times 1 =$$

Step 1: Brackets

If we look at our BDMAS list, we know that the brackets are first, so that's step one.

$$(4 + 5) - 8 \times 1 =$$

$$(9) - 8 \times 1 =$$

Step 2: Division and Multiplication

It's important to do the multiplication and division in order from left to right.

$$9 - 8 \times 1 =$$

$$9 - 8 =$$

Step 3: Addition and Subtraction

Just like above, do the addition and subtraction operations in order from left to right.

$$9 - 8 = 1$$

Ready to try some?

Thinking Space

Why do you have to do × and ÷ in order?

Try the following question from left to right:

$24 \div 12 \times 2 =$

Now try doing the x first:

$24 \div 12 \times 12 =$

Were your answers the same?

Warm-up

1. Solve the following using the order of operations.

   a. $(5 + 3) - 1 \times 6 =$

   b. $(5 + 3) - 1 \times 8 =$

   c. $5 - (2 + 1) + 6 =$

   d. $(10 - 4) + 6 \times 3 =$

   e. $4 + 7 \times 2 - 6 =$

   f. $10 + 8 \div 2 + 4 - 2 =$

Turn to the Answer Key at the end of the Module and mark your answers.

Explore
Multi-step Word Problems

Thinking Space

Let's use an example to help us see the importance of order of operations. Remember to use our problem solving steps.

Step 1: Understand the problem

1. Highlight clue words
2. Drawing a picture
3. Underline the question(s)

Step 2: Make a plan

1. Find the information
2. Estimate

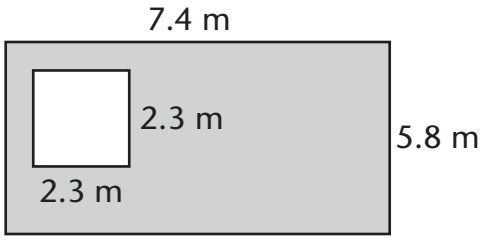
Step 3: Carry out the plan

1. Solve
2. Check

Step 4: Answer the question

1. Does the answer make sense?

PROBLEM:
For your birthday your parents are letting you redecorate your bedroom. You have found wall paper of the New York City Skyline, a city you love and can't wait to visit. The diagram of the wall you are **wall papering** is below. There is a **window in the wall**. *How much wallpaper do you need?*



STEP 1: UNDERSTAND THE PROBLEM

I understand by:
- drawing
- highlighting clue words
- underlining the question
- rewording the question

My way to understand:
- drawing

See above!

STEP 2: MAKE A PLAN
- Find the information I need
- Make an estimate

Information I need:
- Wallpapering your bedroom wall
- There is a window in the wall

Clue words:
- Wallpapering a wall = I need to find the area. The wall is rectangular. Area = length x width
- Window in the wall = I need to subtract this amount because I do not want to wallpaper over it

Information I don't need:
- For your birthday your parents are letting you redecorate your bedroom.
- You have found wall paper of the New York City Skyline, a city you love and can't wait to visit.

My Estimate:

Wall:
7.4 rounds down to 7
5.8 rounds up to 6

Area = $7 \times 6 = 42$ m^2

Window:
2.3 rounds down to 2

Area = $2 \times 2 = 4$ m^2

Wallpaper needed:
42 m$^2 - 4$ m$^2 = 38$ m^2

STEP 3: CARRY OUT THE PLAN
Solve. To determine the area of the wall we needed to calculate: 7.4×5.8 But we need to subtract the area for the window: 2.3×2.3 Our final equation to calculate is: $7.4 \times 5.8 - 2.3 \times 2.3 =$ How do we know which operation to do first? This is where Order of Operations can help us. Using words might help us see what to do first. (Area of the wall) – (Area of the window) = Amount of wallpaper Now just fill in the brackets. $(7.4 \times 5.8) - (2.3 \times 2.3) =$ $42.9 - 5.29 = 37.63$ m^2 (two decimal places)
Check: My estimate is correct.
STEP 4: ANSWER THE QUESTION
How much wallpaper do you need? You need 37.63 m^2 of wallpaper.
Does the answer make sense?: Yes

This tells us the final area of the wallpaper. Without order of operations however, our final answer may not be so accurate.

Why do you think we need to follow order of operation when solving equations?

Can you see how the order makes a difference? If we had not followed the BDMAS order, our answer would have been different.

Let's do one together.

Thinking Space

Solve this question following the order of operations

$$(4.6 + 7) + 11.3 \times 2 =$$

BDMAS

Step 1: Look for brackets first

$$(4.6 + 7) + 11.3 \times 2$$
$$= 11.6 + 11.3 \times 2$$

Step 2: There is definitely some division/multiplication

Sometimes is helps to make a box around the operations you are going to do. Find the operation sign, and make a box around the numbers being worked on around it.

$$11.6 + \boxed{11.3 \times 2} =$$
$$11.6 + 22.6$$

All of the multiplication and division operations are completed, so we can move on to the next operations. If you are having difficulty multiplying and dividing decimals, use a calculator to check your work.

Step 3: Now show the same process with the operations of addition and subtraction

Continue until you have no operations left.

$$11.6 + 22.\ 6 = 34.2$$

Great job! Now you have the answer.

Practice

1. Solve using the order of operations.

   a. $15 - 12.6 \div 3 \times 2 - 1.5 =$

   b. $12 \times 0.8 + 3 =$

   c. $12 - 0.8 \times 3 =$

   d. $5.6 \times 5.6 + 5 - 4.2 \div 2 =$

   e. $6.3 + 5 \times 5 - 4.2 \times 3 =$

   f. $4.2 \times 7 - 10.4 \div 2 + 2.9 \times 3 =$

Turn to the Answer Key at the end of the Module and mark your answers.

Lesson 1.2E: Really Big and Really Small Numbers

Student Inquiry

This activity will help you get ready for, learn, and review the information in the upcoming lesson.

When you turn this page over, you will find a chart containing the inquiry outcomes for this lesson. You may be able to answer some of these questions already! Start by writing down your thoughts before the lesson.

When you finish the lesson, answer each question and give an example.

Student Inquiries	BEFORE THE LESSON What I already know about this question:	AFTER THE LESSON What I thought at the end: My final answer, and examples:
How can technology help me in solving equations involving decimals?		answer
		example
What strategies can I use to solve questions involving really small or really big numbers?		answer
		example
How can I use estimation to help me solve equations involving really small and really big numbers?		answer
		example

Lesson 1.2E: Really Big and Really Small Numbers

Introduction

So far we have covered addition, subtraction, multiplication, and division of equations involving decimals. In this lesson we'll look at questions involving multiple decimals, or decimals multiplied and divided with each other. We have been working with decimals being operated on with whole numbers; see how strategies differ when we work with two decimals, or really big and really small numbers!

Warm-up

1. Estimate. Solve. Check.

   a. $4.2 \times 1.1 =$

   b. $3.1 \times 2.5 =$

   c. $4.5 \div 5 =$

   d. $3.7 \times 2.3 =$

   e. $10 \div 2.5 =$

   f. $6.2 \times 1.2 =$

   g. $2.2 \times 2.3 =$

   h. $3.1 \times 6.7 =$

   i. $3.7 \times 1.2 =$

2. Estimate. Calculate using a calculator.
Round to the nearest hundredth.

a. 6.6 ÷ 2.1 =

b. 4.7 ÷ 3.6 =

c. 11.7 ÷ 3.2 =

d. 9.7 ÷ 21 =

e. 30 ÷ 10.2 =

f. 6.1 ÷ 3 =

Turn to the Answer Key at the end of the Module and mark your answers.

Explore
Addition and Subtraction

Thinking Space

Knowing where to place the decimal in the solution is still the tricky part in operations with decimals. Regardless of whether a number is big or small, we follow the same steps:

1. Estimate
2. Solve
3. Check

And, just like we learned before, when adding and subtracting decimals, the number one most important rule is: lining up the decimal.

It doesn't matter how big or small a number is, as long as the decimals are lined up, we just add or subtract as we would with whole numbers.

Take a look at this example of really small numbers with decimals:

$$0.007 + 8.3 =$$

Step 1: Estimate

0.007 rounds up to 0.01

8.3 rounds down to 8

0.01 + 8 = 8.01

Step 2: Solve

8.3 + 0.007 = 8.307

Step 3: Check

Estimate = 8.01

Actual = 8.307

Thinking Space

Here is a subtraction question involving really big numbers with decimals:

$$567.912 - 100.3 =$$

Step 1: Estimate

567.912 rounds up to 568

100.3 rounds down to 100

568 - 100 = 468

Step 2: Solve

567.912 - 100.3 = 467.612

Step 3: Check

Estimate = 468

Actual = 467.612

Do you think you are ready to try some on your own?

Practice 1

1. Estimate. Solve.

   a. 2.321 + 5.309 + 2.100 =

   b. 9.623 – 5.061 =

   c. 3.05 + 4.26 + 0.63 =

   d. 4.563 – 2.937 =

Turn to the Answer Key at the end of the Module and mark your answers.

Explore
Multiplying and Dividing Really Big and Really Small Numbers

Thinking Space

As always, estimation plays a big role. Let's follow the same steps as before:

$$0.067 \times 0.12 =$$

Step 1: Estimate

A quick way to know where a decimal goes when multiplying is to count the decimal places in the question.

0.067 = 3 decimal places

0.12 = 2 decimal places

I know my answer will have 5 decimal places.

Step 2: Solve

$67 \times 12 = 804$

0.00804

Step 3: Check

Estimate = 5 decimal places

Actual = 0.00804

Look at how we solve a division problem:

Thinking Space

$$2004.5 \div 103.1 =$$

Step 1: Estimate

2004.5 rounds down to 2000

103.1 rounds down to 100

2000 ÷ 100 = 20

Step 2: Solve

Once you have estimated, check your answer with a calculator to see if it is reasonable.

2004.5 ÷ 103.1 = 19.44

Step 3: Check

Estimate = 20

Actual = 19.44

Try practicing some questions involving multiplication and division of really big numbers.

Practice 2

1. Solve.

   a. $3.4 \times 0.2 =$

   b. $7.6 \times 0.8 =$

   c. $4.5 \times 3.6 =$

   d. $12.23 \times 2.9 =$

2. Place the decimal in each question.

   a. $3.4 \times 2 = 680$

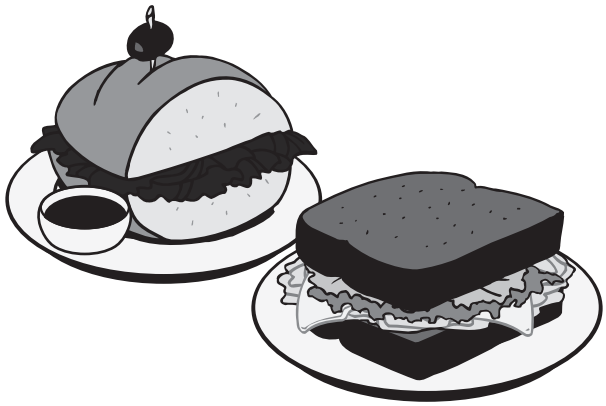
   b. $26.50 \times 2.2 = 5830$

Turn to the Answer Key at the end of the Module and mark your answers.

Section Summary

Now that you have completed this section, try solving the Section Challenge that you saw at the beginning. When you are finished, compare your answer to the solution on the next page.

Section Challenge



It's Friday night and you are out with your friends. You have $10 in your wallet. Although these days that doesn't seem to get you much, it will have to do. You stop at your favourite fast food joint. A sandwich is $5.59, and chips are another $1.99. But you are really hungry, so maybe you want a salad which is $3.45. Throw in a drink for $1.87. Wow, it adds up! We have all been in these situations. It's times like these when we need some good estimating skills!

1. Do you have enough for the salad?

2. How much will your change be?

Section Challenge Solution

<table>
<tr><td colspan="2">STEP 1: UNDERSTAND THE PROBLEM</td></tr>
<tr><td>I understand by:
• drawing
• highlighting clue words
• underlining the question
• rewording the question</td><td>My way to understand:
• drawing

Sandwich $5.59
Chips $1.99
Drink $1.87

Salad $3.45???</td></tr>
<tr><td colspan="2">STEP 2: MAKE A PLAN
• Find the information I need
• Make an estimate</td></tr>
<tr><td>Information I need:
• You have $10 in your wallet
• A sandwich is $5.59 and chips are another $1.99
• You want a salad which is $3.45
• Throw in a drink for $1.87</td><td>Information I don’t need:
• It’s Friday night and you are out with your friends
• Although these days that doesn’t seem to get you much, it will have to do
• You stop at your favourite fast food joint
• But you are really hungry so maybe
• Wow it adds up</td></tr>
<tr><td colspan="2">My Estimate: You have $10 to start. Round up the sandwich, chips, and drink, and it will cost about $10. I estimate you won’t have enough for the salad.</td></tr>
<tr><td colspan="2">STEP 3: CARRY OUT THE PLAN</td></tr>
<tr><td colspan="2">5.59 + 1.99 = 7.58
7.58 + 1.87 = 9.45
10.00 – 9.45 = 0.55

$0.55 left over</td></tr>
<tr><td colspan="2">Check: My estimate is correct.</td></tr>
</table>

STEP 4: ANSWER THE QUESTION
Do you have enough for the salad too? No. *How much will your change be?* $0.55
Does the answer make sense?: Yes.

Section 1.3: Divisibility

Section 3

Contents at a Glance

Learning Outcomes

By the end of this section you will be better able to:

- explain why numbers cannot be divided by 0
- sort a set of numbers based on their divisibility
- determine if a number is divisible by 2, 3, 4, 5, 6, 8, 9, or 10
- explain why a number is divisible by 2, 3, 4, 5, 6, 8, 9, or 10

Pretest 1.3

Complete this pretest if you think that you already have a strong grasp of the topics and concepts covered in this section. Mark your answers using the key found at the end of the module.

If you get all the answers correct (100%), you may decide that you can omit the lesson activities.

If you get all the answers correct for one or more lessons, but not for the whole pretest, you can decide whether you can omit the activities for those lessons.

Lesson 1.3A

1. Circle all the expressions that equal 0.

$$4 \div 4 \qquad 0 \div 5 \qquad 7 \div 0$$

2. Choose the best answer.

$$2 \div 0 =$$

   a. 0

   b. 2

   c. Undefined

3. List the factors of 18.

4. For the equation 28 ÷ 4 = 7

   a. the divisor is _____.

   b. the dividend is _____.

   c. the quotient is _____.

5. a. Is 12 divisible by 3?

   b. Is 18 divisible by 7?

Lesson 1.3B

1. Use divisibility rules to determine if 36 090 has 10, 5 or 2 as factors.

2. If you use 1035 wheels to build tricycles, will you have any wheels left over?

3. Can 1230 people sit in 9 equal rows in a theatre?

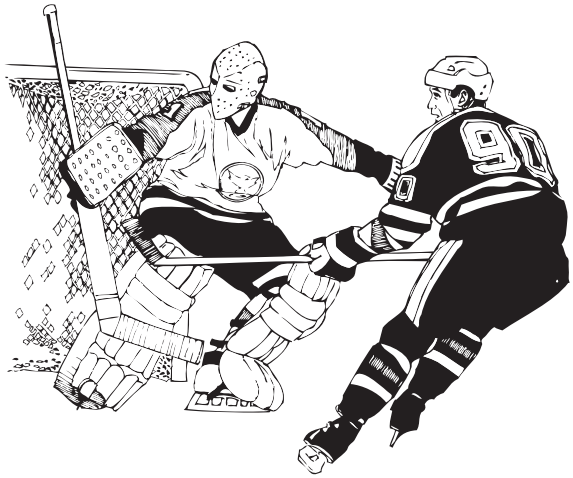
4. Is 6 a factor of 21 648?

5. The number 617 ☐ 8 is divisible by 4. Fill in the missing digit.

6. Can 232 cans be packaged into groups of 8, without any left over?

Turn to the Answer Key at the end of the Module and mark your answers.

Section Challenge



Three hockey teams each had a fund raiser for new uniforms. One team sold gift cards for chocolates ($5), another team sold gift cards for cookies ($4), and the third team sold gift cards for t-shirts ($8). You have received the summary sheet of all the money that was raised and want to find out how many cards each team sold.

HOCKEY TEAM	AMOUNT RAISED
Vipers	$3624
Storm	$1116
Magicians	$2530

1. How can we determine which gift card each team sold?

2. How many gift cards did each team sell?

If you're not sure how to solve the problem now, don't worry. You'll learn all the skills you need to solve the problem in this section. Give it a try now, or wait until the end of the section – it's up to you!

Lesson 1.3A: Factors and Dividing

Student Inquiry

This activity will help you get ready for, learn, and review the information in the upcoming lesson.

When you turn this page over, you will find a chart containing the inquiry outcomes for this lesson. You may be able to answer some of these questions already! Start by writing down your thoughts before the lesson.

When you finish the lesson, answer each question and give an example.

Student Inquiries	BEFORE THE LESSON What I already know about this question:	AFTER THE LESSON What I thought at the end: My final answer, and examples:
What is a factor?		answer
		example
What are divisor, dividend and quotient? Give an example of each.		answer
		example
What does 0 ÷ 4 mean? Does zero divided by a number always have an answer?		answer
		example
What does 4 ÷ 0 mean? Can a number be divided by zero?		answer
		example

Lesson 1.3A: Factors and Dividing

Introduction

Thinking Space

What is a dividend? What is a divisor?

In this lesson you will review, and build on, some of the things that you already know about division.

Try typing this into your calculator:

$$4 \div 0$$

What did you get? What about 10 divided by zero? Seventy-five divided by zero? What does that weird error message mean?

If a calculator can't do it, we should probably know why. Let's explore factors and division, and then see if we can figure it out!

Warm-up

Get ready for this section about dividing by practicing some division facts. Remember: Multiplication facts can help you with division facts. How? Well, Multiplication and division are closely related.

These two expressions describe the same relationship among the numbers 2, 3, and 6.

$$2 \times 3 = 6$$

$$6 \div 3 = 2$$

Complete the following division questions.

1. a. $30 \div 5 =$
   b. $16 \div 4 =$
   c. $24 \div 6 =$
   d. $18 \div 6 =$
   e. $8 \div 2 =$
   f. $20 \div 4 =$
   g. $21 \div 7 =$
   h. $18 \div 3 =$
   i. $12 \div 4 =$
   j. $28 \div 7 =$
   k. $15 \div 3 =$
   l. $20 \div 5 =$
   m. $32 \div 4 =$

2. Write a division fact to go with each multiplication fact.

   a. $5 \times 2 = 10$

   b. $3 \times 4 = 12$

   c. $4 \times 7 = 28$

3. Write a multiplication fact to go with each division fact.

   a. $24 \div 8 = 3$

   b. $14 \div 7 = 2$

   c. $30 \div 6 = 5$

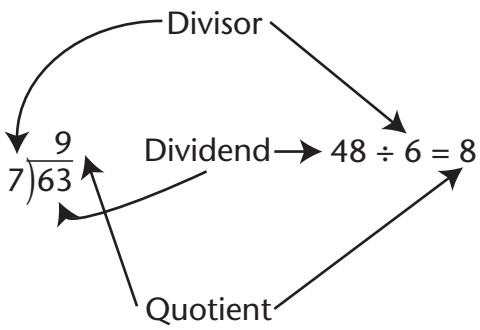
Turn to the Answer Key at the end of the Module and mark your answers.

Explore

Divided, Divisor, Quotient

Thinking Space

Each number that is in a division problem has a name. Look at these two problems that have their parts labelled.



Can you write a definition for each word?

Dividend:

Divisor:

Quotient:

Check your answers in the Glossary at the end of the Module.

Divisible

- 8 is divisible by 4.
- 9 is not divisible by 4.
- 6, 9 and 12 are divisible by 3.
- 5, 8, and 20 are not divisible by 3.

What does divisible mean?

Check your answer in the Glossary at the end of the Module.

Factors

- 3 and 5 are factors of 15.
- 2 and 7 are not factors of 9.

Write a definition for factor:

Thinking Space

Check your answer in the Glossary at the end of the Module.

Can you list all of the factors of 15?

Is 3 in your list? Is 15? How do you know that you have them all?

It can be helpful to make a table when you're thinking about factors. If you do them in order, you can always be sure that you haven't missed any.

Let's find all of the factors of 15.

Make a table like this.

15	

Start at the beginning. Put 1 in the table.
$1 \times 15 = 15$
Put 15 in the table, too.

15	
1	15

Put 2 in your table. 2 is NOT a factor of 15.
Cross it out.
This might seems silly, but this is how we will know that we haven't missed any numbers.

15	
1 ~~2~~	15

Keep going. Put 3 in your table.
$3 \times 5 = 15$
Put 5 in the table.

15	
1 ~~2~~ 3	15 5

After 3 is 4. Put 4 in your table
Is 4 a factor of 15? Nope. Cross it out.

15	
1	15
~~2~~	5
3	
~~4~~	

After 4 is 5. But wait! 5 is already in the table.
You're done!

15	
1	15
~~2~~	5
3	
~~4~~	

You're done AND you know for sure that you haven't missed any. The factors of 15 are 1, 3, 5, and 15.

Use this technique to find all of the factors of 18.

18	
1	18
2	9
3	6
~~4~~	
~~5~~	

The factors of 18 are 1, 2, 3, 6, 9, and 18.

Thinking Space

Practice 1

1. Circle the divisor.

   a. $26 \div 13 = 2$

   b. $2\overline{)40}$ $\quad 20$

2. Circle the dividend.

   a. $4\overline{)8}$ $\quad 2$

   b. $100 \div 10 = 10$

3. Circle the quotient.

   a. $32 \div 4 = 8$

   b. $6\overline{)42}$ $\quad 7$

4. Circle True or False.

   a. 63 is divisible by 7.

      True False

   b. 48 is divisible by 9.

      True False

5. List the factors of 30.

Turn to the Answer Key at the end of the Module and mark your answers.

Explore

Thinking Space

It can be helpful to write out the related multiplication fact when you're faced with a division problem that you can't solve.

Let's say you were having trouble with 15 ÷ 3. Write it out and put a symbol or a letter where the answer should be.

$$15 \div 3 = \#$$

Now write the related multiplication fact.

$$\# \times 3 = 15$$

Something times 3 is 15. What could the something be? Five!

You know that 5 × 3 = 15. If we put a 5 where the # is, everything makes sense.

$$5 \times 3 = 15$$
$$15 \div 3 = 5$$

Let's try that same technique with 0 ÷ 7. Write out the question and put a symbol or letter where the answer should be.

$$0 \div 7 = \#$$

Write the related multiplication fact.

$$\# \times 7 = 0$$

What number could you put in place of the # to make this multiplication statement true? Zero would work. In fact, zero is the only number that would work. If we put a 0 where the # is, everything makes sense.

Thinking Space

$$0 \times 7 = 0$$
$$0 \div 7 = 0$$

Have you noticed that there is nothing special about the 7 in this example? We could have used any other number.

$$0 \div 12 = 0$$
$$0 \div 87 = 0$$
$$0 \div 1329.6 = 0$$

We're going to try this one more time. Let's do $7 \div 0$. Write out the question and put a symbol or letter where the answer should be.

$$7 \div 0 = \#$$

Write the related multiplication fact.

$$\# \times 0 = 7$$

What number could you put in place of the # to make this multiplication statement true? Nothing would work. No matter what number we put in place of the #, the answer would be 0. We want the answer to be 7. It can't be done!

We say that $7 \div 0$ is undefined.

There is nothing special about the 7 in this example either. We could have used any other number.

$$31 \div 0 = \text{undefined}$$
$$267 \div 0 = \text{undefined}$$
$$834.95 \div 0 = \text{undefined}$$

Practice 2

1. Answer these division questions.
   a. $0 \div 6 =$
   b. $0 \div 18 =$
   c. $2 \div 0 =$
   d. $0 \div 74 =$
   e. $53 \div 0 =$
   f. $118 \div 0 =$
   g. $0 \div 297 =$
   h. $92 \div 0 =$
   i. $6.17 \div 0 =$
   j. $0 \div 23 =$

Turn to the Answer Key at the end of the Module and mark your answers.

Lesson 1.3B: Kangaroos in Denmark!

Student Inquiry

This activity will help you get ready for, learn, and review the information in the upcoming lesson.

When you turn this page over, you will find a chart containing the inquiry outcomes for this lesson. You may be able to answer some of these questions already! Start by writing down your thoughts before the lesson.

When you finish the lesson, answer each question and give an example.

Student Inquiries	BEFORE THE LESSON What I already know about this question:	AFTER THE LESSON What I thought at the end: My final answer, and examples:
How do I know if a number is divisible by 3 or 9?		answer
		example
How do I know if a number is divisible by 6?		answer
		example
How do I know if a number is divisible by 2, 5, or 10?		answer
		example
How do I know if a number is divisible by 4 or 8?		answer
		example

Lesson 1.3B: Kangaroos in Denmark!

Introduction

All those multiplication drills you did in math class all those years are really going to pay off in this lesson! This lesson is all about divisibly rules, or rules that help us break big numbers down. Rules like these will help you know, sometimes by just looking at them, whether a number can be divided by a certain factor. Knowing rules like these will help build your mental math skills and assist you in further math modules when working with division, factors, and fractions.

Thinking Space

Warm-up

1. Solve.

a. $2 \times 8 =$

b. $3 \times 6 =$

c. $4 \times 7 =$

d. $5 \times 3 =$

e. $6 \times 7 =$

f. $2 \times 6 =$

g. $8 \times 2 =$

h. $7 \times 9 =$

i. $2 \times 6 =$

j. $3 \times 7 =$

k. $4 \times 4 =$

l. $5 \times 7 =$

m. $6 \times 9 =$

n. $7 \times 0 =$

o. $8 \times 3 =$

p. $9 \times 4 =$

q. $2 \times 1 =$

r. $3 \times 3 =$

s $4 \times 5 =$

t. $5 \times 6 =$

u. $6 \times 6 =$

v. $0 \times 4 =$

w. $8 \times 9 =$

x. $9 \times 5 =$

y. $0 \times 4 =$

z. $2 \times 4 =$

Turn to the Answer Key at the end of the Module and mark your answers.

Explore
Divisibility Rules

Thinking Space

Try out this number trick. (Go one step at a time, and don't peek at the answer!)

Pick a number between 1-10.	
Now multiply that number by 9.	
Add the two digits of your number together. (For example, if your number was 25, you would add 2 + 5 = 7)	
Subtract 5 from the number.	
If the letters of the alphabet were paired with a number, what letter would your number be attached to? (For example: A-1, B-2, C-3, D-4, E-5, and so on.)	
Now, think of a country that starts with that letter.	
What is the last letter of the country's name? Think of an animal that starts with that letter.	
What is the last letter of the animal? Think of a fruit that starts with that letter.	

Are you thinking about a kangaroo eating an orange in Denmark? (No? A Koala eating an apple in Denmark?)

That's weird!

This is an example of how divisibility rules work. If you followed the steps carefully, you would have been tricked by the divisibility rule of 9s.

Adding the digits of a multiple of nine will always give you nine. Try this trick on people in your family and see if it works on them; tell them you can read minds!

Let's look at other divisibility rules. They will help us in determining factors of whole numbers.

Explore
Divisibility Rules: 2,5,10

Knowing a number's factors helps us break down larger numbers. This makes them easier to work with. This is especially helpful when working with fractions (you'll be doing this in Module 2). There are rules that can help us for most numbers from 2 to 10. These rules will tell us whether a number is divisible by a factor. Let's start with 2, 5, and 10.

Thinking Space

How will this help me with fractions?

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

1. Colour the multiples of 2 red.
2. Colour the multiples of 5 blue.
3. Colour the multiples of 10 yellow.

After you have coloured the multiples, look at the ones digit of the coloured boxes. Can you see any pattern for each?

The patterns for multiples of 2 that I see are:

The patterns for multiples of 5 that I see are:

The patterns for multiples of 10 that I see are:

Once we identify patterns, we can make rules that will help us later.

Let's look at the multiples of 2.

- The pattern for multiples of 2 is that the ones digit is always 0, 2, 4, 6 or 8.
- Now, just by looking at a number, you'll be able to tell if it's divisible by 2.
- Is 56 742 divisible by 2? Yes! We know it is because its ones digit is divisible by 2.

The divisibility rule for 2 is given below. Write divisibility rules for 5 and 10.

NUMBER	PATTERNS	RULE	EXAMPLE
2	Ones digit is with 0, 2, 4, 6, or 8. They are all even numbers.	A number is divisible by 2 if the ones digit is divisible by 2. OR All even numbers are divisible by 2.	56 742
5			
10			

Thinking Space

Multiples of 2 are always even numbers.

Practice 1

Remember: A number is divisible by **10** if its **last digit is 0**. All of these numbers are divisible by 10: 30, 430, 6970, 4 293 740.

A number is divisible by **5** if its **last digit is 0 or 5**. All of these numbers are divisible by 5: 25, 95, 430, 715, 3920, 264 955.

A number is divisible by **2** if its **last digit is even: 0, 2, 4, 6, 8**. All of these numbers are divisible by 2: 74, 92, 496, 7260, 23 608.

1. Determine if 10, 5 or 2 are factors of:
   a. 375
   b. 1987
   c. 12456

2. Fill in possible missing digits.
   a. 136 ☐ is divisible by 10, 5 or 2
   b. 456 ☐ is divisible by 2 but not 10 and 5
   c. 943 ☐ is divisible by 5 but not 10 or 2

3. Write a 4-digit number divisible by 5 but not 10.

Turn to the Answer Key at the end of the Module and mark your answers.

Explore
Divisibility Rules: 3 and 9

Thinking Space

We already know a divisibility rule for 9 from the kangaroos in Denmark trick. We know a number is divisible by 9 if its digits add up to 9. Let's use the hundreds chart to look for a pattern for 3s.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

1. Colour the multiples of 3 red.
2. Colour the multiples of 9 blue.

After you have coloured the multiples look at the ones column of the coloured boxes. Can you see any pattern for each?

The patterns for multiples of 3 that I see are:

The patterns for multiples of 9 that I see are:

Is 450 divisible by 9? Yes! We know it is because 4 + 5 + 0 = 9

Write the rules of divisibility for 3 and 9.

NUMBER	PATTERNS	RULE	EXAMPLE
3			
9			

Compare your answers with the divisibility rules at the end of this lesson. Your mental math skills are being put to the test. You're doing great! Are you starting to see how these rules can help you?

Thinking Space

Practice 2

1. Is 3 or 9 a factor of:
   a. 657
   b. 3278
   c. 402

2. Each number below is divisible by 9. Find the missing digit.
   a. 533 ☐
   b. ☐ 678
   c. 30 ☐ 6

3. 1117 trees are planted in 3 rows. Is it possible for each row to have an equal amount of trees?

Turn to the Answer Key at the end of the Module and mark your answers.

Explore

Divisibility Rules: 6

Thinking Space

Keep going, you are doing a great job! Now find the patterns for multiples of 6.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

1. Colour the multiples of 6 red.

After you have coloured the multiples, look at the ones column of the coloured boxes. Can you see any patterns?

The patterns for multiples of 6 that I see are:

Write the rules of divisibility for 6.

NUMBER	PATTERNS	RULE	EXAMPLE
6			

Compare your answers with the divisibility rules at the end of this lesson.

Practice 3

1. Decide if each number is divisible by 6.

   a. 758

   b. 4908

   c. 75 084

2. Solve.

   a. 6 litre containers are being filled from a tank that contains 3258 L of detergent. Will any detergent be left over?

   b. A 9355 cm length of wire is cut into six equal parts. Will each part be cut as a whole number length?

Turn to the Answer Key at the end of the Module and mark your answers.

Explore

Divisibility Rules: 4 and 8

Thinking Space

We have almost figured them all out. Now find patterns for 4 and 8.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

1. Colour the multiples of 4 red.
2. Colour the multiples of 8 blue.

After you have coloured the multiples, look at the ones column of the coloured boxes. Can you see any pattern for each?

The patterns for multiples of 4 that I see are:

The patterns for multiples of 8 that I see are:

Write the rules of divisibility for 4 and 8.

NUMBER	PATTERNS	RULE	EXAMPLE
4			
8			

Compare your answers with the divisibility rules at the end of this lesson.

Thinking Space

Practice 4

1. Determine if 4 or 8 is a factor of:

   a. 3466

   b. 1288

   c. 39 804

   d. 64 684

2. Each of these 4-digit numbers is divisible by 4.
   Identify the possible missing digits.

   a. 533 ☐

   b. 167 ☐

   c. 306 ☐

3. A nursery planted 3448 seeds in 8 rows. Can each row have an equal number of seeds?

Turn to the Answer Key at the end of the Module and mark your answers.

Explore
Divisibility Rules

Thinking Space

One doesn't have divisibility rules like the other numbers; can you figure out why? Use this hundreds chart to help you.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

If you coloured the multiples of 1, you would have to colour every number. Every number's first factor is 1.

Look back on the patterns and rules you have created; compare them to the list of divisibility rules for numbers 2-6 and numbers 8-10, on the next page.

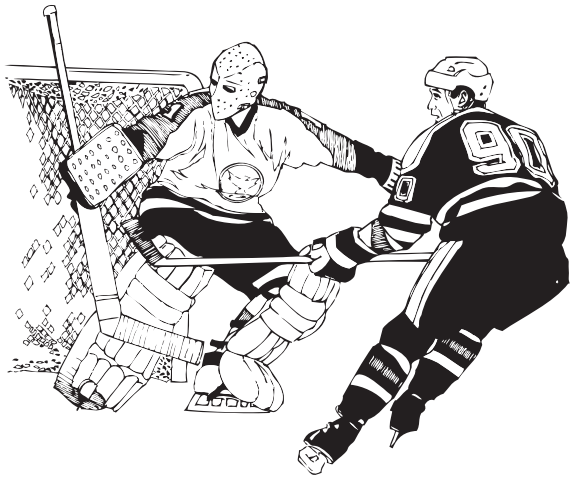
NUMBER	RULE	EXAMPLE
1	All numbers are divisible by 1.	72 169 ÷ 1 = 72 169 34 ÷ 1 = 34
2	A number is divisible by 2 if it is even, or its ones digit is 0, 2, 4, 6 or 8.	45 678 is divisible by 2 because the ones digit is 8.
3	A number is divisible by 3 if the sum of its digits is divisible by 3.	345 is divisible by 3. 3 + 4 + 5 = 12 12 can be divided by 3 evenly.
4	A number is divisible by 4 if its last 2 digits are divisible by 4.	512 is divisible by 4. 12 can be divided by 4 evenly.
5	A number is divisible by 5 if the ones digit ends with 0 or 5.	56 745 is divisible by 5 because its ones digit is 5.
6	A number is divisible by 6 if it is divisible by 2 and 3.	4734 is divisible by 6. The last digit is 4. That's an even number. So, 4734 is divisible by 2. 4 + 7 + 3 + 4 = 18 18 is divisible by 3. So, 4734 is divisible by 3.
8	A number is divisible by 8 if the last 3 digits are divisible by 8.	84 024 is divisible by 8. 24 can be divided by 8 evenly.
9	A number is divisible by 9 if the sum of its digits is divisible by 9.	45 981 is divisible by 9. 4 + 5 + 9 + 8 + 1= 27 27 can be divided by 3 evenly.
10	A number is divisible by 10 if the ones digit is 0.	345 670 is divisible by 10. 0 is the ones digit.

Thinking Space

Section Summary

Now that you have completed this section, try solving the Section Challenge that you saw at the beginning. When you are finished, compare your answer to the solution on the next page.

Section Challenge



Three hockey teams each had a fund raiser for new uniforms. One team sold gift cards for chocolates ($5), another team sold gift cards for cookies ($4), and the third team sold gift cards for t-shirts ($8). You have received the summary sheet of all the money that was raised and want to find out how many cards each team sold.

HOCKEY TEAM	AMOUNT RAISED
Vipers	$3624
Storm	$1116
Magicians	$2530

1. How can we determine which gift card each team sold?

2. How many gift cards did each team sell?

Section Challenge Solution

STEP 1: UNDERSTAND THE PROBLEM

I understand by:
- drawing
- highlighting clue words
- underlining the question
- rewording the question

My way to understand:
- my own words

Hockey teams sold cookies, chocolates and t-shirts for $4, $5 or $10.

STEP 2: MAKE A PLAN
- Find the information I need
- Make a plan

Information I need:
- One team sold gift cards for chocolates ($5), another team sold gift cards for cookies ($4), and the third team sold gift cards for t-shirts ($8)
- Vipers raised $3624
- Storm raised $1116
- Magicians raised $2530
- Want to find out how many cards each team sold

Information I don't need:
- Three Hockey teams each had a fund raiser for new uniforms
- They sold gift cards to raise the money
- You have received the summary sheet of all the money that was raised and want to find out how many cards each team sold

My Plan: If I use divisibility rules for 4, 5 and 8, I will be able to determine which team sold which cards.

STEP 3: CARRY OUT THE PLAN

NUMBER	RULE	VIPERS $3624	STORM $1116	MAGICIANS $2530
4	Last 2 digits divisible by 4	Yes	Yes	No
5	Last digit is 0 or 5	No	No	Yes
8	Last 3 digits divisible by 8	Yes	No	No

STEP 4: ANSWER THE QUESTION

How can we determine which gift card each team sold?

Check the divisibility rules.

- $3624 is the only number that is divisible by 8.
  The Vipers must have sold the t-shirts.
- $2430 is the only number that is divisible by 5.
  The Magicians must have sold the chocolates.
- $1116 is divisible by 4, and not divisible by 5 or 8.
  The Storm must have sold the cookies.

How many gift cards did each team sell?

Vipers 3624 ÷ 8 = 453 cards
Storm 1116 ÷ 4 = 279 cards
Magicians 2530 ÷ 5 = 506 cards

Does the answer make sense?: Yes.

Answer Key Table of Contents

Answer to Pretest 1.1

Lesson 1.1A

1. a. +17 degrees
   b. –$300
   c. –75 m

2. a. –3
   b. –27
   c. 0

Lesson 1.1B

1. a. –6
   b. –3
   c. +6
   d. –9

2. a. +26
   b. –78
   c. +121
   d. –447

3. a. (–25) + (+15) + (–7)
   b. (–25) + (+15) + (–7)
   = (–10) + (–7)
   = –17
   James owes $17

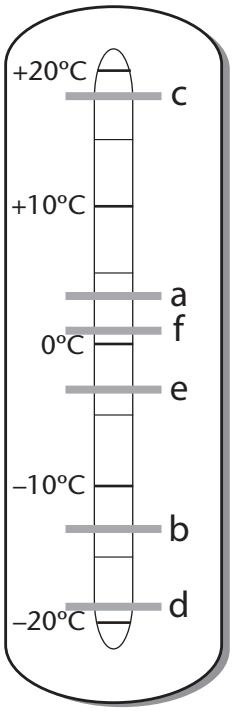
Lesson 1.1C

1. a. –4
   b. +28
   c. –26
   d. –4

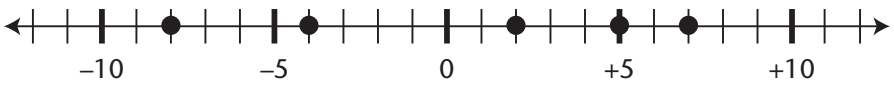
2. a. –6
   b. –12

Answer to Lesson 1.1A Warm-up

1.



2.



3. Any integer that is negative. For example: –1, –5, –7

Answer to Lesson 1.1A Practice 1

1. a. +60 m
   b. +25 m
   c. –40 m
   d. –50 m
   e. –125 m

2. a. –50
   b. +10
   c. –200
   d. –3
   e. +5
   f. –6

Answer to Lesson 1.1A Practice 2

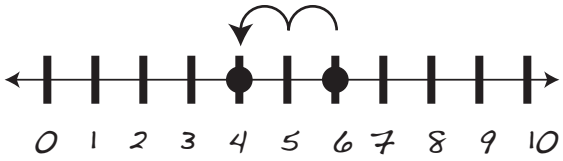
1. a. +5
   b. +9
   c. –2

2. a. +3
   b. –11
   c. –21

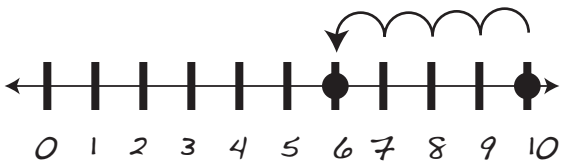
3. –8, –2, 0, +5, +12

Answer to Lesson 1.1B Warm-up

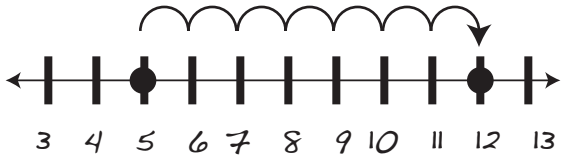
1. b. 6 – 2 = 4



   c. 10 – 4 = 6



d. 5 + 7 = 12



2. a. (–6) + (– 2) =

   b. (+7) + (–3) =

   c. (+9) + (–6) =

   d. (–12) + (+3) + (–7) =

   e. (–64) + (+32) +(+11) =

Answer to Lesson 1.1B Practice 1

1. a. +2

   b. +1

   c. –1

   d. –3

   e. –1

   f. +2

2. a. (–4) + (+5) = +1

   b. (+2) + (–3) = –1

   c. (+4) + (–2) = +2

   d. (–3) + (–1) = –4

Answer to Lesson 1.1B Practice 2

1. a. –5
   b. +8
   c. +5
   d. –3
   e. +3
   f. –5

2. a. –7
   b. +1

3. a. +10
   b. +2

4. Some answers may include:
   (+1) + (–8) = –7
   (–6) + (–1) = –7
   (–3) + (–4) = –7
   (–10) + (+3) = –7

Answer to Lesson 1.1B Practice 3

1. a. Negative
   b. Negative

2. a. +8
   b. –8
   c. –40
   d. –25

3. a. +15

   b. +23

4. –17, –6, 0, 2, 16, 22, 27

5. a. +5

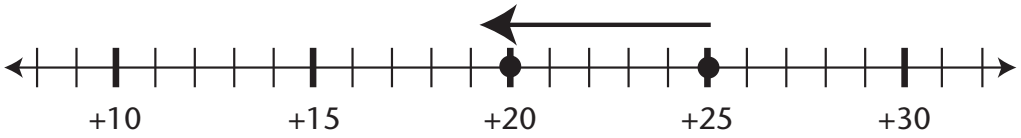
   b. 0

   c. –10

6. The 3rd step

Answer to Lesson 1.1C Warm-up

1. b. 25 – 5 = 20



   c. 120 – 115 = 5

2. a. 13

   b. 46

   c. 220

   d. 1005

   e. 8

   f. 504

Answer to Lesson 1.1C Practice

1. a. +5

   b. –4

   c. –8

   d. –5

2. a. +3

   b. +1

   c. 0

   d. –5

3. (+2000) – (–200) = +2200

   Cullen is right

Answer to Pretest 1.2

Lesson 1.2A

Note: Estimating is about being close to the right answer. If your answer is close, mark it right!

1. a. 9

   b. 87

   c. 120

   d. 2

   e. 11

   f. 230

   g. 90

Lesson 1.2B

1. a. No, they don't have enough to buy all three items

   b. Short $17.64

Lesson 1.2C

1. a. 0.18

   b. 0.24

2. $50.63

Lesson 1.2D

1. a. Estimate: $(30 \times 5) + 25 - (3 \times 2)$
   $= 150 + 25 - 6$
   $= 175 - 6$
   $= 169$

   Actual: $(26.6 \times 6) + 25 - (3.2 \times 2.1)$
   $= 159.6 + 25 - 6.72$
   $= 184.6 - 6.72$
   $= 177.88$

   b. Estimate: $(6 \div 3) + (4 \times 0.25)$
   $= 2 + 1$
   $= 3$

   Actual: $(6.9 \div 3) + (4.6 \times 0.23)$
   $= 2.3 + 1.058$
   $= 3.358$

Lesson 1.2 E

1. a. Yes

   b. 14 times

Answer to Lesson 1.2A Warm-up

1. a. 8
   b. 1
   c. 3
   d. 0
   e. 4
   f. 4

2. b. 14.1
   c. 62
   d. 461.8
   e. 2100
   f. 1500

3. b. 80 + 6 = 86
   c. 20 ÷ 5 = 4
   d. 6 × 20 = 120
   e. 100 – 10 = 90
   f. 660 + 20 = 680

Answer to Lesson 1.2A Practice 1

1. a. 110 + 15 = 125
   b. 320 + 110 = 430

2. a. 90.98
   b. 141.73

3. a. 1 + 1 + 1 = 3
   b. $9 + $6 + $0 = $15

Answer to Lesson 1.2A Practice 2

1. a. 70

   b. 110

   c. 330

   d. 100

2. a. 95.2

   b. $95.61

   c. 7.596

3. a. 25

   b. $7500

   c. 50

Answer to Lesson 1.2A Practice 3

1. a. 150

   b. 650

2. a. 25

   b. 240

Answer to Lesson 1.2B Warm-up

1. a. 20.8
   b. 7.9
   c. 4.3
   d. 102.3
   e. 16.3
   f. 151.3
   g. 59.45
   h. 151.3
   i. 16.62
   j. 628.03
   k. 1226.7
   l. 96
   m. 10.52
   n. 99.9

Answer to Lesson 1.2B Practice

1. No

2. 7.9 kg

Answer to Lesson 1.2C Warm-up

1. a. 2.4
   b. 50.4
   c. 49.6
   d. 17.2
   e. 5.1
   f. 7.2
   g. 68.4
   h. 174
   i. 151.8
   j. 7.2
   k. 9.6
   l. 905.2

Answer to Lesson 1.2C Practice

1. $11 647.75

2. 176.7 km

3. 4.5 kg

Answer to Lesson 1.2D Warm-up

1. a. 2
   b. 0
   c. 8
   d. 24
   e. 12
   f. 16

Answer to Lesson 1.2D Practice

1. a. 5.1
   b. 12.6
   c. 9.6
   d. 34.26
   e. 18.7
   f. 32.9

Answer to Lesson 1.2E Warm-up

1. a. 4.62
   b. 7.75
   c. 0.9
   d. 8.51
   e. 4
   f. 7.44
   g. 5.06
   h. 20.77
   i. 4.44

2. a. 3.14
   b. 1.31
   c. 3.66
   d. 0.46
   e. 2.94
   f. 2.03

Answer to Lesson 1.2E Practice 1

1. a. 9.73
   b. 4.562
   c. 7.94
   d. 1.626

Answer to Lesson 1.2E Practice 2

1. a. 0.68
   b. 6.08
   c. 16.2
   d. 35.467

2. a. 6.8
   b. 5.830

Answer to Pretest 1.3

Lesson 1.3A

1. 0 ÷ 5

2. Undefined

3. 1, 2, 3, 6, 9, 18

4. a. 4
   b. 28
   c. 7

5. a. Yes, 12 is divisible by 3
   b. No, 18 is not divisible by 7

Lesson 1.3B

1. 10, 5 and 2 are all factors of 36 090

2. 1035 is divisible by 3 so there will not be any wheels left over

3. No, because 1 + 2 + 3 = 6 and 6 is not divisible by 9

4. Yes, 21 648 is even which means it is divisible by 2

5. The missing digit could be 2, 4, 6, 8 or 0

6. Yes, there will be 29 groups of cans without any left over

Answer to Lesson 1.3A Warm-up

1. a. 6
   b. 4
   c. 4
   d. 3
   e. 4
   f. 5
   g. 3
   h. 6
   i. 3
   j. 4
   k. 5
   l. 4
   m. 8

2. a. $10 \div 2 = 5$, or $10 \div 5 = 2$

   b. $12 \div 3 = 4$, or $12 \div 4 = 3$

   c. $28 \div 4 = 7$, or $28 \div 7 = 4$

3. a. $3 \times 8 = 24$, or $8 \times 3 = 24$

   b. $2 \times 7 = 14$, or $7 \times 2 = 14$

   c. $5 \times 6 = 30$, or $6 \times 5 = 30$

Answer to Lesson 1.3A Practice 1

1. a. 13

   b. 2

2. a. 8

   b. 100

3. a. 8

   b. 7

4. a. True

   b. False

5. 1, 2, 3, 5, 6, 10, 15, 30

Answer to Lesson 1.3A Practice 2

1. a. 0
   b. 0
   c. Undefined
   d. 0
   e. Undefined
   f. Undefined
   g. 0
   h. Undefined
   i. Undefined
   j. 0

Answer to Lesson 1.3B Warm-up

1.

a. 16
b. 18
c. 28
d. 15
e. 42
f. 12
g. 16
h. 63
i. 12
j. 21
k. 16
l. 35
m. 54
n. 0
o. 24
p. 36
q. 2
r. 9
s 20
t. 30
u. 36
v. 0
w. 72
x. 45
y. 0
z. 8

Answer to Lesson 1.3B Practice 1

1. a. 5
   b. None
   c. 2

2. a. 0, 2, 4, 5, 6, 8
   b. 2, 4, 6, 8
   c. 5

3. Any number ending in 5

Answer to Lesson 1.3B Practice 2

1. a. 3 and 9 are factors
   b. Neither 3 nor 9 is a factor
   c. 3 is a factor

2. a. 7
   b. 6
   c. 0 or 9

3. No

Answer to Lesson 1.3B Practice 3

1. a. No
   b. Yes
   c. Yes

2. a. Yes
   b. No

Answer to Lesson 1.3B Practice 4

1. a. 4 - No, 8 - No
   b. 4 - Yes, 8 - Yes
   c. 4 - Yes, 8 - No
   d. 4 - Yes, 8 - No

2. a. 2, 6
   b. 2, 6
   c. 0, 4, 8

3. Yes, there will be 431 seeds in each row

Module 1 Glossary

Clue Words

Words which give you hints about what mathematical operation to do, or help you understand the problem better.

Dividend

The number in a division problem being divided or shared.
For example, 6 ÷ 2 = 3. The dividend is 6.

Divisibility Rules

Formulas for determining whether or not a number is a factor of another number.

Divisible

When a number can be divided by another number evenly, with no remainder.
For example, 8 is divisible by 4. 9 is not divisible by 4.

Divisor

In a division problem, the number being divided into another number.
For example, 6 ÷ 2 = 3. The divisor is 2.

Estimating

To make an approximate answer.

Equation

A mathematical number sentence.

Factor

A number that divides another number evenly.
2 and 3 are factors of 6; 5 is *not* a factor of 6.

Front End Estimation

Estimating by using the place value of the front end of the number and rounding to make an estimate.

Integers

{…, –3, –2, –1, 0, 1, 2, 3,…}
A set of numbers that includes:
- zero
- all the counting numbers {1, 2, 3,…}
- all of their opposites {–1, –2, –3,…}

Integer Signs

The sign in an equation which tells you if an integer is positive or negative.

Interval

The even spaces between points on a number line.

Number Line

A straight line with points and a set of numbers.

Operations Signs

The signs in an equation that tell you what mathematical operations to perform.

Opposite Integers

Two integers with the same numeral, but different signs. Opposite integers are represented by points that are the same distance in opposite directions from zero on a number line.
For example, –2 and +2 are opposite integers.

Order of Operations

The correct sequence of steps for a calculation. Brackets first, then multiply and divide in order from left to right, and then add and subtract in order from left to right.

Quotient

The result from dividing one number by another.
For example, 6 ÷ 2 = 3. The quotient is 3.

Relative Size Estimation

Estimating by comparing a number to benchmark numbers close to it on a number line.

Sum

The total when numbers are added together.
For example, the sum of 2 and 3 is 5. The sum of 7 and –3 is 4.

Zero Pair

A pair of integers that equal zero when added together.

Zero Principle

The idea that the sum of two opposite integers will always be zero.