Adult Literacy Fundamental Mathematics: Book 4 - 2nd Edition

Adult Literacy Fundamental Mathematics: Book 4 - 2nd Edition

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BCCAMPUS
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Unit 2: Adding and Subtracting Decimals

Unit 3: Multiplying Decimals

Unit 4: Dividing Decimals

Unit 5: Using Decimals in Real Life

Unit 6: Measurement

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To the Learner

Welcome to *Adult Literacy Fundamental Mathematics: Book 4*.

You have the skills you need to be a strong student in this class. Your instructor knows this because you have passed the Adult Literacy Fundamental Mathematics Level 3 class, or you have been assessed into this level.

Adult math learners have many skills. They have a lot of life experience. They also use math in their everyday lives. This means that adult math learners may already know some of what is being taught in this book. Use what you already know with confidence!

How to Use This Book

This textbook has:

- A **Table of Contents** listing the units, the major topics, and the subtopics.
- A **Glossary** giving definitions for mathematical vocabulary used in the course.
- A **Grades Record** to keep track of your marks.
- Many **Exercises** to practice what you learned. Some are quite short, but others have a great number of questions. You do not have to do every single question!
    - Do as many questions as you feel are necessary for you to be confident in your skill. It is best to do all the word problems.
    - If you leave out some questions, try doing every second or every third question. Always do some questions from the end of each exercise because the questions usually get harder at the end. You might use the skipped questions for review before a test.
    - If you are working on a difficult skill or concept, do half the exercise one day and finish the exercise the next day. That is a much better way to learn.
- **Self-tests** at the end of most topics have an "Aim" at the top. If you do not meet the aim, talk to your instructor, find what is causing the trouble, and do some more review before you go on.

- A **Review and Extra Practice** section is at the end of each unit. If there is an area of the unit that you need extra practice in, you can use this. Or, if you want, you can use the section for more review.
- A **Practice Test** is available for each unit. You may:

    - Write the practice test after you have studied the unit as a practice for the end-of-chapter test, OR
    - You might want to write it before you start the unit to find what you already know and which areas you need to work on.
- **Unit Tests** are written after each unit. Again, you must reach the Aim before you begin the next unit. If you do not reach the aim, the instructor will assist you in finding and practising the difficult areas. When you are ready, you can write a B test to show that you have mastered the skills.
- A **Final Test** is to be written when you have finished the book. This final test will assess your skills from the whole book. You have mastered the skills in each unit and then kept using many of them throughout the course. The test reviews all those skills.

Grades Record

You have also been given a sheet to write down your grades. After each test, you can write in the mark. This way you can keep track of your grades as you go through the course. This is a good idea to use in all your courses.

Grade Record – Book 4

Unit	Practice Test	Date of Test A	Test A	Date of Test B	Test B
Example	✔	*September 4, 2020*	*25/33*	*September 7, 2020*	*25/33*
1					
2					
3					
4					
5					
6					
Final Test					

How to Deal with Math Anxiety

Emotions and Learning

Emotions, or what we feel about something, play a big part in how we learn. If we are calm, we learn well. If we are afraid or stressed, we do not learn as well.

Many people are afraid of math. They fear making a mistake. “Math anxiety” is the fear of math. People who suffer from math anxiety may get headaches, sick stomachs, cold hands, or they may just sweat a lot or just feel scared. Math anxiety can happen for a few different reasons:

- Feeling anxious when writing tests
- Negative experiences in a past math class
- Embarrassment in a past math class
- Social pressures and expectations to not like math or not do well in math
- The want to get everything right
- Negative self-message (“I don’t know how to do it,” or “I hate math”)

Math anxiety is a learned habit. If it is learned, it can be unlearned. Most math anxiety comes from bad memories while learning math. It may be from doing badly on a test or asking a question then being made fun of. These bad memories can make learning math hard.

Everyone can learn math. There is no special talent for math. There are some people who are better at math than others, but even these people had to learn to be good at math.

Do You Suffer from Math Anxiety?

Read the list below and put a check mark beside the ones you feel when thinking about or doing math.

- Are your palms moist?
- Is your stomach fluttering?
- Do you feel like you can’t think clearly?
- Do you feel like you would rather do anything else than learn math?
- Are you breathing faster than normal?
- Is your heart pounding?
- Do you feel cold?
- Do you feel sweaty?

If you answered yes to two or more of these items, you may have math anxiety.

If you have math anxiety, a first step to understanding it is to look at where it all started.

Make a list of your experiences with learning math. Think back to the first math experiences you had and write about them. Think about learning math in school from the younger grades to the higher grades and write about your experiences and feelings. Include this class and how you are feeling right now about learning math.

Beside each experience, write if it was a positive or negative experience.

Look at the examples below to give you an idea:

Positive or negative?	**Math experience**
Negative	My teacher in elementary school lined the whole class up in a row and made us play a multiplication game. I could see which question was mine, and I didn't know the answer so I had to figure it out on my fingers before my turn came up. I got the answer right, but I was so nervous that I would be teased because I didn't know the answer off the top of my head. I still don't know my times tables.
Positive	In high school, I could use a calculator to figure out the simple multiplication problems, and then I could figure out the tougher problems without worrying about knowing my times tables.
Negative	Now that I am upgrading my math, I feel nervous every time I even think about opening the book. I want to get all the answers right, and I know that I won't be able to. I really need everything to be right so that I know that I am getting it.

Once you have made a list of experiences, go over the stories with your instructor, or by yourself and try to find some common themes.

- Can you see when you felt anxiety?
- Can you see why you are now anxious about math?
- Is there any experience you could use now to help you feel calmer about math?

Hopefully by examining the beginnings of the anxiety, you can feel more in control of it.

How to Deal with Math Anxiety

Anyone can feel anxiety that will slow down learning. The key to learning is to be the "boss" of your anxiety. Here are an overview of some strategies that may help deal with your anxiety:

- Use breathing exercises
- Think positive math messages
- Know your textbook

- Understand test-taking anxiety

Remember, learning to deal with your math anxiety may take some time. It took you a long time to learn math anxiety, so it will take some time to overcome it.

Use Breathing Exercises

One way to be the “boss” is to relax. Try this breathing exercise.

Breathing Exercise

Start by breathing slowly to the count of four. It may help to close your eyes and count.

Now hold your breath for four counts and then let your breath out slowly to the count of four.

The counting is silent and should follow this pattern: “Breath in, two, three, four. Hold, two, three, four. Breath out, two, three, four. Wait, two, three, four.”

With practice, the number of counts can be increased. This is an easy and good way to relax.

Now, try this exercise quietly and repeat it five times slowly.

Each time you feel anxious about learning, use the breathing exercise to help calm yourself. Ask yourself if what you tried worked. Do you feel calmer?

Think Positive Math Messages

Another way to be the “boss” is to give yourself positive math messages.

Read and think about the positive math messages listed below. Do you say any of those things to yourself?

- If the answer is yes, then great, keep doing that.
- If your answer is no, try to add this little mental trick to your day. The result will probably be that you start to see math as something you can do and that you may even like!

I like math.

I am good at math.

I understand math.

I can relax when I am studying math.

I am capable of learning math.

Math is my friend.

My math improves every day.

I am relaxed, calm and confident when I study math.

I understand math when I give myself a chance.

Math is creative.

Pick three statements that you like and say them to yourself as much as you can in each day. You can also write the statements out on paper and post them around your house so that you read them throughout the day.

Know Your Textbook

Look at the Table of Contents in the front of your textbook. It tells you what you will be learning. You may see some things that you already know, some things that you may have forgotten, and some things that are new to you.

Flip the pages. You can see that the textbook is split into units. Each unit is something to learn.

Each unit has exercises to do. Notice the answers are at the end of the exercise. You can check your answers as soon as you are done. You can also check your answer before moving on if are not sure if you are doing the question right.

At the end of each unit is a self-test. It is a chance for you to see how well you have learned the skills in the unit. If you do well, you can move on. If you don't do well, you can go back and practice those skills.

Knowing your textbook gives you a good skill. If you get frustrated, you can use the Table of Contents to go back and find some help.

Understand Test-Taking Anxiety

There are four reasons people are anxious when writing tests. Any of the four reasons listed below might be the reason a person might feel anxious in a test-taking situation.

1. Not feeling prepared for the test
2. Not sure how to write the test in the best way
3. Feeling too much mental pressure
4. Poor health habits before writing a test

Here is an explanation of each reason and how to work your way out of the anxiety you may feel during tests.

1. Not feeling prepared for the test

Many students feel anxiety about taking math tests because they do not feel prepared for the test. To feel prepared, a student needs to have studied the work and know that they can do the problems they will be given. Get help from your classmates, friends, or your instructor to find out how you can improve your study habits.

Getting ready for a test starts on the first day of class. Everything you do in class and at home is part of that getting ready.

- **Always do as many exercises as you need to help you understand.** Once you understand, do ten more questions, then you will know for sure that you really understand.
- **Always correct your exercises.** It is good to know that you are understanding and getting the questions right. It is also good to know if you are not understanding and need some help.
- **Always do the self-tests.** The self-tests can show things that you are not sure of.
- **Always do the review.** Review is part of this book. It is a chance to go over all the things you have learned in a unit before moving on. It prepares you for what will be on the test.
- **Always do a practice test.** A practice test gives you a chance to see how many questions and what kind of questions are on the test.

2. Not sure how to write the test in the best way

Here are some strategies students should know about how to write a test to do the best as possible on it:

- Before the Test

    1. **Arrive early.** Get out all the supplies you need to do the test (pencils, ruler, calculator, watch, etc.).
    2. **Be comfortable, but alert.** Choose a good spot in the room, and make sure you have enough space to work. Maintain a comfortable posture in your seat, but don't "slouch."
    3. **Stay relaxed and confident.** Keep a good attitude. If you find yourself anxious, take several slow, deep breaths to relax. Don't talk about the test to other students just before entering the room: their anxiety can be contagious.

- During the test.

    1. **Look over the test**. Take a look at the whole test before starting. This takes very little time. Use a highlighter to highlight the questions that you know you can do easily, note key terms, mark the test with comments that come to mind. As you work, put a star beside any questions that you would like to go over again when you finish the test.
    2. **Relax.** Before starting the test, imagine yourself somewhere where you are calm and confident. Go there in your mind. Focus on how good you feel and how in control you are. If you become anxious during the test, in your mind go to the

calming place. Focus on how calm you feel. Then go back to your test.

3. **Read the directions carefully.** This may be obvious, but it will help you avoid careless errors.
4. **Answer questions in a strategic order.**
    - Answer the easy questions first. This will help to build confidence and score points. It may also help you make connections with more difficult questions.
    - Then answer the difficult questions. Work on these harder questions with all the energy of the easier ones.
5. **Review your answers.** Resist the urge to leave as soon as you are done writing. Spend as much time as you can going over your test to see if you:
    - Answered all the questions.
    - Wrote the answers in right.
    - Did not make simple mistakes.

3. Feeling too much mental pressure

There are many reasons why a student may feel mental pressure when writing a test. Listed below are a few main reasons:

- Negative beliefs about one's math abilities
- Low self-esteem when it comes to math
- Too high expectations of success
- Fear that failure or low grades will affect the future
- Feelings of pressure of not wanting to let down family members

When students feel this kind of pressure, it is very hard to feel calm and relaxed about a test. The key to success in a math test is to keep the anxiety at a manageable level. You can do this in two ways:

1. **Change negative self-talk.** Any time a negative thought creeps into your head, it will make it harder to stay positive and relaxed about your test. If you have a negative thought like "I can't do it", try to replace it with a positive thought like "I can do this".
2. **Use relaxing and calming techniques.** Use the calming breathing mentioned earlier in this section. This will help you keep calm. Also, do not study in the last half hour before the test. You will be calmer by spending time relaxing and breathing deeply in that last half hour.

4. Poor health habits before writing a test

When your body and mind are healthy, you will have a better chance of doing well on a test. Eat well, drink plenty of water and get daily exercise. The better you feel, the better you can perform (and a test is a performance!).

Unit 1: Working with Decimals

Topic A: Part of the Whole Thing

This is the beginning of an adventure with numbers that represent part of the whole thing. These numbers can be shown in a few different ways:

Fraction name	**Example**
Decimal fraction	0.50
Common fraction	$\frac{1}{2}$ or $\frac{50}{100}$
Percent fraction	50%

When we talk about fractions in any of the three ways listed above, we are talking about numbers in relation to the whole thing. What do we mean by “the whole thing”? We mean one complete thing.

An example would be one full jug of juice. That is 1 whole thing.

Once someone starts taking some juice, less than the whole thing remains. Now, half of the juice is gone.

The remaining amount can be written as

- half of one whole thing
- 0.5
- ½
- 50%

Now almost all the juice has been taken.

The remaining amount can be written as

- 0.25
- ¼
- 25%

Now there are two full jugs of juice. This shows *two* whole things.

A fraction does not tell us much unless we know what the fraction is part of—we need to know exactly what the whole thing is! If someone says to you, “Sure, let’s go! I still have half!” you really need to know, “Half of what?”

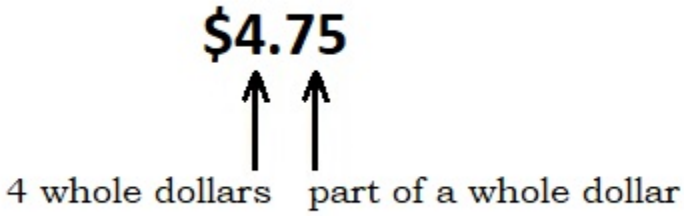
The answer could be $\frac{1}{2}$ a tank of gas, or $\frac{1}{2}$ a paycheque, or $\frac{1}{2}$ a vacation, or $\frac{1}{2}$ an hour.

Fractions have meaning only when we understand the whole thing.

Decimal Fractions

Decimal fractions are one way to consider parts of the whole thing. The whole thing = 1.

You use decimal fractions every time you think about money. The dollars are written as whole numbers and the cents are written as a decimal fraction of a dollar.



A decimal fraction has a decimal point that separates the whole number from the fraction. The decimal point looks like this: •

A whole pizza might be divided into eight pieces, or ten pieces, or twelve pieces. However, for decimal fractions the whole is always divided into ten pieces, which are called tenths. This is because we use a decimal system based on the number ten ("deci" comes from "decimus," the Latin word for "tenth"). The tenths are also divided into ten pieces to make hundredths. And then the hundredths are divided by ten to make thousandths, and so on.

Decimal fractions are often used in our daily lives, especially for money and measurement. For example:

- The total was $12.24.
- It is 3.5 kilometres from my house to the store.
- It costs $1.99 per kilogram for apples.
- She caught a 4.8 kilogram salmon.

You will be working with decimal fractions in the first two units of this book. The following images show some examples of decimals in everyday life.

Common Fractions

Common fractions are a second way we will work with parts of the whole thing.

They are written with two numbers, one above the other, with a line in between. The line may be straight, or it may be on an angle.

$$\frac{3}{4} \text{ or } ¾$$

The **numerator** is the top number in a common fraction. The numerator tells how many parts. The **denominator** is the bottom number. The denominator tells how many equal parts there are in the whole thing.

Numerator → $\frac{3}{4}$ ← Denominator

Example A

The whole thing is 1 pizza. This pizza has been cut into 8 equal pieces. The denominator is 8.

As a fraction, the whole thing is $\frac{8}{8}$ (eight-eighths).

If I ate 3 pieces, that would be $\frac{3}{8}$ of the pizza.

Adult Literacy Fundamental Mathematics: Book 5 (https://opentextbc.ca/alfm5/) explains more about common fractions.

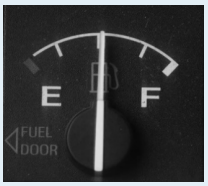
Here are some things to keep in mind while you complete the following exercise:

- $\text{one-quarter} = 0.25 = \frac{1}{4}$
- $\text{one-third} = 0.333.. = \frac{1}{3}$
- $\text{one-half} = 0.5 = \frac{1}{2}$
- $\text{two-thirds} = 0.666... = \frac{2}{3}$
- $\text{three-quarters} = 0.75 = \frac{3}{4}$

Exercise 1

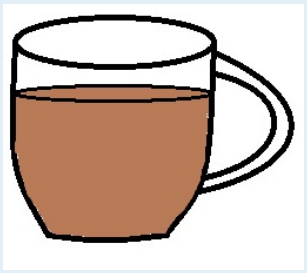
Look at the pictures and use a fraction to answer the questions.

A. How much gas is left?

a. 

b. 

B. Do you want more coffee?

a. 

No thanks, I still have _____ of a cup.

c. 

Yes please, I'm down to _____ of a cup.

b. 

Sure, I only have _____ a cup.

C. Do we need more juice?

Yes, there is just _____ of the juice.

Answers to Exercise 1

Answers may differ because the fraction is approximate. Ask your instructor to check any different answers.

A. Gas

a. $\frac{1}{2}$ or $\frac{2}{4}$ or 0.5

b. $\frac{1}{4}$ or 0.25

B. Coffee

a. $\frac{3}{4}$ or 0.75

b. $\frac{1}{2}$ or 0.5

c. $\frac{1}{4}$

C. Juice – $\frac{1}{3}$

Fractions as a Percent

A third and useful way to think about parts of the whole thing is as a **percent**.

Percent fractions are written with a number and a percent sign.

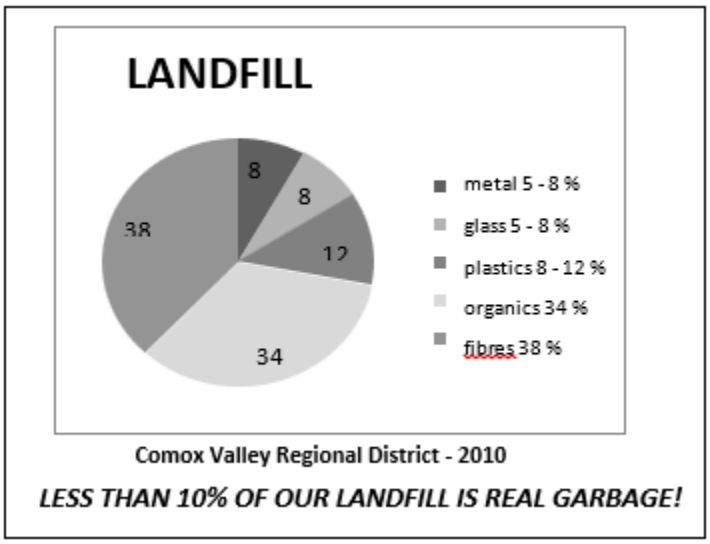
1% 12% 50% 99%

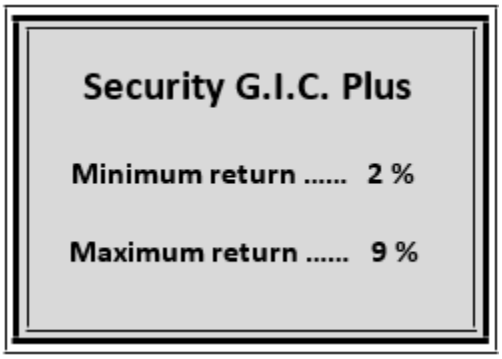
In percent fractions, there is always a denominator of 100. That makes the arithmetic much easier and helps us to understand the fraction.

For example, if you got $\frac{14}{20}$ on a test last week, and $\frac{13}{17}$ on a test this week, it is hard to get a sense of how you are doing. But if you know you got 70% last week and 76% this week, it is easier to see your improvement.

In percent fractions, the whole thing is 100%, so 100% equals 1.

Statistics and general information are often reported in percent fractions.





You will learn to work with fractions as a percent in *Adult Literacy Fundamental Mathematics: Book 6* (https://opentextbc.ca/alfm6/). We hope you enjoy the challenge!

What is a Decimal Fraction?

As you know, fractions describe part of the whole thing — a fraction is smaller than 1. And as you also know, 1 (the whole thing) can be many things. For example, it can be:

- 1 dollar
- 1 city
- 1 school
- 1 pay cheque
- 1 year
- 1 second
- 1 loaf of bread
- 1 ferry ride

A decimal might represent part of a year, part of the population of Canada, part of an hour, or part of anything.

Decimal fractions are different from common fractions in several ways:

- A decimal point separates whole numbers from the fraction.

$\frac{1}{10} = 0.1$ $\frac{34}{100} = 0.34$ $\frac{5}{10} = 0.5$

- In a decimal fraction, there is no denominator.

$\frac{1}{8}$ ⇐ denominator $\frac{3}{4}$ ⇐ denominator

We tell the size of the denominator by looking at how many numerals are placed after the decimal point.

Decimal fraction denominators are always ten or ten multiplied by tens. Decimal means “based on the number ten.”

$$
\begin{array}{ll}
0.4 & \text{has a denominator of } 10 \\
0.44 & \text{has a denominator of } 100 \\
0.444 & \text{has a denominator of } 1\,000 \\
0.4444 & \text{has a denominator of } 10\,000 \\
0.44444 & \text{has a denominator of } 100\,000 \\
0.444444 & \text{has a denominator of } 1\,000\,000
\end{array}
$$

A whole number and a decimal can be written together. This is called a **mixed decimal**.

4.35 **100.47** **$12.39**

Every whole number has a decimal point after it, even though we usually do not bother to write the decimal point unless apart of the whole (fraction) follows the whole number.

We can also put zeros to the right of the decimal point of any whole number without changing its value. Get used to thinking of a decimal point after every whole number!

$$
\begin{array}{rcrcl}
3 & = & 3. & = & 3.0000000 \\
275 & = & 275. & = & 275.0 \\
100 & = & 100. & = & 100.0000000000 \\
\$8 & = & \$8. & = & \$8.00
\end{array}
$$

Tip: In math, we use the word “decimal” to mean “decimal fraction.” In the rest of this book, you will see the word “decimal,” and it will mean “decimal fraction.”

Topic B: Reading & Writing Decimals

Remember the **place value** chart of whole numbers? Complete the following exercise for a refresher.

Exercise 1

352 is the number on the first line of the chart below. The 3 is in the hundreds spot, the 5 is in the tens spot, and the 2 is in the ones spot.

Place the following numbers on the place value chart:

- 4984
- 836466
- 70834

Thousands			Ones			
Hundred thousands	**Ten thousands**	**One thousand**	**Hundreds**	**Tens**	**Ones**	**. (decimal point)**
			3	5	2	.

Answers to Exercise

Check with your instructor to see if you have placed the numbers in the chart correctly.

Turning a Decimal into Words

Have you ever wondered what goes to the right of the decimal in a place value chart? That is where the decimal numbers go! (The parts of the whole.)

Here is a place value chart for decimals:

Hundreds	**Tens**	**Ones**	**Decimal**	**Tenths**	**Hundredths**	**Thousandths**	**Ten thousandths**	**Hundred thousandths**
		3	.	4	5	3		
		0	.	9	6			

See the words in to the right of the decimal point? They look different than the usual whole number words you are used to. These are all the names for the decimal places. You will see them in the next lesson.

The first number on the chart above is 3.453. We say “Three point four five three” or “Three and four hundred fifty-three thousandths.”

- **3** is in the **ones** spot
- **4** is in the **tenths** spot
- **5** is in the **hundredths** spot
- **3** is in the **thousandths** spot

The second number is 0.96. We say “Zero point nine six” or “Zero and ninety six hundredths.”

- **0** is in the **ones** spot
- **9** is in the **tenths** spot
- **6** is in the **hundredths** spot

Tenths Place

Common fractions with a **denominator** of 10 are written as a decimal with one place to the right of the decimal point. This is the tenths place.

We often shorten “places to the right of the decimal point” to “decimal places.” We can say that tenths have one decimal place.

- $\frac{6}{10}$ = 0.6 = six tenths
- $\frac{3}{10}$ = 0.3 three tenths

An easy way to remember this is that there’s one zero in the denominator and so there is one decimal place taken up.

Exercise 2

a. $\frac{4}{10}$ = 0.4 = four tenths

b. $\frac{1}{10}$ = 0.1 = one tenth

c. $\frac{2}{10}$ = _____ = _____

d. $\frac{9}{10}$ = _____ = _____

e. $\frac{7}{10}$ = _____ = _____

f. Now enter each common fraction in the place value chart below. The first one is done for you. Please show this to your instructor once you are finished to make sure you are on the right track.

Hundreds	Tens	Ones	Decimal	Tenths	Hundredths	Thousandths	Ten thousandths	Hundred thousandths
		0	.	4				

Answers to Exercise 2

a. 0.4, four tenths

b. 0.1, one tenth

c. 0.2, two tenths

d. 0.9, nine tenths

e. 0.7, seven tenths

Decimals with one **digit** to the right of the decimal point have an unwritten denominator of ten. This means that the whole thing is broken into 10 equal parts. Each part is called a tenth.

When we write decimals, we put a zero to the left of the decimal point to show there is no whole number. This zero keeps the decimal point from being "lost" or not noticed.

For example, .2 should be written as 0.2.

Exercise 3

Write each decimal as a common fraction and in words.

a. 0.3 = $\frac{3}{10}$ = three tenths

b. 0.4 = $\frac{4}{10}$ = four tenths

c. 0.8 = _____ = _____

d. 0.7 = _____ = _____

e. 0.1 = _____ = _____

Answers to Exercise 3

a. $\frac{3}{10}$ three tenths
b. $\frac{4}{10}$ four tenths
c. $\frac{8}{10}$ eight tenths
d. $\frac{7}{10}$ seven tenths
e. $\frac{1}{10}$ one tenth

Hundredths Place

Decimals with two digits to the right of the decimal point have an unwritten denominator of one hundred. This means that the whole thing is broken into 100 equal parts. Each part is called a hundredth.

Exercise 4

Write each decimal as a common fraction and in words.

a. $0.34 = \frac{34}{100}$ = thirty-four hundredths
b. $0.71 = \frac{71}{100}$ = seventy-one hundredths
c. 0.06 = _____ = _____
d. 0.56 = _____ = _____
e. 0.33 = _____ = _____
f. Now place the above decimal numbers in the place value chart. The first two are done for you. Then ask your instructor to mark it.

Hundreds	Tens	Ones	Decimal	Tenths	Hundredths	Thousandths	Ten thousandths	Hundred thousandths
		0	.	3	4			
		0	.	7	1			

Answers to Exercise 4

a. $\frac{34}{100}$ thirty-four hundredths
b. $\frac{71}{100}$ seventy-one hundredths
c. $\frac{6}{100}$ six hundredths
d. $\frac{56}{100}$ fifty-six hundredths

e. $\frac{33}{100}$ thirty-three hundredths

Common fractions with a denominator of one hundred are written as decimals with two decimal places.

- $\frac{23}{100}$ = 0.23
- $\frac{99}{100}$ = 0.99
- $\frac{4}{100}$ = 0.04

Look at that last example. The 0 must be used after the decimal point in 0.04 to hold the tenths place. This makes it clear that the denominator is one hundred. There are two zeros in the denominator, so there must be two decimal places taken up.

This is called prefixing zeros.

Exercise 5

Write these common fractions as decimals.

a. $\frac{34}{100}$ = 0.34
b. $\frac{70}{100}$ = 0.70
c. $\frac{85}{100}$
d. $\frac{11}{100}$
e. $\frac{21}{100}$
f. $\frac{5}{100}$
g. $\frac{6}{100}$
h. $\frac{45}{100}$
i. $\frac{50}{100}$
j. $\frac{1}{100}$

Answers to Exercise 5

a. 0.34
b. 0.70
c. 0.85
d. 0.11
e. 0.21
f. 0.05
g. 0.06
h. 0.45
i. 0.50
j. 0.01

Thousandths Place

Decimals with three digits to the right of the decimal point (three decimal places) have an unwritten denominator of one thousand. This means that the whole thing is broken into 1000 equal parts. Each part is one thousandth.

Look carefully at how thousandths are written. Watch for the prefixing zeros that may be needed to hold the tenth decimal place or the hundredth decimal place.

- 0.472 = four hundred seventy-two thousandths $= \frac{472}{1000}$
- 0.085 = eighty-five thousandths $= \frac{85}{1000}$
- 0.003 = three thousandths = $\frac{3}{1000}$

There are three zeros in the denominator, so there must be three decimal places taken up.

Exercise 6

Write each decimal as a common fraction and in words. Practice saying them out loud.

a. 0.006 = $\frac{6}{1000}$ = six thousandths

b. 0.142 = $\frac{142}{1000}$ = one hundred forty-two thousandths

c. 0.238 = _____ = _____

d. 0.562 = _____ = _____

e. 0.600 = _____ = _____

Answers to Exercise 6

a. $\frac{6}{1000}$, six thousandths

b. $\frac{142}{1000}$, one hundred forty-two thousandths

c. $\frac{238}{1000}$, two hundred thirty-eight thousandths

d. $\frac{562}{1000}$, five hundred sixty-two thousandths

e. $\frac{600}{1000}$, six hundred thousandths

Exercise 7

Write each common fraction as a decimal.

a. $\frac{736}{1000}$ = 0.736

b. $\frac{84}{1000}$ = 0.084

c. $\frac{210}{1000}$

d. $\frac{6}{1000}$

e. $\frac{106}{1000}$

f. $\frac{116}{1000}$

g. $\frac{592}{1000}$

h. $\frac{962}{1000}$

i. Now place the above decimal numbers in the place value chart on the next page. The first two are done for you. Then ask your instructor to mark it.

Hundreds	**Tens**	**Ones**	**.**	**Tenths**	**Hundredths**	**Thousandths**	**Ten thousandths**	**Hundred thousandths**
		0	.	7	3	6		
		0	.	1	4	2		

Answers to Exercise 7

a. 0.736

b. 0.084

c. 0.210

d. 0.006

e. 0.106

f. 0.116

g. 0.592

h. 0.962

Ten-thousandths Place

Decimals with four decimal places have an unwritten denominator of ten-thousand. The whole thing is being thought of as having 10000 equal parts. Each part is one ten-thousandth.

- 0.1458 = $\frac{1458}{10000}$ = one thousand four hundred fifty-eight ten-thousandths
- 0.0581 = $\frac{581}{10000}$ = five hundred eighty-one ten-thousandths

Notice that there are four zeros in the denominator. That means there must be four decimal places taken up.

Exercise 8

Write each decimal as a common fraction and in words. Practice saying these aloud to someone else; they can be real tongue-twisters!

a. 0.2489 = $\frac{2489}{10000}$ = two thousand four hundred eighty-nine ten-thousandths

b. 0.1111 = $\frac{1111}{10000}$ = one thousand one hundred eleven ten-thousandths

c. 0.0236

d. 0.4015

e. 0.2306

f. 0.0003

Answers to Exercise 8

c. $\frac{236}{10000}$, two hundred thirty-six ten-thousandths

d. $\frac{4015}{10000}$, four thousand fifteen ten-thousandths

e. $\frac{2306}{10000}$, two thousand three hundred six ten-thousandths

f. $\frac{3}{10000}$, three ten-thousandths

Exercise 9

Write these common fractions as decimals.

a. $\frac{1489}{10000}$ = 0.1489

b. $\frac{2}{10000}$ = 0.0002

c. $\frac{386}{10000}$

d. $\frac{9137}{10000}$

e. $\frac{4}{10000}$

f. $\frac{916}{10000}$

Now place the above decimal numbers in the place value chart below. The first two are done for you. Then ask your instructor to mark it.

Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths	Ten thousandths	Hundred thousandths
		0	.	1	4	8	9	
		0	.	0	0	0	2	

Answers to Exercise 9

a. 0.1489
b. 0.0002
c. 0.0386
d. 0.9137
e. 0.0004
f. 0.0916

Mixed Decimals

Mixed decimals are a whole number and a decimal written together.

4.3 = $4\frac{3}{10}$ = four and three tenths

27.27 = $27\frac{27}{100}$ = twenty-seven and twenty-seven hundredths

8.104 = $8\frac{104}{1000}$ = eight and one hundred four thousandths

Digits to the left of the decimal point are whole numbers.
Digits to the right of the decimal point are fractions.
We say “and” for the decimal point.

Look at the **mixed decimals** from the examples above in the place value chart below:

Hundreds	Tens	Ones	Decimal	Tenths	Hundredths	Thousandths	Ten thousandths	Hundred thousandths
		4	.	3				
	2	7	.	2	7			
		8	.	1	0	4		

Turning Words into a Decimal

1. Read the number. Does the word “and” show that this is a mixed decimal?
    a. If it does, the whole number is before the word “and.” Write the whole number with the decimal point after it.
    b. If there is no whole number, write a 0 with the decimal point after it.
2. Decide how many decimal places you need. Look and listen for the “ths” ending. The word with “ths” is the understood denominator. It may help if you draw a little line for each decimal place that you need.
    - Ten**ths** need one decimal place.
    - Hundred**ths** need two decimal places.
    - Thousand**ths** need three decimal places.
    - Ten-thousand**ths** need four decimal places.
3. Write the decimal so the last digit is on the last little line and fill any remaining lines with zeros.

Example A

1. Seven hundredths
    1. It it not a mixed decimal, so write: 0.
    2. “Hundredths” means two decimal places: 0. _ _
    3. Fill in the numbers: 0.07
2. Eight thousandths
    1. It it not a mixed decimal, so write: 0.
    2. “Thousands” means three decimal places: 0. _ _ _
    3. Fill in the numbers: 0.008
3. Twenty-six thousandths
    1. It it not a mixed decimal, so write: 0.
    2. “Thousandths” means three decimal places: 0. _ _ _
    3. Fill in the numbers: 0.026
4. Four hundred six thousandths
    1. It it not a mixed decimal, so write: 0.
    2. “Thousandths” means three decimal places: 0. _ _ _
    3. Fill in the numbers: 0.406

Reading and Writing Money

Dollars

We write money with a dollar sign, a whole number, and a decimal with two decimal places.

$$\$1.00 = 1 \text{ dollar}$$

What do we call $\frac{1}{100}$ of a dollar? Right! One cent.

- $2.33 = two dollars and thirty-three cents
- $427.05 = four hundred twenty-seven dollars and five cents
- $0.62 = sixty-two cents
- $0.03 = three cents

Exercise 10

Write the amount of money in words.

a. $212.63 – two hundred twelve dollars and sixty-three cents
b. $47.01
c. $9.28
d. $82.50
e. $100.05

Write with numerals, using $.

f. twenty-seven dollars and six cents – $27.06
g. one hundred sixty-two dollars
h. thirteen dollars and sixty cents
i. one thousand dollars and seventy-seven cents
j. sixty-nine cents
k. seven cents
l. five hundred dollars and ninety cents

Answers to Exercise 10

a. two hundred twelve dollars and sixty-three cents
b. forty-seven dollars and one cent
c. nine dollars and twenty-eight cents
d. eighty-two dollars and fifty cents
e. one hundred dollars and five cents
f. $27.06
g. $162.00
h. $13.60
i. $1000.77
j. $0.69
k. $0.07
l. $500.90

"Centum" is a Latin word that means hundred! Here are English words that start with "cent":

- centurion – commander of a hundred soldiers
- century – a hundred years
- centennial – a hundredth anniversary
- centigrade – having a hundred degrees
- cent – one hundredth of a dollar
- centimetre – one hundredth of a metre
- centipede – wormlike creatures with a hundred legs

When we read $12.25 as "twelve dollars and twenty-five **cents"** we are using the Latin word for "one hundredths."

We could also write our money like this, as we do on cheques (although it looks funny!):

$14.75 = $\$14\frac{75}{100}$

$12.25 = $\$12\frac{25}{100}$

Cents

We have another way of writing money. We often write money that is less than one dollar using a cent sign which is a c for cent with a line through it ¢.

- $0.05 = 5¢
- $0.33 = 33¢
- $0.10 = 10¢
- $0.25 = 25¢
- $0.99 = 99¢
- $1.08 = 108¢

It is incorrect to use both a dollar sign and a cent sign. Instead of $4.53¢, do $4.53 or 453¢.

It is incorrect to use a cent sign with a decimal point. Instead of 4.53¢, do $4.53 or 453¢.

Important Information

We do not need to use a decimal point with the cent sign. A decimal point would indicate a fraction or part of one cent.

For example, If a sign said "Ice cream cones 0.50¢" those ice cream cones would only cost half a cent each!

Pay careful attention to the way amounts of money are written.

Exercise 11

Rewrite these using the other common way of writing money. Remember to use the ¢ or $ as needed.

a. $0.75 = 75¢
b. 83¢ = $0.83
c. $0.01 =
d. 47¢ =
e. $0.04 =
f. 3¢ =
g. $0.40 =
h. 101¢ =
i. $0.29 =
j. 50¢ =
k. $0.80 =
l. 99¢ =
m. $1.00 =
n. 175¢ =
o. $1.10 =

Answers to Exercise 11

a. 75¢
b. $0.83
c. 1¢
d. $0.47
e. 4¢
f. $0.03
g. 40¢
h. $1.01
i. 29¢
j. $0.50
k. 80¢
l. $0.99
m. 100¢
n. $1.75
o. 110¢

Exercise 12

Correct the following ways of writing money.

a. .50¢ = 50¢
b. .99¢ =
c. .20¢ =
d. ¢0.40 =

Answers to Exercise 12

a. 50¢
b. 99¢
c. 20¢
d. 40¢

Exercise 13: Review

Complete the chart so that each question has the amount written as a decimal, a common fraction, and in words. The first two are done.

#	Decimal	Fraction	In words
a	.048	$\frac{48}{1000}$	forty eight thousandths
b	0.7	$\frac{7}{10}$	seven tenths
c			four hundredths
d	0.006		
e		$16\frac{2}{1000}$	
f			twelve and fifteen hundredths
g	463.03		
h		$213\frac{25}{1000}$	
i			seventy-five and twenty-eight thousandths
j	1833.018		
k		$12\frac{418}{10000}$	
l			nine tenths

Answer to Exercise 13

#	Decimal	Fraction	In words
c	0.04	$\frac{4}{100}$	four hundredths
d	0.006	$\frac{6}{1000}$	six thousandths
e	16.002	$16\frac{2}{1000}$	sixteen and two thousandths
f	12.15	$12\frac{15}{100}$	twelve and fifteen hundredths
g	463.03	$463\frac{3}{100}$	four hundred sixty-three and three hundredths
h	213.025	$213\frac{25}{1000}$	two hundred thirteen and twenty-five thousandths
i	75.028	$75\frac{28}{1000}$	seventy-five and twenty-eight thousandths
j	1833.018	$1833\frac{18}{1000}$	one thousand eight hundred thirty-three and eighteen thousandths
k	12.0418	$12\frac{418}{10000}$	twelve and four hundred eighteen ten-thousandths
l	0.9	$\frac{9}{10}$	nine tenths

Topic B: Self-Test

Mark /41 Aim 36/41

A. Write as decimals. (10 marks)

a. $\frac{3}{10}$

b. $\frac{24}{1000}$

c. $\frac{36}{1000}$

d. $\frac{206}{10000}$

e. $3\frac{123}{1000}$

f. $\frac{2}{100}$

g. $6\frac{3}{10}$

h. $4\frac{11}{1000}$

i. $6\frac{250}{1000}$

j. $9\frac{47}{10000}$

B. Change these decimals to common fractions. (8 marks)

a. 0.5
b. 0.04
c. 0.37
d. 0.010
e. 3.0918
f. 3.025
g. 0.164
h. 2.1498

C. Write as common fractions and as decimals. (20 marks)

a. one hundredth
b. forty-seven hundredths
c. two hundred seventy-one thousandths
d. forty-one thousandths
e. one hundred twenty ten-thousandths
f. four and four tenths
g. two hundred sixty and fourteen ten-thousandths
h. seven and two hundred eleven thousandths
i. forty and six hundredths
j. five dollars and sixty-three cents

D. Write the amount of money with numerals, using a $ sign. (3 marks)

a. Five dollars and sixty cents
b. Seventy-two cents
c. Fifty-six cents
d. Six cents
e. One hundred twenty-four cents

Answers to Topic B Self-Test

A. Write as decimals.

a. 0.3
b. 0.024
c. 0.036
d. 0.0206
e. 3.123
f. 0.02
g. 6.3
h. 4.011
i. 6.250
j. 9.0047

B. Change these decimals to common fractions.

a. $\frac{5}{10}$

b. $\frac{4}{100}$

c. $\frac{37}{100}$

d. $\frac{10}{1000}$

e. $3\frac{918}{10000}$

f. $3\frac{25}{1000}$

g. $\frac{164}{1000}$

h. $2\frac{1498}{10000}$

C. Write as common fractions and as decimals.

a. $\frac{1}{100}$ and 0.01

b. $\frac{47}{100}$ and 0.47

c. $\frac{271}{1000}$ and 0.271

d. $\frac{41}{1000}$ and 0.041

e. $\frac{120}{10000}$ and 0.0120

f. $4\frac{4}{10}$ and 4.4

g. $260\frac{14}{10000}$ and 260.0014

h. $7\frac{211}{1000}$ and 7.211

i. $40\frac{6}{100}$ and 40.06

j. $\$5\frac{63}{100}$ and $\$5.63$

D. Write the amount of money with numerals, using a $ sign.

a. $5.60

b. $0.72

c. $0.56

d. $0.06

e. $1.24

Topic C: Comparing Decimals

More about Zeros…

A whole number can have a decimal point and many zeros after it without changing its value.

$$47 = 47.0 = 47.000 = 47.0000000000000000$$

Zeros are used to hold a place when we write whole numbers.

- in 100, the 0s hold the tens place and the ones place
- in 1 206, the 0 holds the tens place

In decimals, any zero to the right of the decimal point and to the left of another **digit** is important because the zero is holding a place and giving the decimal the correct value.

- in 4.306, the 0 holds the hundredths place
- in 17.0002, the 0's hold the tenth, hundredth and thousandth places.

A zero is usually placed to the left of the decimal point if there is no whole number.

$$0.5 \qquad 0.937$$

Which Zeros are not Needed?

- Zeros at the beginning, or far left, of whole numbers are not needed.
    - 00004 = 4
    - 00100 = 100
- Zeros at the end, or far right, of decimal are not needed.
    - 3.210 = 3.21
    - 34.062000 = 34.062

Zeros on the outside edges of **mixed decimals** do not change the value of the number and are not necessary.

0028.971**0** = 28.971

00100.003**000** = 100.003

890.407 = **00**890.407**0000000**

Exercise One

Cross out the zeros that are not needed.

a. 70.0390
b. 00.2906
c. 06.30
d. 087.50
e. 60.0205
f. 4 020.0020
g. 400.080
h. 340.600
i. 03.5830
j. 9.0
k. 0.002030
l. 50.300

Answers to Exercise One

a. 709.039
b. 0.2906
c. 6.3
d. 87.5
e. 60.0205
f. 4 020.002
g. 400.08
h. 340.6
i. 3.583
j. 9.0
k. 0.00203
l. 50.3

Zeros at the end of a decimal do not change the value.

$$6. = 6.0 = 6.00$$

And zeros at the beginning of a whole number do not change the value.

$$8 = 08 = 00008$$

But zeros between a decimal point and a digit do change the value.

Example A

405 is very different than 45. And 0.05 (five hundredths) is very different than 0.5 (five tenths).

Comparing Decimals

You have probably heard the old saying: “You cannot compare apples to oranges!” And it’s true, it is tough to compare things that do not have much in common. So before we compare decimals, we give the decimals something in common—the same number of decimal places which gives them a common understood **denominator**.

Before comparing decimals, put zeros at the end or cross out any unnecessary zeros so the decimals have a common (same)

number of decimal places. If you write the decimals that you are comparing right underneath each other, your eye will often tell you which is the larger amount or if the amounts are equal.

Example B

Compare 0.43 and 0.4. Which is larger?

0.43 has two decimal places; it is forty-three hundredths $= \frac{43}{100}$. 0.4 has one decimal place; it is four tenths = $\frac{4}{10}$.

Give them a common number of decimal places.

Add a zero to 0.4 to make it 0.40; now we read it as forty hundredths = $\frac{40}{100}$.

Now, which is larger? $\frac{40}{100}$ or $\frac{43}{100}$.

You can easily see that 0.43 is the larger amount.

Review of Greater Than > and Less Than <

An easy way to remember these signs is to think that the big (wide) end of the sign is closer to the bigger (greater) number, and the small end of the sign is closer to the smaller number.

0.43 is larger than 0.40, 0.43 > 0.40

0.52 is smaller than 0.60, 0.52 < 0.60

Exercise Two

Which is greater? Draw a box around the bigger decimal fraction in each pair and write a greater than > or a less than < sign to make a true statement.

a. 0.6 _<_ 0.65
b. 14 _>_ 1.4
c. 0.17 ___ 0.02
d. 0.009 ___ 0.09
e. 0.23 ___ 0.215
f. 0.51 ___ 0.159
g. 0.03 ___ 0.0352
h. 0.07 ___ 0.063
i. 630.3 ___ 630.03
j. 0.80 ___ 0.6989

Answers to Exercise Two

a. <
b. >
c. >
d. <
e. >
f. >
g. <
h. >
i. >
j. >

Comparing Decimals Using a Number Line

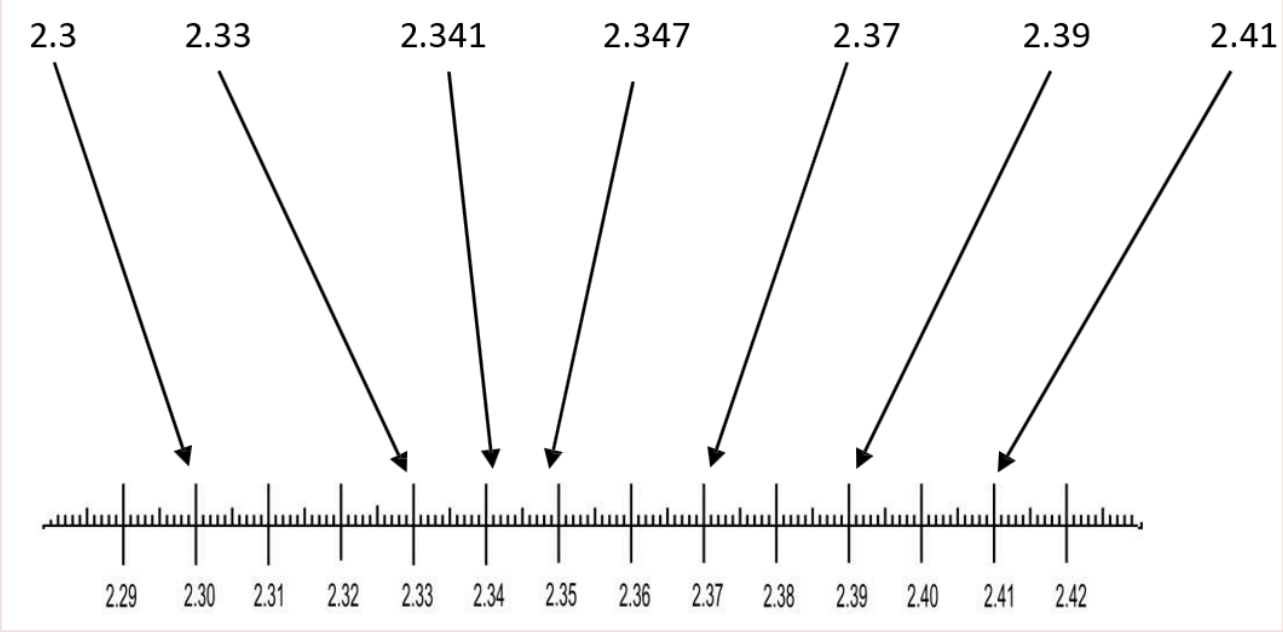
You can compare decimals using a number line. A number line organizes what you are thinking about on paper – or on a ruler. You can plot your decimals on the number line and then be able to see which number is larger. Take a look:

Example C

First try to put the following numbers in order without looking at the number line below:

2.347 2.3 2.37 2.33 2.39 2.341 2.41

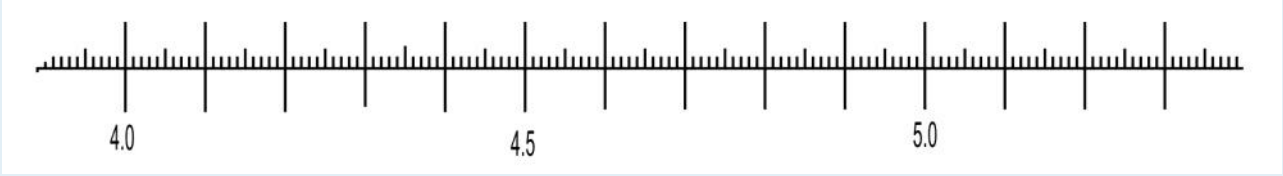
Then, look at the number line and see if you ordered your numbers correctly. The number line has a jagged edge which means it does not start at zero. It starts in the middle of a ruler. Using a number line can help you see your work and think about it at the same time.



Exercises

Try plotting the following decimals on the number line below:

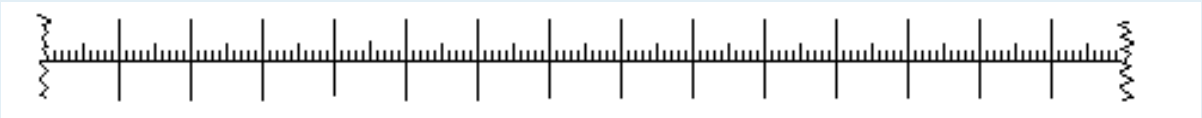
4.59 4.32 4.7 5.23 4.47 4.3 4.17



Exercises

And now, plot these numbers on an empty number line. (You need to fill in the numbers yourself. Plot 7.3 on the first large vertical line on the left)

7.35 7.3 8.2 7.53 7.98 8.34 7.9 7.5



This is one way to organize and order decimals, please use it if the system is helpful for you.

Exercise Three

Draw a circle around the smallest decimal fraction in each group.

a. 0.3, 0.03 , 0.23
b. 0.04 , 0.14, 0.41
c. 0.016, 0.2, 0.216
d. 0.62, 0.6103, 0.5
e. 0.041, 0.04, 0.4
f. 100.1, 100.13, 100.01

Answers to Exercise Three

a. 0.03
b. 0.04
c. 0.016
d. 0.5
e. 0.04
f. 100.01

Exercise Four

Identify whether the pair of numbers is equal (=) or not equal (≠).

a. 0.8 ___ 0.80
b. 0.25 ___ 0.205
c. 5.503 ___ 5.330
d. 9.3200 ___ 9.32
e. 0.75 ___ 0.750
f. 23.3 ___ 2.33
g. 0.040 ___ 0.40
h. 0.8010 ___ 0.801

Answers to Exercise Four

a. =
b. ≠
c. ≠
d. =
e. =
f. ≠
g. ≠
h. =

Topic C: Self-Test

Mark /14 Aim 12/14

A. Cross out the unnecessary zeros. (4 marks)

a. 0401.02
b. 1 000.001
c. 68.3020
d. 050.200

B. Draw a box around the larger amount in each pair. (4 marks)

a. 0.8 or 0.08
b. 0.004 or 0.04
c. 0.006 or 0.6
d. 33.006 or 33.06

C. Put the correct sign between the decimals. Choose = or > or <. (6 marks)

a. 2.3 ___ 23
b. 0.2 ___ 0.003
c. 4.7 ___ 4.700
d. 0.25 ___ 0.250
e. 042.9002 ___ 042.9
f. 0.4092 ___ 0.411

Answers to Topic C Self-Test

A. Cross out the unnecessary zeros.

a. 401.02
b. 1 000.001
c. 68.302
d. 50.2

B. Draw a box around the larger amount in each pair.

a. 0.8
b. 0.04
c. 0.6
d. 33.06

C. Put the correct sign between the decimals. Choose = or > or <.

a. <
b. >
c. =
d. =
e. >
f. <

Topic D: Rounding Numbers

If a pair of jeans cost $49.98, what amount would you say if someone asks what you paid for them? You would probably say, “They cost around $50.”

We often round cents to dollars as we go about our lives. You may already have an idea of how to do this. For example, answer these questions.

- About how much do your groceries cost each month?
- About how much does it cost to fill a small car’s gas tank?

Look at your answers. The amount for groceries may be quite large. When you estimated your answer, how did you round the amount? For example, if your real monthly grocery bill was $481.73 you might have said $482 or perhaps $480. Perhaps you even have estimated to the nearest hundred dollars and said, “About $500 a month for groceries.” All those estimates would be correct.

The amount for a tank of gas is less than a month’s groceries. How did you estimate?

For example, a small car may take $54.72 of gas.

If you estimated to the nearest dollar, you would say, “About $55.”

If you estimated to the nearest ten dollars, you would say, “About $50.”

We round a number in different ways depending on several things:

- the size of the number we are rounding
- what we are going to do with the number after we have rounded it off
- our own convenience

Carefully review the **place value** for whole numbers.

Thousands			**Ones**			
Hundred thousands	Ten thousands	One thousand	Hundreds	Tens	Ones	Decimal

Rounding Whole Numbers

We round **down** if the **digit** to the right is less than 5. We round **up** if the digit to the right is 5 or more.

- Rounding numbers gives an approximate amount; it is not an accurate figure.
- Use a different form of the equal sign (≈) which means “approximate equality.”

Review: Rounding to the Nearest Ten

- Underline the tens digit
- Look at the digit in the ones place (to the right). You can put an arrow above it to help you find it later.
    - If the ones digit is **5 or more, round up**. Write the ones digit as zero and increase the tens digit by one.
    - If the ones digit is **less than 5, round down**. The tens digit does not change and the ones digit is written as a zero.

Example A

$$\underset{\downarrow}{\underline{2}3}$$

23 is rounded down to 20. The tens digit stays the same.

23 ≈ 20

Here’s another example:

Example B

$$\underset{\downarrow}{2\underline{8}7}$$

287 is rounded up to 290. Tthe tens digit increases by 1.

287 ≈ 290.

Exercise 1

Round each of the following to the nearest ten. Use the “approximate equality” sign ≈.

a. 46 ≈ 50
b. 111 ≈ 110
c. 7 ≈
d. 116 ≈
e. 71 ≈
f. 89 ≈
g. 96 ≈
h. 4 ≈
i. 385 ≈

j. 108 ≈
k. 73 ≈
l. 17 ≈
m. 361 ≈
n. 8 ≈
o. 49 ≈
p. 148 ≈

Answers to Exercise 1

a. 50
b. 110
c. 10
d. 120
e. 70
f. 90
g. 100
h. 0
i. 390
j. 110
k. 70
l. 20
m. 360
n. 10
o. 50
p. 150

Review: Rounding to the Nearest Hundred

- Underline the hundreds digit.
- Look at the digit in the tens place (to the right). You can put an arrow above it to help you find it later.
    - If the tens digit is **5 or more, round up**. Write the tens and ones digit as zero and increase the hundreds digit by one.
    - If the tens digit is **less than 5, round down**. The hundreds digit does not change and the tens and ones digit is written as a zero.

Example C

$$\underset{\downarrow}{\underline{4}73}$$

473 is rounded up to 500.

473 ≈ 500

Round down if the tens digit is less than 5 and up if it is 5 or more:

- 728 rounded to the nearest hundred is 700. (The tens digit is 2, which is less than 5, so the hundreds digit stays the same.)
- 758 rounded to the nearest hundred is 800. (The tens digit is 5, which is five or more, so the hundreds digit increases by 1.)

Exercise 2

Round each of the following to the nearest HUNDRED. Use the "approximate equality" sign ≈.

a. 330 ≈ 300
b. 908
c. 2795
d. 1260
e. 742
f. 127
g. 302
h. 945
i. 865
j. 275
k. 590
l. 1240
m. 214
n. 4450
o. 98
p. 996

Answers to Exercise 2

a. 300
b. 900
c. 2 800
d. 1 300
e. 700
f. 100
g. 300
h. 900
i. 900
j. 300
k. 600
l. 1 200
m. 200
n. 4 500
o. 100
p. 1 000

Review: Rounding to the Nearest Thousand

- Underline the thousands digit
- Look at the digit in the hundreds place (to the right). You can put an arrow above it to help you find it later.
    - If the hundreds digit is **5 or more, round up**. Write the hundreds, tens and ones digit as zero and increase the thousands digit by one.
    - If the hundreds digit is **less than 5, round down**. The thousands digit does not change and the hundreds, tens and ones digit is written as a zero.

Example D

↓
3485

3 485 is rounded down to 3 000.

3 485 ≈ 3 000

Round down if the hundreds digit is less than 5 and round up if it is 5 or more:

- 2 109 rounded to the nearest thousand is 2 000. (The hundreds digit is 1, which is less than

5.)

- 2 643 rounded to the nearest thousand is 3 000. (The hundreds digit is 6, which is more than 5.)
- 0940 rounded to the nearest thousand is 1 000. (The hundreds digit is 9, which is more than 5, so the thousands digit increases from 0 to 1.)
- 0465 rounded to the nearest thousand is 0. (The hundreds digit is 4, which is less than 5, so the thousands digit stays at 0.)

Exercise 3

Round each of the following to the nearest thousand. Use the "approximate equality" sign ≈.

a. 1 760 ≈ 2 000
b. 6 250
c. 850
d. 320
e. 5 544
f. 1 234
g. 492
h. 6 199
i. 9 883
j. 1 045
k. 7 856
l. 500
m. 1 780
n. 495
o. 9 300
p. 700
q. 2 449
r. 5 555
s. 8 914
t. 85 455
u. 6 475

Answers to Exercise 3

a. 2 000
b. 6 000
c. 1 000
d. 0
e. 6 000
f. 1 000
g. 0
h. 6 000
i. 10 000
j. 1 000
k. 8 000
l. 1 000
m. 2 000
n. 0
o. 9 000
p. 1 000
q. 2 000
r. 6 000
s. 9 000
t. 85 000
u. 6 000

Rounding Decimals to Whole Numbers

Remember, decimals are part of the whole thing. We can round the decimal to the nearest whole number. Rounding to whole numbers means rounding off to the ones place.

When rounding to the whole number:

- Underline the ones digit.
- Look at the digit in the tenths place (to the right). You can put an arrow above it to help you find it later.
    - If the tenths digit is **5 or more, round up**. Increase the ones digit by one. Do not write a decimal or any decimal digits.

- If the tenths digit is **less than 5, round down**. The ones digit does not change. Do not write a decimal or any decimal digits.

Example E

$$37.482$$

37.482 rounded to the nearest whole number is 37. (The tenths digit is 4, which is less than 5.)

37.482 ≈ 37

$$37.906$$

37.906 rounded to the nearest whole number is 38. (The tenths digit is 9, which is more than 5.)

37. 906 ≈ 38

Example F

1. Round to a whole number.

   $$42.123 \rightarrow 42.123 \approx 42$$

2. Round 960.802 to the nearest whole number.

   $$960.802 \rightarrow 960.802 \approx 961$$

3. Round 39.5 to the nearest ones.

   $$39.5 \rightarrow 39.5 \approx 40$$

Zeros again –

You know that zeros at the end of a decimal do not change the value of the amount. You can add as many as you like.

But when a decimal has been rounded, drop any zeros after the place where you have rounded.

Instead of 39.52 ≈ 40.0, do 39.52 ≈ 40

Instead of 960.802 ≈ 961.000, do 960.802 ≈ 961

Exercise 4

Round each of the following to the nearest whole number. Use the "approximate equality" sign ≈.

a. 11.3 ≈ 11
b. 2.679
c. 403.8
d. 7.6
e. 65.91
f. 22.2
g. 3.76
h. 9.2
i. 1.7
j. 0.6
k. 2.63
l. 5.09
m. 19.8
n. 2.1
o. 0.7
p. 74.2
q. 3.61
r. 12.3
s. 34.5
t. 17.82
u. 2.45
v. 1.792
w. 2.01
x. 5.55
y. 10.3
z. 9.9
aa. 8.15

Answers to Exercise 4

a. 11
b. 3
c. 404
d. 8
e. 66
f. 22
g. 4
h. 9
i. 2
j. 1
k. 3
l. 5
m. 20
n. 2
o. 1
p. 74
q. 4
r. 12
s. 35
t. 18
u. 2
v. 2
w. 2
x. 6
y. 10
z. 10
aa. 8

Important Information

If these exercises on rounding are becoming tiresome, please do not despair—there is a purpose. When you do operations (+ − × ÷) with decimals, you will often end up with answers in the ten-thousandths place when you really only need the accuracy of a tenth or a hundredth place decimal. If you do decimal operations on a calculator, you may end up with 6 decimal places (millionths)—not too practical if you are working with money and only want two decimal places! You will know how to round the answer to the decimal place you need for that question or situation.

Rounding Decimals to the Nearest Tenth

- Underline the tenths place digit.
- Look at the digit (to the right) in the hundredths place. You can put an arrow above it to help you find it later.
    - If the hundredths digit is **less than 5**, the tenths digit does not change and the hundredths digit (and all other decimals numbers after the hundredths) are not

written at all.

- If the hundredths digit is **5 or more**, increase the tenths digit by one and write no more decimals in the hundredths spot or after.

Example G

Round to the nearest tenth.

- $13.432 \to 13.\underline{4}32 \approx 13.4$
- $13.476 \to 13.\underline{4}76 \approx 13.5$
- $0.263 \to 0.\underline{2}63 \approx 0.3$
- $234.0399 \to 234.\underline{0}399 \approx 234.0$

Keep the 0 because you have accurately rounded off to that zero. It is called a significant figure.

Exercise 5

Round each of the following to the nearest tenth.

a. $4.23 \approx 4.2$
b. 5.18
c. 8.54
d. 16.09
e. 3.52
f. 4.14
g. 6.24
h. 1.76
i. 1.74
j. 7.19
k. 2.15
l. 1.44
m. 3.172
n. 9.99
o. 5.09
p. 4.111
q. 6.046
r. 0.71
s. 3.63
t. 9.45
u. 12.36
v. 202.305
w. 2.66
x. 9.492
y. 7.388
z. 5.249
aa. 2.45

Answers to Exercise 5

a. 4.2
b. 5.2
c. 8.5
d. 16.1
e. 3.5
f. 4.1
g. 6.2
h. 1.8
i. 1.7

j. 7.2	p. 4.1	v. 202.3
k. 2.2	q. 6.0	w. 2.7
l. 1.4	r. 0.7	x. 9.5
m. 3.2	s. 3.6	y. 7.4
n. 10.0	t. 9.5	z. 5.2
o. 5.1	u. 12.4	aa. 2.5

Rounding Decimals to the Nearest Hundredth

Rounding decimals to the nearest hundredth is similar to rounding to the nearest tenth.

- Underline the hundredths place digit.
- Look at the digit (to the right) in the thousandths place. You can put an arrow above it to help you find it later.
    - If the thousandths digit is **less than 5**, the hundredths digit does not change and the thousandths digit (and all other decimals numbers after the hundredths) are not written at all.
    - If the thousandths digit is **5 or more**, increase the hundredths digit by one and write no more decimals in the thousandths spot or after.

Example H

Round to the nearest hundredth.

$$35.4524 \to 35.4\underline{5}24 \approx 35.45$$

$$35.4567 \to 35.4\underline{5}67 \approx 35.46$$

$$47.9873 \to 47.9\underline{8}73 \approx 47.99$$

$$23.99609 \to 23.9\underline{9}609 \approx 24.00$$

Keep these zeros because you have accurately rounded off to them.
These zeros are significant.

Exercise 6

Round to the nearest hundredth. Keep significant zeros!

a. 128.409 ≈ 128.41
b. 0.909
c. 98.024
d. 3.001
e. 76.3333
f. 0.229
g. 100.999
h. 0.756

Answers to Exercise 6

a. 128.41
b. 0.91
c. 98.02
d. 3.00
e. 76.33
f. 0. 23
g. 101.00
h. 0.76

More Dollars and Cents

A cent is what fraction of a dollar?

Yes, a cent is $\frac{1}{100}$ of a dollar (one hundredth).

You may be asked to round amounts of money to the nearest cent. What you are actually doing is rounding to the nearest hundredth of a dollar.

- $\$3.2\underset{\downarrow}{8}6 \approx \$3.29$
- $\$14.9\underset{\downarrow}{2}3 \approx \$14.92$

one cent = one hundredth of a dollar

Exercise 7

Round to the nearest cent.

a. $42.008 ≈ $42.01
b. $ 0.233 ≈ $0.23
c. $25.255
d. $10.141
e. $0.706
f. $100.999
g. $0.9834
h. $2.8977

Answers to Exercise 7

a. $42.01
b. $0.23
c. $25.26
d. $10.14
e. $0.71
f. $101.00
g. $0.98
h. $2.90

Rounding Decimals to the Nearest Thousandth

Example I

Round to the nearest thousandth (1000th).

2.0486 ⇒ 2.0486 ≈ 2.049

Round to the nearest thousandth (1000th).

29.4324 ⇒ 29.4324 ≈ 29.432

Use rounded numbers to estimate answers in daily situations, in math problem solving, and to get an idea of the answer before you figure something out on a calculator. Numbers that are rounded off make calculations simpler.

Exercise 8

Round the following numbers as called for at the left of the chart.

1. Round to the nearest tenth.
   a. 2.34 ≈ 2.3
   b. 3.75
   c. 1.028
2. Round to the nearest thousandth.
   a. 0.1234
   b. 1.8032
   c. 7.0052
3. Round to the nearest whole number.
   a. 21.1
   b. 2.7
   c. 12.05
4. Round to the nearest hundred.
   a. 275
   b. 490
   c. 1260
5. Round to the nearest hundredth.
   a. 1.732
   b. 2.466
   c. 3.074
6. Round to the nearest ten.
   a. 68
   b. 32
   c. 824
7. Round to the nearest thousandth.
   a. 0.7286
   b. 0.5027
   c. 1.2345

Answers to Exercise 8

1. Round to the nearest tenth.
    a. 2.3
    b. 3.8
    c. 1.0
2. Round to the nearest thousandth.
    a. 0.123
    b. 1.803
    c. 7.005
3. Round to the nearest whole number.
    a. 21
    b. 3
    c. 12
4. Round to the nearest hundred.
    a. 300
    b. 500
    c. 1300
5. Round to the nearest hundredth.
    a. 1.73
    b. 2.47
    c. 3.07
6. Round to the nearest ten.
    a. 70
    b. 30
    c. 820
7. Round to the nearest thousandth.
    a. 0.729
    b. 0.503
    c. 1.235

Exercise 9

Round the numbers to estimate the answer. Circle the estimate that is the best answer.

a. $47 \times 52 \approx 240$, (2 500), 250, 2 600
Estimation: $50 \times 50 = 2\,500$
b. $3.2 \times 4.875 \approx 6, 8, 15, 17$
c. $4\,149 \div 20 \approx 2\,000, 200, 20, 230$
d. $2\,895 + 2\,895 \approx 600, 6\,000, 4\,000, 5\,000$
e. $91 \times 79 \approx 720, 800, 8\,000, 80\,000$
f. $347 \div 50 \approx 7, 70, 700, 8$
g. $4\,892 - 3\,012 \approx 1\,500, 1\,000, 2\,000, 2\,500$
h. Nathan drives to Terrace and back once a week. He averages 286 km per week. Estimate how many kilometres he drives in one year (52 weeks).

Answers to Exercise 9

a. 2 500
b. 15
c. 200
d. 6 000
e. 8 000
f. 7
g. 2 000
h. 15 000 km

Topic D: Self-Test

Mark /10 Aim 8/10

A. Round to the nearest hundred. (2 marks)

a. 749 b. 691

B. Round to the nearest whole number. (2 marks)

a. 0.831 b. 6.24

C. Round to the nearest tenth. (2 marks)

a. 8.29 b. 6.533

D. Round to the nearest hundredth. (2 marks)

a. 34.792 b. 6.459

E. Round to the nearest thousandth. (2 marks)

a. 5.4392 b. 0.8208

F. Estimate the answer. (2 marks)

a. Mary baby-sat for her twin nephews for 6.75 hours on Saturday. She is paid $8.40 an hour. Estimate her earnings by rounding the numbers in the problem to whole numbers. Show how you worked out the estimate.

Answers to Topic D Self-Test

A. Round to the nearest hundred. (2 marks)

a. 700 b. 700

B. Round to the nearest whole number. (2 marks)

a. 1 b. 6

C. Round to the nearest tenth. (2 marks)

a. 8.3 b. 6.5

D. Round to the nearest hundredth. (2 marks)

a. 34.79 b. 6.46

E. Round to the nearest thousandth. (2 marks)

a. 5.439 b. 0.821

F. Estimate the answer. (2 marks)

a. Estimation: 7 hours × $8 ≈ $56

Unit 1 Review

This section is for extra practice and review. If you are unsure about how to do something, look back at the lesson on that skill.

Reading and Writing Decimals

A. Write as decimals:

a. $\frac{4}{10}$

b. $\frac{25}{100}$

c. $\frac{37}{100}$

d. $\frac{3}{100}$

e. $\frac{207}{10000}$

f. $3\frac{787}{1000}$

g. $\frac{11}{100}$

h. $5\frac{12}{10000}$

i. $38\frac{12}{100}$

j. $78\frac{43}{10000}$

B. Write these decimals as common fractions:

a. 0.7

b. 0.06

c. 0.49

d. 3.078

e. 47.397

f. 2.173

C. Write as common fractions and as decimals:

a. three tenths

b. fifty-one hundredths

c. three hundred and sixty-one thousandths

d. fifty one thousandths

e. four hundred thirty-one ten-thousandths

f. seven and seven tenths

g. nine hundred seventy and eighty-nine hundredths

h. nine and four hundred twelve thousandths

i. six hundredths

D. Write the amount of money with numerals, using a $ sign:

a. seven dollars and seventy-eight cents

b. eighty-eight cents

c. five hundred dollars and five cents

d. ninety-nine dollars and ninety cents

e. five thousand three hundred twenty-two dollars eighty-nine cents

E. Complete the chart. The first two are done for you as examples.

#	Decimal	Fraction	In words
a.	0.0005	$\frac{5}{10000}$	five ten-thousandths
b.	0.07	$\frac{7}{100}$	seven hundredths
c.		$\frac{86}{1000}$	
d.		$7\frac{11}{100}$	
e.			fourteen and seventeen thousandths
f.	647.8		
g.		$103\frac{62}{1000}$	
h.	75.13		
i.			forty-two and three tenths
j.	0.789		
k.			ten and five hundred sixty-seven thousandths

Comparing Decimals

F. Cross out the zeros that are not needed:

a. 0.5060

b. 07.0307

c. 900.380

d. 05.200

G. Compare the decimals and then put the correct sign between the decimals (<, >, =):

a. 4.3 _____ 43

b. 78.9 _____ 7.89

c. 3.5 _____ 3.05

d. 042.9003 _____ 042.9

e. 17.34 _____ 13.34

f. 4.01 _____ 5.01

Rounding Decimals

H. Round the following decimals:

a. To the nearest tenth:

i. 3.84

ii. 0.09

iii. 3.97

b. To the nearest hundredth:

i. 2.754

ii. 4.3856

iii. 5.9754

iv. 1.8032

v. 37.439

c. To the nearest thousandth:

i. 0.1376

ii. 2.7499

iii. 0.00057

d. To the nearest whole number:

i. 0.39

ii. 78.78

iii. 4.44

iv. 80.745

v. 901.399

Answers to Review

A. Write as decimals.

a. 0.4

b. 0.25

c. 0.37

d. 0.03

e. 0.0207

f. 3.787

g. 0.11

h. 5.0012

i. 38.12

j. 78.0043

B. Write these decimals as common fractions.

a. $\frac{7}{10}$

b. $\frac{6}{100}$

c. $\frac{49}{100}$

d. $3\frac{78}{1000}$

e. $47\frac{397}{1000}$

f. $2\frac{173}{1000}$

C. Write as common fractions and as decimals.

a. $\frac{3}{10}$, 0.3

b. $\frac{51}{100}$, 0.51

c. $300\frac{61}{1000}$, 300.061

d. $\frac{51}{1000}$, 0.051

e. $\frac{431}{10000}$, 0.0431

f. $7\frac{7}{10}$, 7.7

g. $970\frac{89}{100}$, 970.89

h. $9\frac{412}{1000}$. 9.412

i. $\frac{6}{100}$, 0.06

D. Write the amount of money with numerals, using a $ sign.

a. $7.78

b. $0.88

c. $500.05

d. $99.90

e. $5 322.89

E. Complete the chart.

#	Decimal	Fraction	In words
a.	0.0005	$\frac{5}{10000}$	five ten-thousandths
b.	0.07	$\frac{7}{100}$	seven hundredths
c.	0.086	$\frac{86}{1000}$	eighty-six thousandths
d.	7.11	$7\frac{11}{100}$	seven and eleven hundredths
e.	14.017	$14\frac{17}{1000}$	fourteen and seventeen thousandths
f.	647.8	$647\frac{8}{10}$	six hundred forty-seven and eight tenths
g.	103.062	$103\frac{62}{1000}$	one hundred three and sixty-two thousandths
h.	75.13	$75\frac{13}{100}$	seventy-five and thirteen hundredths
i.	42.3	$42\frac{3}{10}$	forty-two and three tenths
j.	0.789	$\frac{789}{1000}$	seven hundred eighty-nine thousandths
k.	10.567	$10\frac{567}{1000}$	ten and five hundred sixty-seven thousandths

F. Cross out the zeros that are not needed.

a. 0.506
b. 7.0307
c. 900.38
d. 5.2

G. Compare the decimals and then put the correct sign between the decimals (<, >, =).

a. <
b. >
c. >
d. >
e. >
f. <

H. Round the following decimals:

a. To the nearest tenth:
   i. 3.8
   ii. 0.1
   iii. 4.0

b. To the nearest hundredth:
   i. 2.75
   ii. 4.39
   iii. 5.98
   iv. 1.80
   v. 37.44

c. To the nearest thousandth:
   i. 0.138
   ii. 2.750
   iii. 0.001

d. To the nearest whole number:
   i. 0
   ii. 79
   iii. 4
   iv. 81
   v. 901

Test time!

Please see your instructor to get your **Practice Test**.

When you are confident, you can write your **Unit 1 Test or do the Unit 1 Assignment.**

Congratulations!

Unit 2: Adding and Subtracting Decimals

Topic A: Adding Decimals

Line Up the Decimals

Review **place value** in whole numbers and in decimal fractions.

Here is a place value chart for decimals:

Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths	Ten thousandths	Hundred thousandths
		3	.	4	5	3		
		0	.	9	6			

Vocabulary Review

Use the example below and the glossary to help you write the definitions.

$$\underset{\downarrow}{\text{addend}} \quad \underset{\downarrow}{\text{addend}} \quad = \quad \underset{\downarrow}{\text{sum}}$$
$$3 + 5 = 8$$

Definition of Addends:

Definition of Sum:

When adding decimals, you must be very careful to add together the **digits** with the same place value.

- Add thousandths to thousandths.
- Add hundredths to hundredths.
- Add tenths to tenths.

The best way to do this is to **line up your decimals**.

How to Add Decimals

1. Write the **addends** underneath each other so the decimal points are in a straight column. Notice how lining up the decimals also lines up the place values.

$0.43 + 0.2 + 0.804 + 0.1 =$

Rewrite as:

$$\begin{array}{rr} & 0.43 \\ & 0.2 \\ & 0.804 \\ + & 0.1 \\ \hline \end{array}$$

2. Put zeros at the end of the decimal fractions so that all fractions have the same number of decimal places.

$$\begin{array}{rr} & 0.430 \\ & 0.200 \\ & 0.804 \\ + & 0.100 \\ \hline \end{array}$$

3. It may help you to put the decimal point in the answer line before you do the addition.

$$\begin{array}{rr} & 0.430 \\ & 0.200 \\ & 0.804 \\ + & 0.100 \\ & \cdot \end{array}$$

4. When adding **mixed decimals**, be sure to keep the whole number places lined up as well. As you know, ones add to ones, tens to tens, hundreds to hundreds and so on. Put a decimal point after any whole numbers.

$62.1 + 14.58 + 6. + 7.311 + 6.23 =$

$$\begin{array}{rr} & 62.100 \\ & 14.580 \\ & 6.000 \\ & 7.311 \\ + & 6.230 \\ \hline \end{array}$$

5. Add each column, starting with the decimal place farthest to the right. If the total of a column is ten or more, carry the ten number to the next column as you are used to doing with whole numbers.

$$\begin{array}{rr} & {\scriptstyle 1\ 1} \\ & 0.470 \\ & 0.298 \\ & 0.100 \\ + & 5.600 \\ & 6.468 \end{array}$$

Exercise 1

Rewrite each question in columns and add.

a. 0.24 + 0.73 + 0.51 =

$$\begin{array}{r} {\scriptstyle 1} \\ 0.24 \\ 0.73 \\ +\ 0.51 \\ \hline 1.48 \end{array}$$

b. 0.821 + 0.14 + 0.019 =

$$\begin{array}{r} {\scriptstyle 1} \\ 0.821 \\ 0.140 \\ +\ 0.019 \\ \hline 0.980 \end{array}$$

c. 0.084 + 0.291 + 0.652 =

d. 0.195 + 0.982 + 0.605 =

e. 0.625 + 0.845 + 0.33 =

f. 0.442 + 0.782 + 0.254 =

Answers to Exercise 1

a. 1.48

b. 0.980

c. 1.027

d. 1.782

e. 1.8

f. 1.478

Exercise 2

Rewrite in columns and add.

a. 1.003 + 141.2 + 0.47 =

$$\begin{array}{r} 1.003 \\ 141.200 \\ + \quad 0.470 \\ \hline 142.673 \end{array}$$

b. 5.6 + 3.59 + 1 829 =

$$\begin{array}{r} 5.60 \\ 3.59 \\ + \quad 1829.00 \\ \hline 1838.19 \end{array}$$

c. 4.6 + 2.59 + 1 629 =

d. 0.391 + 80 + 4.63 =

e. 16.34 + 211.684 + 75.0697 =

f. 321.6 + 485.791 + 0.001 =

g. 0.22 + 46.84 + 95.6 =

h. 0.042 + 0.018 + 19.1 =

Answers to Exercise 2

a. 142.673

b. 1838.19

c. 1636.19

d. 85.021

e. 303.0937

f. 807.392

g. 142.66

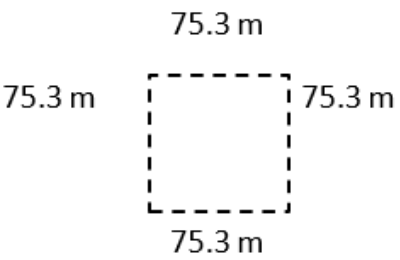
h. 19.16

Remember that **perimeter** is the measurement around the outside edge of an object. To find perimeter, you add the lengths of all the sides together.

Exercise 3

Find the perimeter of the squares described in each question. The measure of one side has been given. Draw a picture of each square to help visualize the question.

a. S = 75.3 m
P = S + S + S + S
P = 75.3 + 75.3 + 75.3 + 75.3 m
P = 301.2 m



b. S = 12.4 mm

P =

c. S = 100.73 km
P =

d. S = 50.2 cm

e. S = 16.5 m

f. S = 3.25 m

Answers to Exercise 3

a. 301.2 m

b. 49.6 mm

c. 402.92 km

d. 200.8 cm

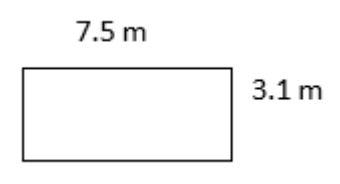
e. 66 m

f. 13 m

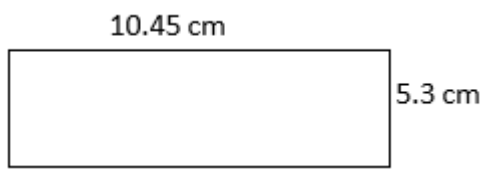
Exercise 4

Find the perimeter of the rectangles described below. Draw your own rectangle if there is no picture.

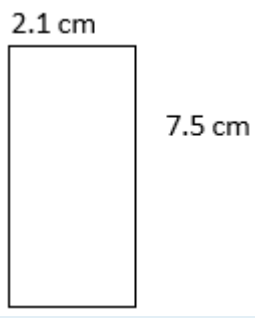
a. P = side + side + side + side
P =



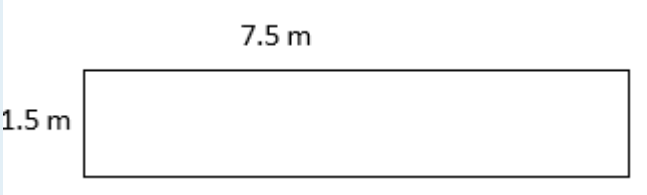
b. P = side + side + side + side
P =



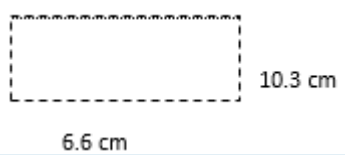
c.



d.



e. l = 10.3 cm
w = 6.6 cm



f. l = 100.03 km
w = 70.96 km

g. l = 9.75 cm
w = 3.5 cm

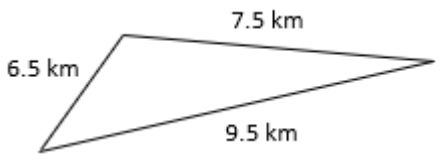
Answers to Exercise 4

a. 21.2 m
b. 31.5 cm
c. 19.2 cm
d. 18 m
e. 33.8 cm
f. 341.98 km
g. 26.5 cm

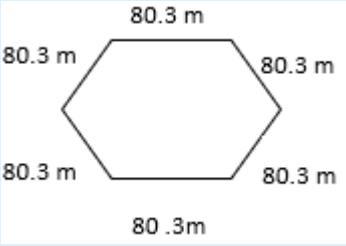
Exercise 5

Find the perimeter of the polygons described below. Be sure the measurements are in the same unit value. Use a formula for each calculation, the formula work is started in the first two for you.

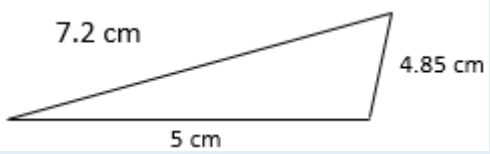
a. P = Side + Side + Side
P = 6.5 km + 7.5 km + 9.5 km
P =



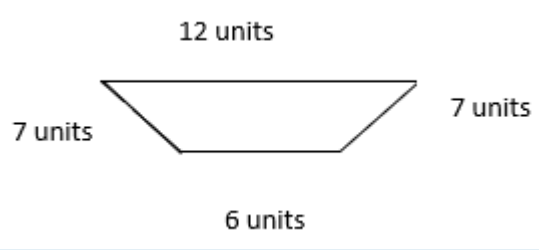
b. P = Side + Side + Side + Side + Side + Side
P = ___ + ___ + ___ + ___ + ___ + ___
P =
P =



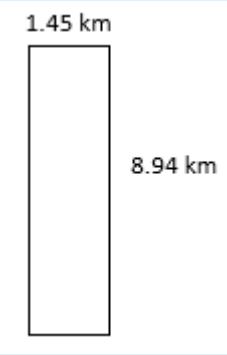
c. P =



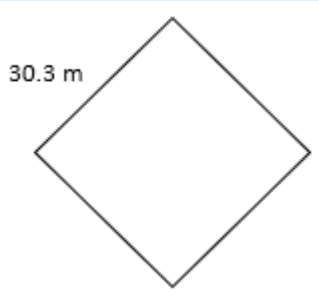
d. P =



e. P =



f. P =



Answers to Exercise 5

a. 23.5 km
b. 481.8 m
c. 17.05 cm
d. 32 units
e. 20.78 km
f. 121.2 m

How to Solve Word Problems

In math, word problems describe real-life situations that involve numbers.

Often the most difficult part of a word problem is knowing what we should do. Once we know what to do, it is much easier to figure out how to do it.

It is sort of like driving. You may be all ready to go, but before you get into the car, turn on the engine, or put your foot on the gas pedal, you need to know **where** you are going and figure out how to get there.

The first thing to do is decide on your destination.

Okay, how do you "decide on a destination" for a math problem?

Use these steps:

Steps to Solving a word problem

Step 1: Question	• Read the problem carefully. • What is the question being asked? • Does the problem have two parts? • Draw a picture to help you see the problem described.
Step 2: Information	• What information is necessary to solve the problem? • Often you are given extra numbers and information that are not needed. • Keep the question (destination) in mind. • Circle the information you need. • Write that information on the picture you drew.

Step 3: Operation	• Decide what arithmetic operation to use.
	• Do you need to add, subtract, multiply, or divide?
	• If the problem has two parts, decide what operation you need to do for each part.
	  ◦ Key words often point to the operation needed.
	  ◦ Drawing a diagram or sketch is always helpful.
	  ◦ Write an equation (a number sentence).

Step 4: Estimate	• **Estimate** the answer to the problem. ◦ Round the numbers so you can work with them quickly. Use the operation you chose in Step 3 and come to a quick answer. • Does this estimated answer make sense? • Does it answer the question of the problem? • Think carefully before you do Step 5.

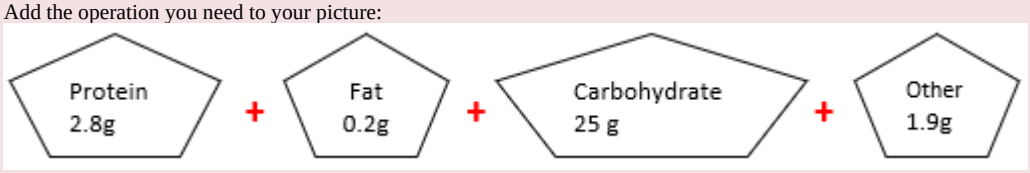
Step 5: Solve	• Solve the problem using the actual numbers.
	  ◦ Check your arithmetic.
	  ◦ Compare your answer in Step 5 to your estimate from Step 4.
	  ◦ Think again about the question. Does your solution make sense?
	  ◦ When you write your answer, include the units.
	  ◦ For example: 3 dozen eggs, 7.5 kilometres, 68 people

Some common metric units and their abbreviations

Unit	Abbreviations
kilometre	km
metre	m
centimetre	cm
kilogram	kg
gram	g
litre	L

Example A

The nutrition information on a box of cereal says that a regular serving contains 2.8 g of protein, 0.2 g of fat, 25 g of carbohydrate, and 1.9 g of “other nutrients.” Give the total number of grams in a regular serving.

Step 1: Question	How many grams in a regular serving? Draw a picture: 
Step 2: Information	What information is necessary to solve the problem? • A regular serving contains 2.8 g protein, 0.2 g fat, 25 carbohydrate, and 1.9 g "other nutrients." • Add the information to your Picture.
Step 3: Operation	• The problem lists four different amounts and asks you to find one total. "Total" is a key word that points to addition. • Add the operation you need to your picture:  • Next, write an equation: 2.8 + 0.2 + 25 + 1.9 = total number of grams
Step 4: Estimate	• Round off each amount and add them together to get an estimated answer. ◦ 2.8 g ≈ 3 g, 0.2 g ≈ 0 g, 25 g ≈ 25 g, 1.9 g ≈ 2g ◦ 3 g + 0 g + 25 g + 2 g = 30 g • Does this answer make sense? ◦ A slice of bread is about 35 grams. A serving of cereal would probably weigh a similar amount. Yes, this makes sense.
Step 5: Solve	2.8 g + 0.2 g + 25.0g + 1.9 g = 29.9 g **Answer**: A regular serving of cereal is 29.9 grams ← (include the units) • Check arithmetic • Compare answer to estimate (estimate = 30 answer =29.9) • Does the answer make sense? • Did I include the units in my answer?

Some key words that point to addition include:

- **sum**
- plus
- **total**
- total amount
- altogether
- combined
- complete
- entire
- in all
- added to
- increased by

Word Problems Using Addition of Decimals

Exercise 6

Use your skills in adding decimal fractions to do the following problems. Underline key words in the problems that will help you to recognize addition problems. Remember to draw a picture first!

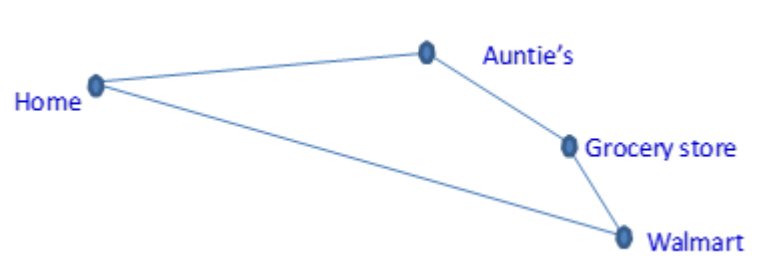
a. A road construction crew finished surfacing 5.7 km of highway one week and 4.4 km the next week. How many kilometres did they complete in that two weeks?

- 5.7 km + 4.4 km
- **Estimation**: 6 km + 4 km = 10 km
- **Actual solution**:

$$\begin{array}{r} 5.7 \text{ km} \\ +\quad 4.4 \text{ km} \\ \hline 10.1 \text{ km} \end{array}$$

- **Answer**: The road crew completed 10.1 km of road surfacing in two weeks.

b. Lisa rode her bike 4 km to her auntie's house for a little visit. Then she rode 1.5 km to the grocery store to get apples and 0.7 km to Walmart to get bread and chips. From Walmart, she rode 3.6 km home. How far did she go on her bike altogether? (the picture has been drawn here but you will need to fill in the information)



- Estimation:
- Actual solution:
- Answer:

c. When Crystalle bought her used car, the odometer showed 12 686.4 km. In one year, she drove 13 294.8 km. What did the odometer read then? (draw your own picture)

- Estimation:
- Actual solution:
- Answer:

d. A recipe for spaghetti sauce uses 1.25 kg of ground beef, 2.4 kg of fresh tomatoes, 1 kg of onions, 0.75 kg of celery, 0.5 kg of green pepper and lots of garlic and herbs. What is the total weight of the ingredients, not counting the garlic and herbs?

- Estimation:
- Actual solution:
- Answer:

e. This month your power bill has increased $24.67, your phone bill has an extra $13.43, and your cable bill is up $2.24. It has been an expensive month! What is the combined extra cost that you are paying this month?

- Estimation:
- Actual solution:
- Answer:

f. Wanda texted her boyfriend Curtis and asked him to pick up some groceries on the way home. He answered back “Only have $20. Is that enough?” Wanda wanted him to buy milk ($4.86), mac and cheese ($1.99), a bag of apples ($3.99) and laundry detergent ($8.57). Does Curtis have enough money?

- Estimation:
- Actual solution:
- Answer:

Answers to Exercise 6

a. Estimation: 6 + 4 = 10
Actual solution: 5.7 + 4.4 = 10.1
Answer: The road crew completed 10.1 km of road surfacing in two weeks.

b. Estimation: 4 + 2 + 1 + 4 = 11
Actual solution: 4 + 1.5 + 0.7 + 3.6 = 9.8
Answer: Lisa rode her bike 9.8 km altogether.

c. Estimation: 13 000 km + 13 000 km = 26 000 km
Actual solution: 12 686.4 km + 13 294.8 km = 25 981.2 km
Answer: The odometer read 25 981.2 km after one year.

d. Estimation: 1 kg + 2 kg + 1 kg + 1 kg + 1 kg = 6 kg
Actual solution: 1.25 kg + 2.4 kg + 1 kg + 0.75 kg + 0.5 kg = 5.9 kg
Answer: The total weight of the ingredients is 5.9 kg.

e. Estimation: $25 + $13 + $2 = $40
Actual solution: $24.67 + $13.43 + $2.24 = $40.34
Answer: The extra cost you are paying is $40.34.

f. Estimation: $5 + $2 + $4 + 9 = $20
Actual solution: $4.86 + $1.99 + $3.99 + $8.57 = $19.41
Answer: The groceries will cost $19.41, so yes, Curtis has enough money.

Topic A: Self-Test

Mark /6 Aim 5/6

A. Find the sum. (4 marks)

a.
$$\begin{array}{r} 3.67 \\ 12.55 \\ 8.19 \\ +\ \ 5.67 \end{array}$$

c.
$$\begin{array}{r} 4.648 \\ 1.92 \\ 1.275 \\ +\ \ 86.9 \end{array}$$

b. $5.27 + 2.4 + 8 + 6.93 + 10.27 =$

d. $2.72 + 0.6 + 110 + 17.223 =$

B. Word Problem. (2 marks)
Gwen mailed Christmas presents to her family. She sent a 3.7 kg box to her daughter in Vancouver, a 2.145 kg package to her sister’s family in Campbell River, a box to Prince

George that was 1.06 kg, and a parcel to Kitwanga that was 4 kg. What was the combined weight of Gwen's parcels?

a. Estimate:

b. Actual Solution:

c. Answer:

Answers to Topic A Self-Test

A. Find the sum.

a. 30.08

b. 32.87

c. 94.743

d. 130.543

B. Word problem.

a. Estimation: 4 kg + 2 kg +1 kg + 4 kg = 11 kg

b. Actual Solution: 3.7 kg + 2.145 kg + 1.06 kg + 4 kg = 10.905 kg

c. Answer: The combined weight of the parcels was 10.905 kg.

Topic B: Subtracting Decimals

Line Up the Decimals

To subtract decimals you must subtract each **digit** from the digit of the same **place value**.

- Subtract thousandths from thousandths.
- Subtract hundredths from hundredths.
- Subtract tenths from tenths.

The best way to do this is to **line up your decimals.**

How to Subtract Decimals

The same techniques that you used in adding decimals are helpful when you subtract decimals.

1. Rewrite the problem. Write the first number. Put the amount you are subtracting underneath so the decimal points are in a straight column.

$$\begin{array}{rcl} 0.468 & - & 0.3 = \\ \uparrow & & \uparrow \\ \text{starting number} & & \text{subtracting this much} \end{array}$$

$$\begin{array}{rl} & 0.468 \\ - & 0.3 \\ \hline \end{array}$$

2. Put zeros at the end of the decimals so that all the decimals in the question have the **same number of decimal places**.

$$\begin{array}{rl} 0.468 - 0.3 = & 0.468 \\ - & 0.3\mathbf{00} \\ \hline \end{array}$$

3. Subtract the numbers, keeping the decimal point in the answer directly beneath the other decimal points.

$$\begin{array}{rl} & 0.468 \\ - & 0.300 \\ \hline & \cdot \end{array}$$

Example A

$2.536 - 0.59 =$

1. Rewrite the problem, lining up the decimals:

$$\begin{array}{rr} & 2.536 \\ - & 0.59 \\ \hline \end{array}$$

2. Add zeros so that there are the same number of decimal places for each.

$$\begin{array}{rr} & 2.536 \\ - & 0.59\mathbf{0} \\ \hline \end{array}$$

3. Subtract the numbers. You will need to borrow.

$$\begin{array}{rr} & {\scriptstyle 1\,4\,1} \\ & 2.536 \\ - & 0.590 \\ & 1.946 \end{array}$$

Vocabulary Review.

Write the definition.

$8 - 5 = 3$ ← Difference

Difference:

Exercise 1

Subtract to find the differences.

a. $\begin{array}{rr} & 2.75 \\ - & 0.68 \\ & 2.07 \end{array}$

b. $\begin{array}{rr} & 9.64 \\ - & 7.15 \\ & 2.49 \end{array}$

c. $\begin{array}{rr} & 3.85 \\ - & 1.75 \end{array}$

d. $\begin{array}{rr} & 1.17 \\ - & 0.92 \end{array}$

e. $\begin{array}{rr} & 27.3 \\ - & 18.9 \end{array}$

f. $\begin{array}{rr} & 0.732 \\ - & 0.651 \end{array}$

g. $\begin{array}{r} 0.362 \\ -\ 0.177 \\ \hline \end{array}$

i. $\begin{array}{r} 18.5 \\ -\ 7.9 \\ \hline \end{array}$

k. $\begin{array}{r} 5.276 \\ -\ 3.298 \\ \hline \end{array}$

h. $\begin{array}{r} 6.85 \\ -\ 1.28 \\ \hline \end{array}$

j. $\begin{array}{r} 98.6 \\ -\ 45.8 \\ \hline \end{array}$

l. $\begin{array}{r} 5.251 \\ -\ 2.738 \\ \hline \end{array}$

Answers to Exercise 1

a. 2.07
b. 2.49
c. 2.10
d. 0.25
e. 8.4
f. 0.081
g. 0.185
h. 5.57
i. 10.6
j. 52.8
k. 1.978
l. 2.513

Subtracting a Decimal from a Whole Number

Follow these steps to subtract a decimal from a whole number:

1. Put a decimal point after the whole number.
   16. − 0.4 =
2. Rewrite the problem. Write the first number. Put the amount you are subtracting underneath so the decimal points are in a straight column.
   $\begin{array}{r} 16. \\ -\ 0.4 \\ \hline \end{array}$
3. Put zeros after the decimal point as needed.
   $\begin{array}{r} 16.\mathbf{0} \\ -\ 0.4 \\ \hline \end{array}$
4. Do the subtraction as usual. See that you will need to borrow right away.

Example B

$32 - 0.12 =$

$\begin{array}{r} 32.00 \\ -\ 0.12 \\ \hline \end{array}$

- Rename the 2 in the ones place as 1 and 10 tenths.

$$\begin{array}{r} {\scriptstyle 1\,10} \\ 32.00 \\ -\quad 0.12 \\ \hline \end{array}$$

- Now rename the 10 tenths as 9 tenths and 10 hundredths. You are ready to subtract.

$$\begin{array}{r} {\scriptstyle 9} \\ {\scriptstyle 1\,\cancel{10}\,10} \\ 3\,\cancel{2.00} \\ -\quad 0.12 \\ 31.88 \end{array}$$

Example C

$\$14 - \$3.49$

$$\begin{array}{r} \$14.00 \\ -\quad \$3.49 \\ \hline \end{array}$$

$$\begin{array}{r} {\scriptstyle 9} \\ {\scriptstyle 3\,\cancel{10}\,10} \\ \$14.\cancel{00} \\ -\quad \$3.49 \\ \$10.51 \end{array}$$

Exercise 2

Rewrite each question in columns and find the difference.

a. $6 - 3.42 =$

$$\begin{array}{r} {\scriptstyle 5\,\cancel{10}\,10} \\ 6.\cancel{00} \\ -\quad 3.42 \\ 2.58 \end{array}$$

b. $14 - 9.23 =$

$$\begin{array}{r} 14.00 \\ -\quad 9.23 \\ \hline \end{array}$$

c. $11 - 3.821 =$

d. $2 - 1.98 =$

e. $7 - 3.976 =$

Answers to Exercise 2

a. 2.58
b. 4.77
c. 7.179
d. 0.02
e. 3.024

If you had problems with this, go over your subtraction method with your instructor before you continue.

Exercise 3

Rewrite each question in columns and find the difference.

a. 163.682 − 41.5 =

$$\begin{array}{r} 163.682 \\ -\quad 41.500 \\ \hline 122.182 \end{array}$$

b. $60 − $44.28 =

c. $260.06 − $3 =

d. 89.0309 − 6.3 =

e. $100 − $13.75 =

Answers to Exercise 3

a. 122.182
b. $15.72
c. $257.06
d. 82.7309
e. $86.25

Word Problems Using Subtraction of Decimals

Some key words that point to subtraction include:

- **difference**
- **balance**
- minus
- amount left
- subtracted from
- decreased by
- reduced by
- taken away
- less
- compare

A math question may ask you to compare or find the difference between two amounts. Look for such words as “how much more” (or larger, taller, greater) or “how much less” (or smaller, shorter). What are the savings?

Subtract to find the answer.

Exercise 4

Use your skills in subtracting decimal fractions to do the following problems. Underline key words in the problems that will help you to recognize subtraction problems. Remember to draw a picture first!

a. Brad is 1.8 m tall. He just did the best high jump of his life, clearing 1.89 m. How much less is his own height than the height he jumped? (add the information to the drawing)

- Estimation:
- Actual Solution:

b. Susan's best track and field event is long jump. She leapt 6.16 m. Her mom used to long jump in high school and jumped 5.52 m. How much farther did Susan jump than her mom?

- Estimation (to tenths):
- Actual Solution:

c. Joe had a bank balance of $438. He wrote a cheque for $111.59 to pay for a phone bill. What is the balance in his bank account now?

- Estimation:
- Actual Solution:

d. A plumber needs to replace 11.5 m of pipe in a home. She has 6.5 m in her truck. How much more pipe does she need?

- Estimation:
- Actual Solution:

e. Lee is going to install base boards in the bachelor suite he has built in his basement. The room is 5.8 metres square. The baseboard material is expensive, so he will be sure to deduct 1 m for each of the two doorways. How much baseboard material does he need to buy? (this question involves addition and subtraction)

- Estimation (to tenths):
- Actual Solution:

Answers to Exercise 4

a. Estimation: 1.9 m − 1.8 ≈ 0.1 m
Actual Solution: 1.89 − 1.8 = 0.09 m
Answer: Brad's height is 0.09 m less than the height he jumped.

b. Estimation: 6.2 − 5.5 ≈ 0.7 m
Actual Solution: 6.16 − 5.52 = 0.64 m
Answer: Susan jumped 0.64 m farther than her mom.

c. Estimation: $440 − $100 ≈ $340
Actual Solution: $438 − $111.59 = $326.41
Answer: Joe's bank balance is now $326.41.

d. Estimation: 12 m − 7 m ≈ 5 m
Actual Solution: 11.5 m – 6.5 m = 5 m

Answer: The plumber needs 5 m more of pipe.

e. Estimation: 6 m × 4 = 24 m, 24 m − 2 m (doors) ≈ 22 m
Actual Solution: 5.8 m × 4 = 23.2 m, 23.2 m − 2 m (doors) = 21.2 m
Answer: Lee will need to buy 21.2 m worth of base board material.

Design Your Own House Part 1: Drawing and Measuring

1. On a sheet of graph paper, use a ruler to draw a one-story house (bird's-eye-view). Use the scale of 1 cm^2 = 1m^2.
2. You may make your house any shape you choose (square, rectangle, L-shaped, etc.) but one wall must measure 15.5 metres (it will be 15.5 cm on your graph paper).
3. Clearly label the length of each wall and show your calculations! Be precise and careful with your sketching. Feel free to add colour or get creative.
4. Be sure to organize and label all your work!
    a. What is the perimeter of the entire house? (perimeter = side + side + side + side)
5. Give your house two bedrooms. Clearly label the length of each wall.
6. Include a bathroom, a living room, and a kitchen. Label the length of each wall.
    b. What is the perimeter of each room?
        - Bedroom 1:
        - Bedroom 2:
        - Bathroom:
        - Kitchen:
        - Living room:
7. On your sketch, give your house two exterior doors and four exterior windows, each 1m wide. Because it is two-dimensional bird's eye view, you can't see the height of your doors and windows, but imagine that each door would be 2.3 m tall and each window would be 1.1 m tall. Sketch one window and one door here, and label the measurements.
    c. Each window needs external trim and internal trim. How much trim would you need to buy to have enough to go around all of the windows?
    d. Each door would also need external and internal trim. How much trim would you need to go around both doors? Keep in mind that the bottom of the door will not need trim.

When you have finished this project, put your graph paper somewhere safe, because you will be using it again at the end of Unit 3.

Marking Checklist of House Project Part 1

/50 marks

Sketch: /14

Mark	Criteria
/2	A ruler was used for drawing lines.
/2	The house has five rooms.
/5	All wall lengths (internal and external) are marked clearly on the sketch.
/2	Locations for doors and windows have been marked on the sketch.
/2	One door and one window have been drawn with measurements marked.
/2	The house has a yard and measurements have been clearly marked on the sketch.

Calculations: / 36

Mark	Criteria
/2	The perimeter of the house has been calculated correctly.
/10	The perimeter of each room has been calculated correctly.
/2	Bedroom 1
/2	Bedroom 2
/2	Bathroom
/2	Kitchen
/2	Living room
/2	Window and door locations have been marked on the graph paper sketch.
/2	One window and one door has been sketched and measurements labelled.
/5	The amount of trim for the windows has been calculated correctly.
/5	The amount of trim for the doors has been calculated correctly.

Topic B: Self-Test

Mark /6 Aim 5/6

A. Subtract. (4 marks)

a. $\begin{array}{r} 72.04 \\ -\ 13.98 \end{array}$

b. $19.6 - 6.254 =$

c. $\begin{array}{r} 11.21 \\ -\ 3.875 \end{array}$

d. $\$140 - \$102.73 =$

B. Problems (2 marks)

a. Gail spent $273.24 on her groceries. She had $300 with her. How much of her money is left?

- Estimation:
- Actual Solution:

Answers to Topic B Self-Test

A. Subtract.

a. 58.06

b. 13.346

c. 7.335

d. $37.27

B. Problems.

a. Estimation: $300 − $275 ≈ $25

b. Actual Solution: $300 − $273.24 = $26.76. Gail had $26.76 left after buying groceries.

Topic C: Bookkeeping

One everyday use of adding and subtracting decimals is the bookkeeping that we all must do with our money.

Here are some examples:

- Keeping track of online payments
- Figuring out how much money to take on a trip
- Stretching a pay cheque over two weeks
- Organizing the household budget
- Deciding how much you can spend on eating out

What are some other examples of bookkeeping that you do?

The bookkeeping that most of us do is straightforward:

- Add money received or deposited to our accounts.
- Subtract money spent or paid out.

The result of the addition or subtraction is the **balance**.

Methods of Payment

There are many different methods of paying for purchases. Some of the most common methods are:

- Cash
- Debit card
- Credit card
- Cheque
- Online payment (i.e., PayPal, e-transfer)

There are benefits to each method of payment. Each person chooses to do what works best for them depending on the situation. Here is a list of some of the benefits and drawbacks of each method of payment.

Cash

Advantages:

- It is quick and easy to pull money out of your wallet.
- You can see how much money you have left.
- It is impossible to overspend.
- It is a great method to use if you do not have a bank account.

Disadvantages:

- It is easier to loose.
- You may need to continue to visit the bank to get money out.
- You might run out of cash while trying to pay at the till.

Debit Card

Advantages:

- It is quick at the till.
- You cannot spend more than you have in your bank account.
- It is safe.

Disadvantages:

- There is often a service fee when using the card to pay for shopping.
- You cannot always use it for online shopping.

Credit Card

Advantages:

- You only have to pay the company money once a month.
- It is quick at the till.
- It is easy to keep track of what you have spent because the credit card company sends you a monthly statement.
- You can use a credit card for online shopping.

Disadvantages:

- It is really easy to overspend your budget because you do not have to pay any money up front.

- There are often service charges once a year that are expensive.
- You can get into debt with a credit card and it may be really hard to get out of that debt.

Cheque

Advantages:

- It can be convenient when you want to mail someone money.
- It is safe.
- The cheque book helps you keep a written record of your bank balance.

Disadvantages:

- Some stores do not accept cheques or require several pieces of identification, usually a driver's licence and a credit card.
- Most banks and credit unions have a small service charge for each cheque that you write.
- If your account is **overdrawn**, your cheque will be N.S.F. (Not Sufficient Funds) for which you are charged extra by the store and the bank. To avoid this, keep careful, up-to-date records so you always know your balance.

Online Payment

Advantages:

- It allows you to shop online securely.
- You can pay directly online with money from your bank account or your credit card.
- You can easily send money to friends or family.

Disadvantages:

- You may not have rights that regular banks give you when you use an online payment company.
- The company is not local, and so any problems may be hard to resolve.
- There are fees charged to have an online payment account.

No matter what method of payment you choose to use, it is very helpful to keep track of your money. You can use a record book to mark in when you spent money and when you were paid money. This will help with budgeting and planning.

Online Banking

Many people use online banking to keep track of their finances. When online banking, you will see a record of your **transactions** that looks something like this:

Date	Transactions	Debit	Credit	Running Balance
2023-01-29	Electronic Funds Transfer PAYCHEQUE	175.00		1439.66
2023-02-23	Internet Banking INTERNET BILL PAY TELUS COMMUNICATIONS		65.49	1374.17
2023-03-10	Electronic Funds Transfer DEPOSIT CANADA	125.00		1499.17
2023-03-16	Internet Banking E-TRANSFER Larissa	100.00		1599.17

The transactions are usually recorded in chronological order, by the date and time.

Here is a description of each column:

- **Date** – The date of the transaction. The examples given use this method: 2023-01-29. January 29 is the 29th day of the 1st month.
- **Debit** – This is money that is deposited into the account, either through a cash deposit, a paycheque, or a transfer in.
- **Credit** – This is money that has gone out of the account, either through a withdrawal, a bill payment, or a transfer out.
- **Running Balance** – The amount in the bank account after each transaction.

Exercise 1

Look carefully at this sample online banking transaction record, and answer the questions that follow.

Date	Transactions	Debit	Credit	Running Balance
	Balance Forward			121.16
2022-03-29	Electronic Funds Transfer PAYCHEQUE	675.62		798.78
2022-03-30	Internet Banking INTERNET BILL PAY MCCARTHY GM		175.40	621.38
2022-03-30	Internet Banking INTERNET BILL PAY BC HYDRO		50.27	571.11
2022-04-05	CASH DEPOSIT	25.00		596.11
2022-04-08	Internet Banking INTERNET BILL PAY CITYWEST		19.80	576.31
2022-04-09	INTERAC PAYMENT MAVERICK FOODS		128.54	447.77
2022-04-09	CASH WITHDRAWAL		30.00	417.77

a. How much money was in the account at the beginning of this transaction record (balance forward)?
b. Name the month when the Citywest online bill payment happened.
c. What is the amount of the Interac payment to Maverick Foods?
d. How much was the pay deposit?
e. What was the balance after the BC Hydro transaction?
f. How many deposits were made to the account?
g. What is the total amount of the deposits?

Answers to Exercise 1

a. $121.16
b. April
c. $128.54
d. $675.62
e. $571.11
f. 2
g. $700.62

Exercise 2

Complete the transaction record using the information below.

Continue to fill out the "Running Balance" column as you add each credit or debit.

Transaction Record

Date	Transactions	Debit	Credit	Running Balance
	Balance Forward			

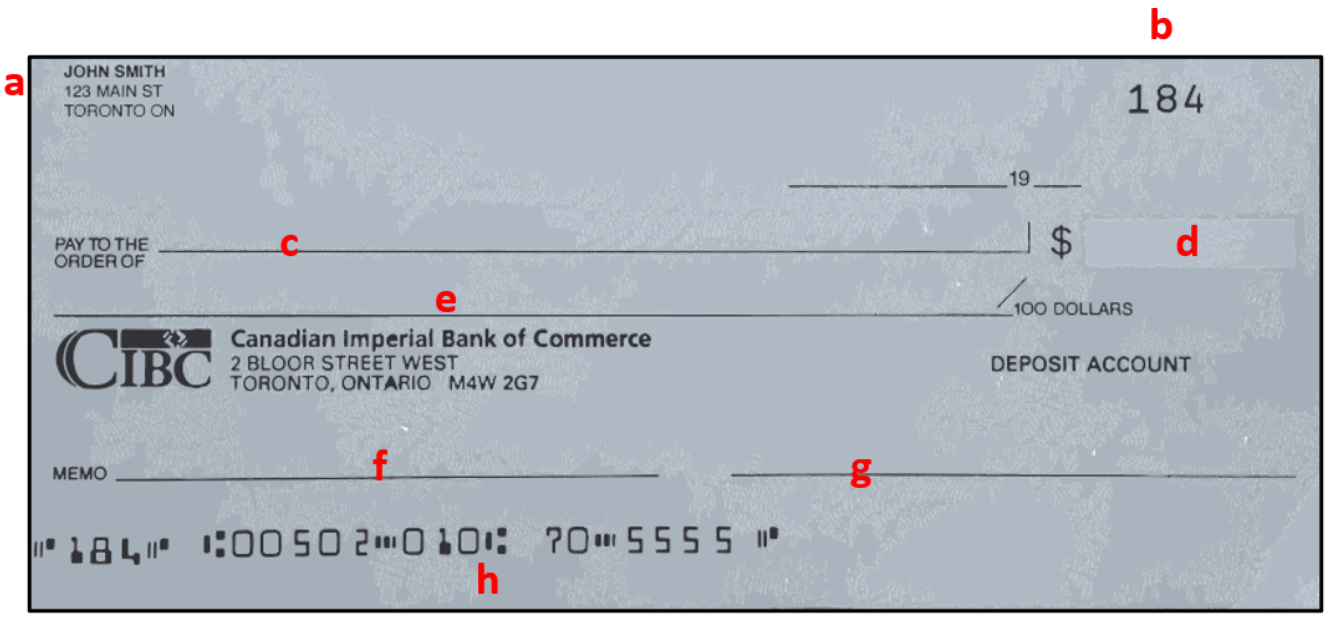
Transaction Details

Date	Details	Transaction
April 23, 2022	Balance forward	$210.83
April 25, 2022	Cash withdrawal	$45.00
April 28, 2022	Payment to Maverick Mart	$99.95
April 30, 2022	Pay deposit	$843.29
May 1, 2022	Online payment Mark Jones for rent	$420.00
May 3, 2022	E-transfer to Kathy Smythe (for Facebook raffle)	$25.00
May 6, 2022	Interac payment to Chevron gas	$18.27
May 8, 2022	Cash withdrawal	$110.00
May 10, 2022	Online bill payment for Mastercard	$150.00
May 12, 2022	Deposit Child Care Tax Credit	$66.48
May 13, 2022	Interac payment Maverick Mart	$183.00
May 15, 2022	Pay deposit	$792.18

Answers to Exercise 2

Date	Transactions	Debit	Credit	Running Balance
2022-04-23	**Balance Forward**			210.83
2022-04-25	Cash withdrawal		45.00	165.83
2022-04-28	INTERAC PAYMENT MAVERICK FOODS		99.95	65.88
2022-04-30	Electronic Funds Transfer PAYCHEQUE	843.29		909.17
2022-05-01	Internet Banking INTERNET BILL PAY MARK JONES		420.00	489.17
2022-05-03	Internet Banking E-TRANSFER KATHY SMYTHE		25.00	464.17
2022-05-06	INTERAC PAYMENT CHEVRON GAS		18.27	445.90
2022-05-08	Cash withdrawal		110.00	335.90
2022-05-10	Internet Banking INTERNET BILL PAY MASTERCARD		150.00	185.90
2022-05-12	DEPOSIT CANADA CHILD TAX CREDIT	66.48		252.38
2022-05-13	INTERAC PAYMENT MAVERICK MART		183.00	69.38
2022-05-15	Electronic Funds Transfer PAYCHEQUE	792.18		861.56

Cheque Writing



a. When you have a chequing account, you sometimes have cheques printed with your name, address and phone number, usually in the top left corner.

b. The cheques are numbered in sequence (in order) to help you keep track of your cheques.

c. This line is for the name of the person or institution that will be receiving the money.

d. This line is for the amount of the cheque in numbers: $22.98.

e. This spot is for you to write, in words, the dollars to be paid. Write the cents as a fraction over 100. If you do not use the whole line, fill unused parts of the space with a straight line so that nothing can be added. $22.98 becomes twenty-two and 98⁄100 dollars.

f. The Memo spot is a place for details. It is useful if you want to use the cheque as a receipt, too. You might list the invoice number for the bill you are paying, for example.

g. When you open a bank account, the bank will ask you for a sample signature for their files. Sign exactly as you plan to sign your cheques.

h. Your bank account number and codes used at the bank will be printed on your cheques.

Any cheques you do not want cashed should have **VOID** or **SAMPLE ONLY** written on them.

As soon as you write a cheque, be sure to enter the details in your cheque book.

A cheque book is a simple accounts book or ledger. A ledger is a convenient way to record expenditures (money spent) and income.

Exercise 3

Use the information below to complete the chequing account ledger. Arrange the information in chronological order. That means put the information with the earliest date first, then the next date, and so on.

In this exercise, the balance forward on March 1, 2022, is $312.07.

Withdrawals

Date	Cheque #	Details	Credit
2022-05-01	#122	Mortgage payment	$375.00
2022-05-06	#123	Cable	$32.17
2022-04-23		E-transfer Mike the Mechanic	$45.82
2022-04-18	#121	BC Hydro (Feb & Mar)	$62.53
2022-03-02		Cash withdrawal	$75:00
2022-03-02		Debit card charge	$1.50
2022-05-04		Grocery Mart	$111.95

Deposits

Date	Details	Debit
2022-04-30	Pay	$596.27
2022-04-15	Birthday money	$200.00
2022-04-20	Child Care Tax Refund	$33.64

Transaction Record

DATE	CHEQUE #	TRANSACTION	DEBIT AMOUNT	CREDIT AMOUNT	BALANCE
		BALANCE FORWARD			

Use the blank cheque to write out cheque #121 from part A. Use any name and address you want. Ask your instructor to check your work.

Your name _____
Your address _____
Your phone number _____ _____ 20_____ No. _____

PAY TO
THE ORDER OF _____ $ _____

_____ _____DOLLARS
100

ABE Bank
123 Any Street Account # 456-789-0 ***SAMPLE ONLY***
Our Town, BC

MEMO _____ _____

Answers to Exercise 3

Transaction Record

DATE	CHEQUE #	TRANSACTION	DEBIT AMOUNT	CREDIT AMOUNT	BALANCE
2022-03-01		**BALANCE FORWARD**			312.07
2022-03-02		Cash withdrawal	75.00		237.07
2022-03-02		Debit card charge	1.50		235.57
2022-04-15		Birthday money		200.00	435.57
2022-04-18	121	BC Hydro (Feb & Mar)	62.53		373.04
2022-04-20		Child Care Tax Refund		33.64	406.68
2022-04-23		Mike the Mechanic (fix shocks)	45.82		360.86
2022-04-30		Pay		596.27	957.13
2022-05-01	122	Mortgage Payment	375.00		582.13
2022-05-04		Grocery Mart	111.95		470.18
2022-05-06	123	Cable	32.17		438.01

Your name John Smith
Your address 123–FourthStreet,Anywhere,BC
Your phone number 250-123-4567 *April 18* 20*21* No. 121

PAY TO
THE ORDER OF *BCHydro* $ *62.53*

----------Sixty-Two and $^{53}/_{100}$ DOLLARS

ABE Bank
123 Any Street Account # 456-789-0 ***SAMPLE ONLY***
Our Town, BC

MEMO *Feb.&Mar Payment* *John Smith*

Unit 2 Review

A. Find the sum:

a. 4.87 + 3.91 + 0.33 + 5.68 =

b. 0.187 + 28.27 + 8.039 + 4.44 =

c. 5.38 + 4.7102 + 24.003 + 0.78 =

d. 3.912 + 46 + 72.04 + 19.19 =

B. Solve the following word problems:

a. Cynthia spent $4.53 on butter, $10.97 on a big bag of flour and $3.50 on eggs. How much did she spend?

b. A seaplane pilot is finding the weight of the freight and passengers on her next flight. The freight weighs 800.25 kg. All of the passengers together weigh 452.5 kg. How much is the total weight on the flight?

c. Use a ruler or metre stick to measure the edges of the top of the table where you are sitting. Draw and label a diagram and then use your measurements to find the perimeter.

C. Find the difference:

a. 82.07 − 14.86 =

b. 89.506 − 16.039 =

c. $72.53 − $51.30 =

d. $7 − $0.31 =

D. Solve the following word problems:

a. Babies often lose a bit of weight in the first few days after they are born. They then usually go on to grow quite quickly. When Oliver was first born, he weighed 3.36 kg. When he was two days old, he weighed 3.19 kg. How much weight did he lose?

b. Jules is installing trim around a doorway. The perimeter of the door is 5.78 m. Jules will not be putting trim on the base of the doorway. If the base of the doorway measures 0.85 m, how much trim should she purchase?

c. Carissa is helping her relatives calculate a budget for a memorial feast. Her family has $575 saved up. Several friends and family members have made contributions totaling $360. The expenses will include $120 for a hall rental, $85.50 for table and chair rental, $50 for a microphone and sound system, $45.68 for insurance coverage, and $600 for gifts. How much money will Carissa’s family have left after the expenses?

E. Reading a transaction record. Look at the following statement and answer the questions on the following page:

Transaction Record

Date	Transactions	Debit	Credit	Running Balance
	Balance Forward			559.58
2022-04-20	CASH DEPOSIT	200.00		
2022-04-21	INTERAC PAYMENT Kaien Island Optometry		74.53	
2022-04-29	DEPOSIT CANADA CHILD TAX CREDIT	89.70		
2022-05-01	Electric Funds Transfer PAYCHEQUE	609.74		
2022-05-08	Internet Banking INTERNET BILL PAY BC HYDRO		52.46	
2022-05-08	INTERAC PAYMENT FEES		1.75	
2022-05-10	INTERAC PAYMENT Safeway		73.02	
2022-05-10	INTERAC PAYMENT FEES		1.89	
2022-05-12	CASH WITHDRAWAL		60.00	

a. Complete the running balance column. You may use a calculator.
b. How much was the pay transfer?
c. What amount is the child tax credit?
d. What day was the cash withdrawal made?
e. How much was the cash deposit?
f. Why do you think there is a fee for the gas station and grocery store purchases?

Answers to Unit 2 Review

A. Find the sum.

a. 14.79
b. 40.936
c. 34.8732
d. 141.142

B. Solve the word problems.

a. $19.00
b. 1252.75 kg
c. Answers will vary.

C. Find the difference.

a. 67.21
b. 73.467
c. $21.23
d. $6.69

D. Solve the word problems.

a. Oliver lost 0.17 kg or 170 g.
b. Jules should purchase 4.93 m of trim.
c. Carissa's family will have $33.82 left.

E. a.

Transaction Record

Date	Transactions	Debit	Credit	Running Balance
	Balance Forward			559.58
2022-04-20	CASH DEPOSIT	200.00		759.58
2022-04-21	INTERAC PAYMENT Kaien Island Optometry		74.53	685.05
2022-04-29	DEPOSIT CANADA CHILD TAX CREDIT	89.70		774.75
2022-05-01	Electric Funds Transfer PAYCHEQUE	609.74		1384.49
2022-05-08	Internet Banking INTERNET BILL PAY BC HYDRO		52.46	1332.03
2022-05-08	INTERAC PAYMENT FEES		1.75	1330.28
2022-05-10	INTERAC PAYMENT Safeway		73.02	1257.26
2022-05-10	INTERAC PAYMENT FEES		1.89	1255.37
2022-05-12	CASH WITHDRAWAL		60.00	1195.37

b. $609.74
c. $89.70
d. May 12, 2022
e. $200.00
f. Some banks charge people for using their debit cards at places other than the bank.

Test time!

Please see your instructor to get your **Practice Test**.

When you are confident, you can write your **Unit 2 Test and/or do the Unit 2 Assignment.**

Congratulations!

Unit 3: Multiplying Decimals

Topic A: Multiplying Decimals

Multiplying decimals uses the same method that you learned for multiplying whole numbers. Review multiplication of whole numbers.

Vocabulary Review

Review the diagram below and try to write in the explanations of the mathematical terms. You may refer to the glossary, if you wish. For right now, it is mostly important to remember what factor means.

$$\begin{array}{c}\text{Factors} \\ \downarrow \quad \downarrow \\ 3 \times 7 = 21 \leftarrow \text{Product}\end{array}$$

Product:

Factors:

How to Multiply Decimals

Multiplying decimals follows almost the same steps as multiplying whole numbers. On the next few pages, you will be shown two ways to multiply decimals.

Method One

One method is to **estimate** the **product** using whole numbers to determine where the decimal goes.

Example A

4.3×5.7

Estimate: $4.3 \times 5.7 \approx 4 \times 6 = 24$

This tells us that the correct answer will be around 24 (which is two whole number places). We know that the answer will not be around 2.4 and it will not be around 240.

If we take the decimals out and just multiply the **digits**, the answer is **2451**.

$$\begin{array}{rr} & 57 \\ \times & 43 \\ & 171 \\ + & 2280 \\ & 2451 \end{array}$$

The estimate shows that the decimal point will come after two whole number places, so 4.3 × 5.7 = 24.51

$$\begin{array}{rr} & 5.7 \\ \times & 4.3 \\ & 171 \\ + & 2280 \\ & 24.51 \end{array}$$

Example B

23.24×3.9

Estimate: 23.24 × 3.9 ≈ 23 × 4 = 92

The answer will be around 92. It will not be around 9.2 and it will not be around 920.

If we take the decimals out and just multiply the digits, the answer is 90636.

The estimate shows that the decimal point will come after two whole number places.

So $23.24 \times 3.9 = 90.636$

$$\begin{array}{rr} & 23.24 \\ \times & 3.9 \\ & 20916 \\ + & 69720 \\ & 90.636 \end{array}$$

If the whole numbers in the question are large, you can round to the nearest ten or hundred to help you decide where to put the decimal point. This is a quick estimate.

Example C

383.298×213.87

383.298 × 213.87 ≈ 400 × 200 = 80 000

The answer will be around 80 000. It will not be around 8 000 or 800 000.

If we take the decimals out and just multiply the digits 383.298 by 213.87, the numerals in the product are 8 197 594 326.

The estimate shows that the whole number will go up to the ten-thousands place, which is five whole number places, so

383.298 × 213.87 = 81 975.94326 **Whew!**

$$\begin{array}{rr} & 383.298 \\ \times & 213.87 \\ \hline & 81975.94326 \end{array}$$

Exercise 1

All the multiplying has been done already. Your task is to put the decimal point in the product by doing a whole number estimate of the question.

Example

$$\begin{array}{rr} & 2.8 \\ \times & 4.3 \\ \hline & 84 \\ + & 1120 \\ \hline & 12.04 \end{array} \qquad \text{Estimate: } \begin{array}{r} 3 \\ \times \ 4 \\ \hline 12 \end{array}$$

a.
$$\begin{array}{rr} & 56.9 \\ \times & 12.3 \\ \hline & 1707 \\ & 11380 \\ & 56900 \\ \hline & 69987 \end{array}$$

b.
$$\begin{array}{rr} & 7.3 \\ \times & 19.6 \\ \hline & 14308 \end{array}$$

c.
$$\begin{array}{rr} & 28.7 \\ \times & 64.97 \\ \hline & 1864639 \end{array}$$

d.
$$\begin{array}{rr} & 73.2 \\ \times & 1.6 \\ \hline & 11712 \end{array}$$

e.
$$\begin{array}{rr} & 1.8 \\ \times & 1.3 \\ \hline & 234 \end{array}$$

f.
$$\begin{array}{rr} & 48.29 \\ \times & 55.6 \\ \hline & 2684924 \end{array}$$

g.
$$\begin{array}{rr} & 91.2 \\ \times & 1.5 \\ \hline & 13680 \end{array}$$

Answers to Exercise 1

a. 699.87
b. 143.08
c. 1864.639
d. 117.12
e. 2.34
f. 2684.924
g. 136.80

Method Two

Another way of locating the decimal point in the product is to look at the number of decimal places in the decimals you are multiplying.

Example D

$$\begin{array}{rll} & 43.23 & 2 \text{ decimal places} \\ \times & 19.6 & 1 \text{ decimal place} \\ \hline \end{array}$$

Then add the number of decimal places you counted above (2 + 1 = 3)

This is the number of decimal places you will have in your answer.

$$\begin{array}{rrl} & 43.23 & 2 \text{ decimal places} \\ \times & 19.6 & 1 \text{ decimal place} \\ & 847.\mathbf{308} & 3 \text{ decimal places} \end{array}$$

Example E

$$\begin{array}{rrl} & 0.35 & 2 \text{ decimal places} \\ \times & 0.47 & 2 \text{ decimal places} \\ & 0.\mathbf{1645} & 4 \text{ decimal places} \end{array}$$

Example F

$$\begin{array}{rrl} & 13.452 & 3 \text{ decimal places} \\ \times & 30 & 0 \text{ decimal places} \\ & 403.\mathbf{560} & 3 \text{ decimal places} \end{array}$$

Exercise 2

Again, the multiplying has been done. Use the method of multiplying the understood **denominators** to put the decimal point in the product.

a. $\begin{array}{rll} & 9.2 & \text{1 decimal place} \\ \times & 0.3 & \text{1 decimal place} \\ \hline & 2.76 & \text{2 decimal places} \end{array}$

b. $\begin{array}{rll} & 0.27 & \text{2 decimal places} \\ \times & 1.8 & \text{1 decimal place} \\ \hline & 0.486 & \text{3 decimal places} \end{array}$

c. $\begin{array}{rl} & 6.8 \\ \times & 0.4 \\ \hline & 272 \end{array}$

d. $\begin{array}{rl} & 2.4 \\ \times & 0.13 \\ \hline & 0312 \\ & 240 \end{array}$

e. $\begin{array}{rl} & 0.05 \\ \times & 1200 \\ \hline & 0.91 \end{array}$

f. $\begin{array}{rl} & 6.2 \\ \times & 5642 \end{array}$

g. $\begin{array}{rl} & 0.29 \\ \times & 1.2 \\ \hline & 0348 \\ & 0.87 \end{array}$

h. $\begin{array}{rl} & 0.19 \\ \times & 01653 \\ \hline & 7.3 \end{array}$

i. $\begin{array}{rl} & 3.8 \\ \times & 2774 \\ \hline & 4.24 \end{array}$

j. $\begin{array}{rl} & 0.07 \\ \times & 02968 \\ \hline & 0.042 \end{array}$

k. $\begin{array}{rl} & 60 \\ \times & 2520 \end{array}$

Answers to Exercise 2

a. 2.76
b. 0.486
c. 2.72
d. 0.312
e. 12.00
f. 5.642
g. 0.348
h. 0.1653
i. 27.74
j. 0.2968
k. 2.52

Exercise 3

If you had trouble with the first two exercises, then get help from your instructor. Here is extra practice if you want or need it.

a. $\begin{array}{rll} & 41 & \text{0 decimal places} \\ \times & 0.061 & \text{3 decimal places} \\ \hline & 2.501 & \text{3 decimal places} \end{array}$

b. $\begin{array}{rll} & 7.8 & \text{1 decimal place} \\ \times & 0.5 & \text{1 decimal place} \\ \hline & 3.90 & \text{2 decimal places total} \end{array}$

c.
$$\begin{array}{r} 59.275 \\ \times \quad 0.08 \\ \hline 474200 \end{array}$$

d.
$$\begin{array}{r} 7.18 \\ \times \quad 23.46 \\ \hline 1684428 \end{array}$$

e.
$$\begin{array}{r} 0.84 \\ \times \quad 2.1 \\ \hline 1764 \end{array}$$

f.
$$\begin{array}{r} 18.6 \\ \times \quad 0.3 \\ \hline 558 \end{array}$$

g.
$$\begin{array}{r} 100 \\ \times \quad 0.35 \\ \hline 3500 \end{array}$$

h.
$$\begin{array}{r} 0.72 \\ \times \quad 3.4 \\ \hline 2448 \end{array}$$

Answers to Exercise 3

c. 4.74200
d. 168.4428
e. 1.764
f. 5.58
g. 35.00
h. 2.448

Exercise 4

Multiply to find the product. Remember to put the decimal point in the correct place; you know two methods!

a.
$$\begin{array}{r} 13.8 \\ \times \quad 3.9 \\ \hline 1242 \\ 4140 \\ \hline 53.82 \end{array}$$

b.
$$\begin{array}{r} 0.076 \\ \times \quad 24 \end{array}$$

c.
$$\begin{array}{r} 2.05 \\ \times \quad 1.7 \end{array}$$

d.
$$\begin{array}{r} 0.429 \\ \times \quad 7.5 \end{array}$$

e.
$$\begin{array}{r} 96 \\ \times \quad 0.2 \end{array}$$

f. $\begin{array}{rr} & 1.79 \\ \times & 0.33 \end{array}$

g. $\begin{array}{rr} & 40.1 \\ \times & 0.9 \end{array}$

Answers to Exercise 4

a. 53.82
b. 1.824
c. 3.485
d. 3.2175
e. 19.2
f. 0.5907
g. 36.09

Prefixing Zeros

Remember this skill?

- $\frac{23}{1000} = 0.\mathbf{0}23$ – The **0** must be used after the decimal point in 0.**0**23 to hold the tenths place. This makes it clear that the denominator is 1000.
- $\frac{7}{100} = 0.\mathbf{0}7$ – The **0** must be used after the decimal point in 0.**0**7 to hold the tenths place. This makes it clear that the denominator is 100.
- $\frac{8}{1000} = 0.\mathbf{00}8$ – The **00** must be used after the decimal point in 0.**00**8 to hold the tenths and hundredths place. This makes it clear that the denominator is 1000.
- $\frac{19}{10000} = 0.\mathbf{00}19$ – The **00** must be used after the decimal point in 0.**00**19 to hold the tenths and hundredths places. This makes it clear that the denominator is 10 000.

When changing from a fraction to a decimal:

If there are not enough digits to fill all the decimal places, put zeros between the decimal point and the digits from the fraction—this is called prefixing zeros.

How does this apply to multiplying decimals? Look at the examples.

Example G

$$\begin{array}{rll} & 0.07 & \text{2 decimal places} \\ \times & 0.5 & \text{1 decimal place} \\ & 35 & \text{3 decimal places} \end{array}$$

Uh oh! There are not enough spots in the answer to make the decimals fit in!

$$\begin{array}{rll} & 0.07 & \\ \times & 0.5 & \\ & \mathbf{00}35 & \leftarrow \\ & 3\,2\,1 & \text{count} \end{array}$$

Add zeros before your product. It is completely within the rules of math to do that. Then put in the decimal in the place in the correct place.

$$\begin{array}{rll} & 0.07 & \\ \times & 0.5 & \\ & \mathbf{0.0}35 & \leftarrow \\ & 3\,2\,1 & \text{count} \end{array}$$

Example H

$$\begin{array}{rll} & 0.07 & 2 \text{ decimal places} \\ \times & 0.03 & +2 \text{ decimal places} \\ & .\_\_21 & 4 \text{ decimal places in product} \\ & 4\,3\,2\,1 & \text{count} \\ & \mathbf{0.0021} & \end{array}$$

Example I

Look carefully at this one — it is tricky!

$$\begin{array}{rll} & 0.05 & 2 \text{ decimal places} \\ \times & 0.8 & +1 \text{ decimal place} \\ & .\_40 & 3 \text{ decimal places in product} \\ & 3\,2\,1 & \text{count} \end{array}$$

Because the last digit, the zero, is the result of multiplying 8 × 5, you must count it when working out the decimal places to put in the decimal point.

The product is forty thousandths:

$$\frac{40}{1000} = 0.040$$

which can also be written as four hundredths:

$$\frac{4}{100} = 0.04$$

Note that if you had not counted that zero, you would have written 0.004, which is four thousandths and not correct.

Exercise 5

Find the products. Be certain to place all decimal points correctly.

a.
$$\begin{array}{r} 0.35 \\ \times\ 0.13 \\ \hline 105 \\ 350 \\ \hline 0.0455 \end{array}$$

b.
$$\begin{array}{r} 1.8 \\ \times\ 0.05 \end{array}$$

c.
$$\begin{array}{r} 300 \\ \times\ 0.04 \end{array}$$

d.
$$\begin{array}{r} 1.3 \\ \times\ 0.027 \end{array}$$

e.
$$\begin{array}{r} 500 \\ \times\ 0.073 \end{array}$$

f.
$$\begin{array}{r} 0.603 \\ \times\ 0.4 \end{array}$$

g.
$$\begin{array}{r} 38.2 \\ \times\ 1.9 \end{array}$$

h.
$$\begin{array}{r} 0.025 \\ \times\ 0.25 \end{array}$$

i.
$$\begin{array}{r} 3.5 \\ \times\ 0.018 \end{array}$$

j.
$$\begin{array}{r} 0.043 \\ \times\ 3.3 \end{array}$$

k. $\begin{array}{r} 0.013 \\ \times\ \ 1.4 \end{array}$

l. $\begin{array}{r} 0.201 \\ \times\ \ 2.1 \end{array}$

Answers to Exercise 5

a. 0.0455
b. 0.09
c. 12.00
d. 0.0351
e. 36.500
f. 0.2412
g. 72.58
h. 0.00625
i. 0.063
j. 0.1419
k. 0.0182
l. 0.4221

Multiplying by 10, 100, 1 000, 10 000...

There is a pattern that you can see when we multiply by a decimal number by 10, 100, 1 000, 10 000, and so on. Look at the following example and try to find the pattern:

45.9264 × 10 = 459.264

45.9264 × 100 = 4 592.64

45.9264 × 1 000 = 45 926.4

45.9264 × 10 000 = 459 264

Do you see a pattern?

When **multiplying** by 10, 100, 1 000, 10 000, etc., count the zeros in the 10, 100, 1 000, etc. and move the decimal point that same number of places to the right.

Multiply by Ten

When you multiply by ten, move the decimal point one place to the right. Remember that every whole number can have a decimal point at the right.

Example J

a. .37 × 10 = 3.7
b. 13 × 10 = 130

Exercise 6

a. $2.2 \times 10 =$ b. $6.67 \times 10 =$ c. $2.1 \times 100 =$

Answers to Exercise 6

a. 22 b. 66.7 c. 210

Multiply by 100

When you multiply by 100, move the decimal point two places to the right. Note that zeros may be needed at the end of the numeral.

Example K

a. $4.2 \times 100 = 420.$ b. $6 \times 100 = 600.$

Exercise 7

a. $5.67 \times 100 =$ b. $92.737 \times 100 =$ c. $25 \times 100 =$

Answers:

a. 567 b. 9 273.7 c. 2 500

Multiply by 1000

To multiply by 1000, move the decimal point three places to the right.

Example L

$4.2 \times 1000 = 4200.$

Exercise 7

a. 6.721 × 1000 =
b. 1.56 × 1000 =
c. 0.7246 × 1000 =
d. 2.1 × 1000 =

Answers to Exercise 7

a. 6 721
b. 1 560
c. 724.6
d. 2 100

Exercise 8

Write the products using the short method you now know.

a. 0.4 × 10 =
b. 0.27 × 10 =
c. 10 × 0.926 =
d. 10 × 0.09 =
e. 0.62 ×100 =
f. 0.119 × 100 =
g. 100 × 2.03 =
h. 100 × 0.345 =
i. 1.934 × 1000 =
j. 28.9 × 100 =

Answers to Exercise 8

a. 4
b. 2.7
c. 9.26
d. 0.9
e. 62
f. 11.9
g. 203
h. 34.5
i. 1 934
j. 2 890

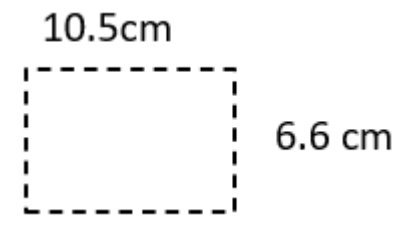
Multiplying Decimals to Determine Area

The area of an object is: the measurement of the amount of space the object surface covers. Area is described in square units.

Exercise 9

Find the area of the rectangles described below. The measures of the length (l) and width (w) have been given. You should draw and label a sketch for each.

a. l = 10.5 cm
w = 6.6 cm



$A = l \times w$
$A = 10.5 \times 6.6$ cm
$A =$

b. l = 100.04 km
w = 70.2 km

c. l = 15.5 mm
w = 10.5 mm

d. l = 9.75 cm
w = 3.5 cm

e. l = 40.43 km
w = 10.9 km

f. l = 19.6 cm
w = 2.8 cm

Answers to Exercise 9

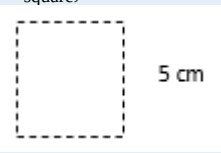
a. 69.3 cm^2
b. 7022.808 km^2
c. 162.75 mm^2
d. 34.125 cm^2
e. 440.687 km^2
f. 54.88 cm^2

Exercise 10

Find the area of each square described in the questions below. Even though this is a simple square, it is still good practice to draw the picture.

Remember, all four sides of a square are the same length.

a. A_{square}, if s = 5 cm



b. A_{square}, if s = 12.5 km
c. A_{square}, if s = 1.4 km
d. A_{square}, if s = 25.4 cm

Answers to Exercise 10

a. 25 cm^2
b. 156.25 km^2
c. 1.96 km^2
d. 645.16 cm^2

Word Problems Using Multiplication of Decimals

Multiplication problems usually give information about one thing and ask you to find a total amount for several of the same things. Look for this pattern in the following problems. Also look for key words.

Some key words which point to multiplication include:

- **product**
- **total**
- altogether
- of

Multiplication by a decimal or fraction often uses the word “of” in word problems.

“Of” usually means multiply one number by another number.

Example M

Kathy spends 0.25 **of** her salary on rent. Her salary is $1445 a month. How much is her rent?

0.25 × $1445 = $361.25

She spends $361.25 on rent every month.

Remember, it can be very useful to draw a picture to help yourself visualize the problem.

Exercise 11

Solve these problems. Do an estimation first.

a. One crate of juice costs $11.73. How much will five crates cost?
   - Estimation: $11.73 ≈ $12, 12 × 5 = 60
   - Actual Solution:
   - Answer:

b. It takes Maria 0.75 hours to install a bathroom sink. The owner of the Ramada Hotel wants her to install 35 new sinks. How many hours of labour will Maria charge the hotel for this job?
   - Estimation:
   - Actual Solution:
   - Answer:

c. Find the longest hallway in your learning centre. Stand at one end and count how many steps you take until you reach the other end. Write that number here.
   i. How many steps would you take if you walked down your hallway 4.5 times?

ii. How many steps would you take if you walked down your hallway 33.68 times?

d. Jessica's 4×4 truck averages 15.75 kilometres per litre of gas (km/L). How far could her truck travel with 52 L of gas?

- Estimation:
- Actual Solution:
- Answer:

e. The distance between Jackie's work place and her home is 4.3 kilometres. She walks to work in the morning and then walks back to her home at the end of the work day, five days a week. How far does she walk each week?

- Estimation:
- Actual Solution:
- Answer:

f. A new subdivision is being built outside of Terrace. There are 21 new houses. Each house needs 25.2 metric tons of crushed rock for the driveway. How much crushed rock will be used to build all the driveways?

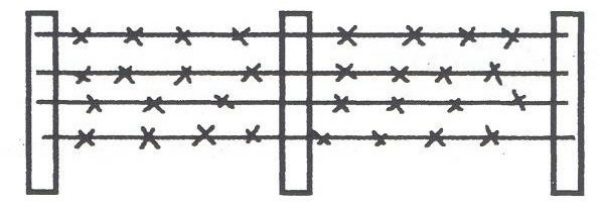
- Estimation:
- Actual Solution:
- Answer:

g. Union workers who work on statutory holidays are paid double time and a half. This is 2.5 times their regular pay.

i. The employees at the coal terminal earn $17.37 per hour. How much are they paid per hour if they work on a statutory holiday?

ii. Jesse worked a 7.5 hour shift at the coal terminal on Labour Day last year. What were his earnings for that day?

h. Lucy's aunt in Hartley Bay has a large 50.5 m square vegetable garden. Lucy is going to help her aunt build a barbed wire fence to keep the deer out. The fence will be made with four strands of barbed wire. How much barbed wire should Lucy buy for her aunt? The fence will look like this:



- Draw a picture:
- Estimation:
- Actual Solution:
- Answer:

i. The directions on a carpet shampoo say one bottle will clean 50 m^2 of carpet. Joyce wants to clean the wall-to-wall carpet in three rooms. The living room is 6 m by 4.5 m, the bedroom is 3 m by 4 m, and the hall is 1.2 m by 5 m. How many bottles of carpet shampoo should she buy? (This is a two-part question: Calculate the area of each of the rooms and then find the total area to be cleaned. Remember, Joyce cannot buy a partial bottle!)

- Draw a picture:
- Estimation:
- Actual Solution:
- Answer:

Answers to Exercise 11

a. Estimation: $12 × 5 ≈ $60
Actual Solution: $11.73 × 5 = $58.65
Five packages of juice will cost $58.65

b. Estimation: 1 × 35 ≈ 35 hours
Actual Solution: 0.75 × 35 = 26.25 hours
It will take Maria 26.25 hours to install the sinks.

c. Answers will vary. Please ask your instructor to check your work.

d. Estimation: 16 km × 50 L ≈ 800 km
Actual Solution: 15.75 km × 52 L = 819 km
The truck could travel 819 km.

e. Estimation: 4 km × 10 (5 trips there and 5 trips home) ≈ 40 km
Actual Solution: 4.3 km × 10 = 43 km
Jackie walks 43 km each week.

f. Estimation: 25 t × 20 ≈ 500 t
Actual Solution: 25.2 t × 21 = 529.2 t
There will be 529.2 metric tons of crushed rock used for the driveways.

g. Union workers:

   i. $17.37 × 2.5 = $43.425 per hour

   ii. $43.425 × 7.5 hours = $325.69.
   Jesse earned $325.69 on Labour Day.

h. Estimation: 50 + 50 + 50 + 50 ≈ 200 m, 200 m × 4 ≈ 800 m
Actual Solution: 50.5 m × 4 = 202 m, 202 m × 4 = 808 m.
Lucy should buy 808 m of barbed wire.

i. **Estimation:**
6 m × 5 m ≈ 30 m^2
3 m × 4 m ≈ 12 m^2
1 m × 5 m ≈ 5 m^2
30 m^2 + 12 m^2 + 5 m^2 ≈ 47 m^2
Actual Solution:
6 m × 4.5 m = 27 m^2
3 m × 4 m = 12 m^2
1.2 m × 5 m = 6 m^2
27 m^2 + 12 m^2 + 6 m^2 = 45 m^2
Joyce should buy just one bottle of carpet cleaner.

Design Your Own House Project Part 2: Roofing Your House

Mark: /16

Use the graph paper house sketch that you made in the Design Your Own House Project Part 1 in Unit 2 – Topic B: Subtracting Decimals (#chapter-subtracting-decimals) to do this activity.

a. What is the area of your entire house? (area = length × width) **/2**

b. Your house has a flat roof and overhangs (meaning “sticks out past”) the edges of the house by 0.5 m. Add the overhang to the length and width of your house and find the area of the roof of your house. **/2**

c. Before covering a roof, builders put down tarpaper, which keeps water out. Look at a

hardware store flyer or go online and check prices for tarpaper. **/1**

- Choose one type of tarpaper and write down the cost per roll.

d. Use your answer for question a to figure out how many rolls will you need to cover the entire roof (remember, you cannot buy part of a roll). **/2**

e. Using your answers for questions c and d, calculate what it would cost to cover the entire roof with tarpaper. **/2**

f. Use a flyer or look at hardware stores online and choose a roofing material. **/1**

- Write down your choice.

g. Roofing shingles are often sold in **bundles** that will cover 3 m^2. Metal roofing materials are sold in sheets that will cover 50 square feet, which is the equivalent of 15 m^2. What is the price per bundle or sheet for the material you chose in question f? **/2**

h. Using your answer from question a, calculate how many bundles or sheets of roofing material you will need to cover your roof. /2

i. Using your answers from questions g and h, calculate the total cost of roofing your house. **/2**

When you have finished this project, put your graph paper somewhere safe, because you will be using it again at the end of Unit 5 Topic A.

Marking Checklist for House Project Part 2

Calculations:

- The area of the house has been calculated correctly.
- The area of the roof has been calculated correctly.
- The number of rolls of tarpaper has been calculated correctly.
- The cost of covering the roof in tarpaper has been calculated correctly.
- The number of bundles or sheets of roofing material has been calculated correctly.
- The total cost of roofing the house has been calculated correctly.

Topic A: Self-Test

Mark /6 Aim 5/6

A. Find the product. (4 marks)

a. 66×0.7

b. 7.25×12

c. $\begin{array}{r} 6.5 \\ \times\ 0.6 \end{array}$

d. $\begin{array}{r} 19.5 \\ \times\ 0.07 \end{array}$

B. Problems. (2 marks)

a. Rhonda bought a 3.4 kg roast at $2.89 per kilogram. What was the cost of her roast? (Round to the nearest cent.)

- Estimation:
- Actual Solution:

Answers for Topic A: Self Test

A. Find the product.

a. 46.2

b. 87

c. 3.9

d. 1.365

B. Problems.

a. Estimate: 3 × 3 = $9

b. Actual solution: 3.4 × 2.89 = 9.826 (round to nearest cent: $9.83). Rhonda paid $9.83 for her roast.

Unit 3 Review

A. Put the decimals in the correct place in the answer:

a.
$$\begin{array}{rr} & 66 \\ \times & 0.9 \\ \hline & 594 \end{array}$$

b.
$$\begin{array}{rr} & 19.5 \\ \times & 3.47 \\ \hline & 67665 \end{array}$$

B. Find the product:

a.
$$\begin{array}{rr} & 0.78 \\ \times & 1.4 \end{array}$$

c.
$$\begin{array}{rr} & 7.94 \\ \times & 4.02 \end{array}$$

b.
$$\begin{array}{rr} & 3.469 \\ \times & 4.63 \end{array}$$

C. Multiply by 10, 100, or 1 000:

a. 0.53 × 10 =

b. 7.89 × 10 =

c. 0.472 × 10 =

d. 3.7834 × 100 =

e. 46.3214 × 100 =

f. 42.42 × 100 =

D. Solve the following word problems:

a. Mark rides his bike at a speed of 11.4 km an hour. How much distance will he cover in a 7.5 hour bike ride?

b. Johnny spends 3.25 hours cleaning the civic centre twice a week. How many hours does he work each week?

c. Joe and Kat’s rectangular family tent measures 3.4 m by 2.9 m. How much area does the floor of the tent cover?

Answer Key to Unit 3 Review

A. Put the decimals in the correct place.

a. 59.4 b. 67.665

B. Find the product.

a. 1.092 b. 16.06147 c. 31.9188

C. Multiply by 10, 100, or 1 000.

a. 5.3 c. 4.72 e. 4 632.14
b. 78.9 d. 378.34 f. 4 242

D. Solve the following word problems

a. 85.5 km b. 6.5 hours c. 9.86 m^2

Test time!

Please see your instructor to get your **Practice Test**.

When you are confident, you can write your **Unit 3 Test and/or do the Unit 3 Assignment.**

Congratulations!

Unit 4: Dividing Decimals

Topic A: Dividing Decimals

Dividing decimals uses the same method that you learned for dividing whole numbers.

Vocabulary Review

$$\begin{array}{r} \text{quotient} \\ \text{divisor}\overline{)\text{dividend}} \end{array}$$

dividend ÷ divisor = quotient

Using the above diagram, write the definitions.

Divisor:

Dividend:

Quotient:

Remember to use zeros to hold the places in the **quotient** if there is no other **digit**.

$$\begin{array}{r} \downarrow\ \ \\ 1\mathbf{0}4 \\ 9\overline{)936} \\ 9\downarrow\ \\ 03\ \\ 0\downarrow \\ 36 \\ 36 \\ 0 \end{array}$$

Where Do You Place the Decimal Point?

Dividing decimals follows almost the same steps as dividing whole numbers. Here you will be shown two ways to figure out where to place the decimal point.

Method One

One way is to **estimate** the **quotient** using rounded whole numbers.

Example A

$17.7 \div 3$

Estimate: 17.7 ÷ 3 ≈ 18 ÷ 3 = 6

This tells us that the correct answer will be around 6 (which is one whole number place).

We know that the answer will not be around 0.6 and it will not be around 60.

If we take the decimals out and just divide the digits, the answer is 59.

$$3\overline{)177}$$
$$59$$

The estimate shows that the the decimal point will come after one whole number.

17.7 ÷ 3 = 5.9

Example B

$137.88 \div 18$

Estimate: 137.88 ÷ 18 ≈ 140 ÷ 20 = 7

The answer will be around 7. It will not be around 0.7 or 70 or 700.

If we take the decimals out and just divide the digits, the answer is 7.66.

$$18\overline{)137.88}$$
$$7.66$$

The estimate shows that the the decimal point will come after one whole number.

137.88 ÷ 18 = 7.66

To check the accuracy of your division, multiply the **quotient** by the **divisor**.

dividend ÷ **divisor** = **quotient**

quotient × **divisor** = dividend

The **product** will equal the **dividend** if your arithmetic is correct.

23.72 ÷ 8 = 2.965

$$\begin{array}{r} 2.965 \\ \times \quad 8 \\ \hline 23.720 \end{array}$$

Exercise 1

The division has been done. Your task is to put the decimal point in the quotient by doing a whole number estimate of the question.

a. $2\overline{)21.6}\quad 10.8$ $\left(2\overline{)20}\quad 10\right)$

b. $8\overline{)10.4}\quad 1.3$ $\left(8\overline{)10}\quad 1\right)$

c. $6\overline{)14.16}\quad 236$

d. $7\overline{)37.4}\quad 53$

e. $4\overline{)173.6}\quad 434$

f. $5\overline{)17.25}\quad 345$

g. $7\overline{)60.48}\quad 864$

h. $6\overline{)10.92}\quad 182$

i. $2\overline{)6.738}\quad 3369$

j. $37\overline{)66.6}\quad 18$

k. $18\overline{)43.74}\quad 243$

l. $21\overline{)90.3}\quad 43$

Answers to Exercise 1

a. 10.8
b. 1.3
c. 2.36
d. 5.3
e. 43.4
f. 3.45
g. 8.64
h. 1.82
i. 3.369
j. 1.8
k. 2.43
l. 4.3

Method Two (If the Divisor is a Whole Number)

Have you found the shortcut?

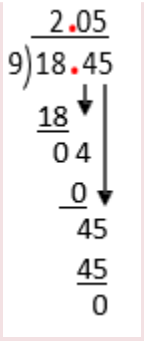
If the divisor is a whole number, put the decimal point in the quotient right above the decimal point in the dividend.

Then just go ahead and divide, ignoring the decimal point all together.

Example C

$18.45 \div 9 =$

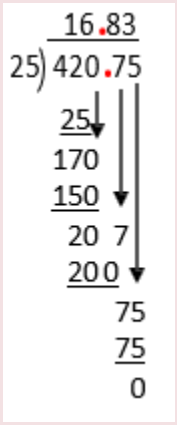
$$9\overline{)18.45}\quad \begin{matrix}\cdot\end{matrix}$$



Example D

$420.75 \div 25 =$

$$25\overline{)420.75}$$



Exercise 2

Find the quotients. Check the answer by multiplying the quotient by the divisor.

Example

$$60\overline{)14.40}$$

0.24

$12 \downarrow$

$24 \downarrow$

240

0

Check: $\times$ 0.24, 60, 14.40

a. $91\overline{)263.9}$

b. $25\overline{)207.5}$

c. $57\overline{)96.9}$

d. $63\overline{)176.4}$

Answers to Exercise 2

a. 2.9

b. 8.3

c. 1.7

d. 2.8

Method 3 (If the Divisor is a Decimal)

The past section taught us that if the divisor is a whole number, we put the decimal point in the quotient right above the decimal point in the dividend. Then we just go ahead and divide.

But what if the divisor has a decimal in it? A decimal divisor must be changed to a whole number before we can divide.

Remember:

- Multiplying by 10, 100 or 1000, etc. moves the decimal point as many places to the right as there are zeros in the 10, 100, 1000.
  - 46 × 10 = 460, 4.6 × 10 = 46. The decimal moved over one spot because of the one zero in 10
  - 46 × 100 = 4600, 4.6 × 100 = 460**.** The decimal moved over two spot because of the two zero in 100
- When the divisor and dividend are both multiplied by the same number, the quotient is not changed.

Your instructor will give you more information about why this method works if you wish to know.

Example E

$0.05\overline{)1.255}$

If the divisor has a decimal, do this:

1. Move the decimal point in the divisor as many places to the right as needed to make a whole number. In this example, the decimal is moved two places, which is like multiplying by 100.$005.\overline{)1.255}$
2. Now move the decimal point in the dividend the same number of places to the right (like multiplying by 100).
   $005.\overline{)125.5}$

3. Put the decimal point in the quotient directly above the new place in the dividend. Now divide. $5\overline{)125.5}$ with quotient 25.1

1.255 ÷ 0.05 = 25.1

Note: Zeros may have to be put at the end of the dividend when you move the decimal point.

Example F

48.6 ÷ 0.24 =

$0.24\overline{)48.6}$ changes to $24.\overline{)4860.}$

There is nothing here, so we must add a zero.

Remember that if the dividend is a whole number, put a decimal to the right of it first, and then move the decimal as needed to match what you did to the divisor. You will need to add zeros to hold the places.

Example G

$3.6 \div 1.8 =$

$1.8\overline{)36.}$ Put a decimal to the right of the dividend.

$18.\overline{)360.}$ Move the decimals for both numbers one place to the left. This is like multiplying both numbers by ten. Add a zero to the dividend to hold the tens place.

$18.\overline{)360.}$ with the decimal point placed above: Put the decimal directly above the decimal in the dividend.

Exercise 3

Find the quotients.

a. $3.4\overline{)3.808}$

b. $6.6\overline{)19.14}$

c. $0.04\overline{)15.2}$

d. $0.67\overline{)6.164}$

Answers to Exercise 3

a. 1.12
b. 2.9
c. 380
d. 9.2

If you are having any difficulty with this exercise, ask your instructor for help before you go any further.

Exercise 4

Now try these:

a. $0.5\overline{)0.2635}$
b. $1.7\overline{)15.47}$
c. $0.003\overline{)42.12}$
d. $0.33\overline{)0.1452}$

Answers to Exercise 4

a. 0.527
b. 9.1
c. 14 040
d. 0.44

Exercise 5

Set the question up for long division and find the quotient. Check your answers by multiplying quotient divisor. The product should equal the dividend.

Example

0.2448 ÷ 0.008 =

$$\begin{array}{r} 30.6 \\ 0.008.\overline{)0.224.8} \\ 24\downarrow\downarrow \\ 04\downarrow \\ 0\downarrow \\ 48 \\ 48 \\ 0 \end{array}$$

Check: $\times \begin{array}{r} 30.6 \\ 0.008 \\ 0.2448 \end{array}$

a. 2.3412 ÷ 0.6 =
b. 25.6 ÷ 0.008 =

c. 2.176 ÷ 3.4=
d. 205 ÷ 4.1 =
e. 2.1122 ÷ 59 =

Answers to Exercise 5

a. 3.902
b. 3 200
c. 0.64
d. 50
e. 0.0358

What About Remainders?

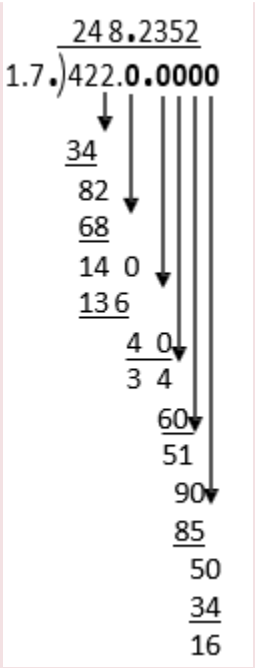
The questions that you have been practicing all work out evenly. But, as you know, the world is seldom perfect and division questions often have **remainders**! For everyday uses of mathematics, answers to the hundredths or thousandths decimal places are accurate enough.

This is what you do if the division problem does not work out evenly:

1. Do the long division until you have worked out three or four decimal places in your quotient. Add zeros to the decimal in the dividend as necessary.
2. Round the quotient to the nearest tenth, hundredth, or thousandth as you are asked or as you need for your own use. Review rounding if you need to. (In this course, round to the nearest thousandth unless you are asked otherwise.)
3. When you are planning to round the quotient, do the long division only to one decimal place past where you will round. It is not necessary to divide any further.
    - If rounding the quotient to the nearest tenths, divide to the hundredths place (2 decimal places).
    - If rounding the quotient to the nearest hundredths, divide to the thousandths place (3 decimal places).
    - If rounding the quotient to the nearest thousandths, divide to the ten-thousandths place (4 decimal places).

Example H

422 ÷ 1.7 =

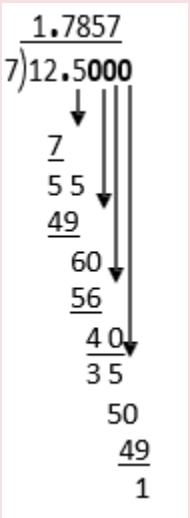


The quotient 248.2352 will round this way:

- To the nearest thousandth 248.235
- To the nearest hundredth 248.24
- To the nearest tenth 248.2

Example I

12.5 ÷ 7 =



The quotient 1.7857 will round this way:

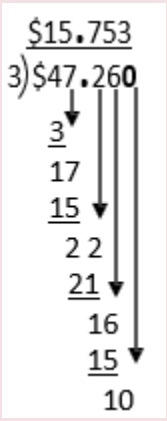
- To the nearest thousandth 1.786
- To the nearest hundredth 1.79

- To the nearest tenth 1.8

Always round money to the nearest cent.

Example J

$47.26 ÷ 3 =

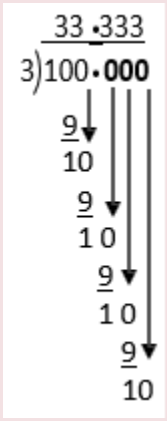


$15.753 ≈ $15.75

Sometimes numbers repeat when you divide. This will go on forever — to **infinity**.

Example K

100 ÷ 3 =



To show that the 3 keeps repeating as a decimal fraction, put a · (dot) or a ¯ (bar) above the repeating decimal digit.

$33.\dot{3}$ or $33.\overline{3}$

Sometimes a group of digits will repeat. Put a bar above the repeating decimal digits. For example 2.341341341341

$2.\overline{341}$

Exercise 6

Use long division to find the quotient. Round the quotient to the nearest tenth.

a. 7.359 ÷ 1.3 =

b. 15.68÷ 2.2 =

c. 4.93 ÷ 6 =

d. 59 ÷ 8 =

Answers to Exercise 6

a. 5.7

b. 7.1

c. 0.8

d. 7.4

Exercise 7

Divide and round the quotient to the nearest hundredth.

a. 43.893 ÷ 1.1 =

b. 1.9525 ÷ 0.6 =

c. 0.4474 ÷ 0.7 =

d. 10.48 ÷ 1.5 =

Answers to Exercise 7

a. 39.90

b. 3.25

c. 0.64

d. 6.99

Dividing by 10, 100, 1 000, 10 000, etc.

Multiplication and division are opposite operations. Multiplying by ten, hundred, etc. moves the decimal point the same number of decimal places to the **right** as there are zeros in the 10, 100, 1000, etc. Moving a decimal point to the right gives a larger number.

Therefore, dividing by ten, hundred, etc. must move the decimal point to the **left**. Remember that moving a decimal point to the left gives a smaller number. Study the examples.

- 4.6 ÷ 10 = **.**46 = 0.46
- 29.6 ÷ 10 = 2**.**9.6 = 2.96
- 27.4 ÷ 100 = **.**27.4 = 0.274
- 185.4 ÷ 100 = 1**.**85.4 = 1.854
- 325 ÷ 1000 = 325. ÷ 1000 = **.**325. = 0.325
- 2567. 3 ÷ 1000 = 2**.**567.3 = 2.5673

To divide by a 10, 100, 1 000, 10 000, etc., move the decimal point the same number of places to the **left** as there are zeros in the divisor.

You may need to prefix zeros. Look at these examples:

- 0.3 ÷ 10 = **.**0.3 = 0.03
- 1.75 ÷ 100 = **.**_1.75 = 0.0175
- 0.5 ÷ 1 000 = **.**_ _ _.5 = 0.0005

Exercise 8

Write the quotient. Use the short method you have just learned.

a. 7 ÷ 10 =
b. 14 ÷ 100 =
c. 6.5 ÷ 10 =
d. 74.35 ÷ 10 =
e. 43.2 ÷ 100 =
f. 147.6 ÷ 100 =
g. 183.75 ÷ 1 000 =
h. 2374.5 ÷ 1 000 =
i. 0.63 ÷ 10 =
j. 7.46 ÷ 100 =
k. 0.035 ÷ 10 =
l. 366 ÷ 100 =
m. 0.1 ÷ 1 000 =
n. 100.1 ÷ 10 =
o. 16.2 ÷ 100 =
p. 5692.1 ÷ 10 =
q. 0.025 ÷ 100 =
r. 3.31 ÷ 10 =

Answers to Exercise 8

a. 0.7
b. 0.14
c. 0.65
d. 7.435
e. 0.432
f. 1.476
g. 0.18375
h. 2.3745
i. 0.063
j. 0.0746
k. 0.0035
l. 3.66
m. 0.0001
n. 10.01
o. 0.162
p. 569.21
q. 0.00025
r. 0.331

Word Problems Using Division of Decimals

Division problems usually give information about groups of things and ask you to find the information for one thing.

Some key words which point to division include:

- separated
- split
- cut
- shared
- What is the cost per…?
- **unit price**
- What is the distance per…?
- average (speed, cost, weight, time)

Exercise 9

Solve these division problems. Look carefully for the pattern of the problems and underline any **key words** which point to division. Do an estimation before you find the actual solution.

a. Joanne's little car has a 44.5 L tank. She can drive 525 km on a tank of gas. What is the average distance she can travel per litre of gas? (The answer will be kilometres per litre, so you must divide the kilometres by the litres.)
    - Estimation: 520 km ÷ 40 L ≈ 13 km/L
    - Actual Solution:
      $$445\overline{)5250.0}\quad\begin{matrix}11.798\end{matrix}$$
      ← move the decimal over one spot in both numbers and add the appropriate number of zeros.
      525 km ÷ 44.5 L = 11.798 km/L
    - Answer: Joanne's car travels an average of 11.798 kilometres per litre of gas.

b. Three villages are organizing a feast in Prince Rupert to celebrate the start of the All Native Basketball tournament (ANT). The total cost for the feast will be $8972.43. How much will each community pay?
    - Estimation:

- Actual Solution:
- Answer:

c. If you can solve 30 math questions in 1.5 hours, how long would it take to solve just one?
Hint: You want the average time per question. The answer will be less than one hour, so it may be easier to work out the problem using minutes. Change hours to minutes by multiplying the hours by 60 minutes. [1.5 hours × 60 minutes = number of minutes]

- Estimation:
- Actual Solution:
- Answer:

d. During her shift at the container port, Lucinda used a forklift to load 3675.6 kilograms of crated goods onto four and a half pallets. How many kilograms did she load onto each pallet?

- Estimation:
- Actual Solution:
- Answer:

e. Murray buys a double-double from Tim Hortons before class every morning and another on his lunch break. On weekends he only has one each day. He spends $113.40 in four and a half weeks. How much does he pay for each coffee?

- Estimation:
- Actual Solution:
- Answer:

Answers to Exercise 9

a. Estimation: 520 km ÷ 40 L ≈ 13 km/L
Actual Solution: 525 km÷ 44.5 L = 11.798 km/L
Answer: Joanne‘s car travels an average of 11.798 kilometres per litre of gas.

b. Estimation: 9000 ÷ 3 ≈ 3000
Actual Solution: 8972.43 ÷ 3 = 2990.81
Answer: Each village will pay $2990.81.

c. Estimation: 90 minutes ÷ 30 questions ≈ 3 minutes
Actual Solution: 90 minutes÷30 questions = 3
Answer: It takes you 3 minutes to solve one math question.

d. Estimation: 3700 kg ÷ 5 kg ≈ 740
Actual Solution: 3675.6 kg ÷ 4.5 kg = 816.8 kg
Answer: Lucinda loaded 816.8 kg onto each pallet.

e. Step 1:
How many coffees per week? 12
How many coffees in 4.5 weeks? 54
Step 2:
Estimation: 100 ÷ 50 = 2
Actual Solution: 113.40 ÷ 54 = 2.10
Answer: Murray pays $2.10 for each coffee.

Topic A: Self-Test

Mark /13 Aim 10/13

A. Find the quotients. (2 marks)

a. $4\overline{)17.6}$ b. $0.3\overline{)396}$

B. Divide and round the quotient to: (4 marks)

a. the nearest tenth $2.3\overline{)10.4}$

b. the nearest hundredth $0.12\overline{)0.4739}$

C. Find the quotients. (3 marks)

a. 51 ÷ 10 = b. 81.81 ÷ 100 = c. 62.811 ÷ 1000 =

D. Problems. (4 marks)

a. A train travelled 252.5 km in 4.25 hours. What was its average speed in kilometres per hour?

- Estimation:
- Actual Solution:
- Answer:

b. The office manager ordered t-shirts for the staff for Orange Shirt Day. The shirts cost $181.30 in total. How much should the manager charge each of the fourteen staff members for a shirt?

- Estimation:
- Actual Solution:
- Answer:

Answers to Topic A Self-Test

A. Find the quotients.

a. 4.4 b. 1320

B. Divide and round the quotient.

a. 4.5

b. 3.95

C. Find the quotients.

a. 5.1 b. 0.8181 c. 0.062811

D. Problems.

a. Average speed of train

- Estimation: 250 km ÷ 5 hours ≈ 50 km/hr
- Actual Solution: 252.5 km ÷ 4.25 hours = 59.411764 km/hr
- Answer: The average speed is 59.41 kilometres per hour.

b. Cost per t-shirt.

- Estimation: $180 ÷ 15 ≈ $12
- Actual Solution: $181.30 ÷14 = $12.95
- Answer: The manager should charge each team member $12.95.

Unit 4 Review

A. Write the decimal in the correct place in the quotient.

a. $7\overline{)60.48}$ $= 864$

b. $21\overline{)90.3}$ $= 43$

c. $9\overline{)18.45}$ $= 205$

d. $60\overline{)14.4}$ $= 024$

B. Find the quotient.

a. $34\overline{)179.146}$

b. $75\overline{)6947.25}$

c. $57\overline{)30.21}$

d. $75\overline{)61.5}$

C. Find the quotient.

a. $3.4\overline{)23.46}$

b. $2.1\overline{)0.1134}$

c. $1.005\overline{)0.25929}$

d. $0.72\overline{)2.58768}$

D. Find the quotient. Round the quotient to the nearest hundredth.

a. 14.71 ÷ 3.1 =

b. 81.13 ÷ 12 =

c. 4.93 ÷ 6 =

E. Divide. Round your answer to the nearest tenth.

a. 98.9 ÷ 1.3=

b. 1.742 ÷ 3.2 =

c. 0.64 ÷ 3 =

F. Divide by 10, 100 or 1000. Make sure you use the shortcut!

a. 53.4 ÷10 =

b. 0.34 ÷ 100 =

c. 10 000 ÷ 1 000 =

d. 1.22 ÷ 100 =

e. 124.32 ÷ 100 =

f. 12.12 ÷ 1 000 =

g. 62.911 ÷ 100 =

h. 4.2 ÷ 1 000 =

G. Solve the following word problems.

a. Len pays $35.89 each month to pay off his interest free loan of $304.73. How many months will it take to pay off the loan?

b. The Robinson family children want to adopt a dog from the BC SPCA. The four children will split the cost of the dog evenly.

The costs of buying a dog

Cost	**Detail**
$395.35	Adoption cost
$159.30	Vet care
$67.49	Immunizations
$38.99	First month of food
$278.43	Extra gear a dog needs (collars, leash, toys, crate, and a bed)
$30.00	Licence fee

What will each child pay?

Answers to Review

A. Write the decimal in the correct place in the quotient.

a. 8.64

b. 4.3

c. 2.05

d. 0.24

B. Find the quotient.

a. 5.269

b. 92.63

c. 0.53

d. 0.82

C. Find the quotient.

a. 6.9
b. 0.054
c. 0.258
d. 3.594

D. Find the quotient. Round the quotient to the nearest hundredth.

a. 4.75
b. 6.76
c. 0.82

E. Divide. Round your answer to the nearest tenth.

a. 76.1
b. 0.5
c. 0.2

F. Divide by 10, 100 or 1000.

a. 5.34
b. 0.0034
c. 10
d. 0.0122
e. 1.2432
f. 0.01212
g. 0.62911
h. 0.0042

G. Word problems.

a. It will take Len 8.49 months to pay off his loan (so really 9 months).
b. The children will pay $242.39 each.

Unit 5: Using Decimals in Real Life

Topic A: Unit Pricing

This next topic will help you practice some math skills you have already learned:

- Dividing rounding
- Working with money
- Comparing numbers

Have you ever stood in front of a grocery store shelf holding two different sizes of the same product in your hands trying to decide on the “best buy”? The different sized packages make it difficult to compare the prices. Many stores now help by putting the unit prices on the shelf below their products, but sometimes you need to figure the unit price out yourself.

The **unit price** is the price for one measure or one unit of a product.

- The unit price for a 10 kilogram (kg) bag of sugar will be the price per one kilogram (price/kg).
- You may wish to compare the cost of pop sold in 750 millilitre (mL) bottles, 500 mL cans and 2 litre bottles. For these items, the unit price will be price per one millilitre (price/mL).
- Socks are often sold in bundles of several pairs. How do you decide on the best buy if the same socks are on sale in bundles of 6 pairs, bundles of 8 pairs and bundles of 12 pairs? You figure out the unit price which would be the price per one pair of socks (price/pair).

To calculate the unit price, do this:

total price ÷ number of units = unit Price

To compare unit prices, you need to compare the same unit to the same unit.

Compare kilograms to kilograms

Compare litres to litres

Compare pairs of slippers to pairs of slippers

Compare grams to grams

…and so on!

Example A

A 210 gram bag of potato chips costs $4.20 while an 110 g bag sells for $3.30 Which is the better buy? We will compare the price per gram for the two bags.

- **Step 1** – Be sure that the **prices** are written the same way; that is, all using the $ (dollars) style or all using the ¢ (cents) style. Be sure that the **units** for all items are the same.
- **Step 2** – Work out the unit price for each size bag by dividing the total price by the contents (the number of grams). Be careful to include the money sign and units.
  - $4.20 ÷ 210g = $0.02/g. The 210g bag costs **2 cents per gram**.
  - $3.30 ÷ 110g = $0.03/g. The 150g bag costs **3 cents per gram**.
- **Step 3** – Compare the unit price to decide which size bag is the better value. The 210 g bag is the better buy.

Of course the item with the best unit price may not be the best buy for you. You may only have enough money to buy a small quantity, or you may not want to have a large quantity of something. This is a helpful skill to know for if you need to use it.

Exercise 1

Calculate the unit price of these items which are of equal quality and then put a checkmark beside the better buy. (Divide the price by number of units.)

Socks

Item	Unit to Compare	Total Price	Number of Units	Unit Price	✓
Socks – 4 pair $2.80	pairs	$2.80	4	$0.70/pr	
Socks – 6 pairs $4.08	pairs	$4.08	6	$0.68/pr	✓

Toilet Paper

Item	Unit to Compare	Total Price	Number of Units	Unit Price	✓
Toilet paper – 6 rolls $1.86					
Toilet paper – 8 rolls $2.56					

Laundry Soap

Item	Unit to Compare	Total Price	Number of Units	Unit Price	✓
Laundry Soap – 3 Litres $5.94					
Laundry Soap – 5 Litres $9.80					

Eggs

Item	Unit to Compare	Total Price	Number of Units	Unit Price	✓
A dozen eggs $2.79					
A dozen and a half eggs $4.09					

Answers to Exercise 1

Item	Unit to Compare	Total Price	Number of Units	Unit Price	✓
Toilet paper – 6 rolls $1.86	rolls	$1.86	6	$0.31/roll	✓
Toilet paper – 8 rolls $2.56	rolls	$2.56	8	$0.32/roll	
Laundry Soap – 3 Litres $5.94	litres	$5.94	3	$1.98/L	
Laundry Soap – 5 Litres $9.80	litres	$9.80	5	$1.96/L	✓
A dozen eggs $2.79	eggs	$2.79	12	$0.2325/egg	
A dozen and a half eggs $4.09	eggs	$4.09	18	$0.227/egg	✓

Now look at this example:

Examples

Shoppers Drug Mart is advertising one brand of toothpaste at $1.39 per 100 mL tube and another brand at 99¢ per 75 mL tube. Which is the better buy?

Step 1 – Check that the **units** are the same.

- Both toothpastes are measured in mililitres, so we will be comparing millilitres to millilitres.
- The price for one is written in dollars, and the other is in cents. Rewrite 99¢ as $0.99 so that we will compare dollars to dollars.

Step 2 – Work out the unit price for each tube by dividing total price by the contents (number of mL).

- $1.39 ÷ 100 mL = $0.0139/mL
- $0.99 ÷ 75 m = $0.0132/mL

Step 3 – Decide which tube is cheaper per unit price.

- Even though the results look strange for money, you are still able to tell that $0.0132/mL is less than $0.0139/ml. The 75 mL tube is the better buy.

Remember:

Unit Abbreviations

Unit	Abbreviations
kilogram	kg
gram	g
litre	L
millilitre	mL
package	pkg

1 kilogram = 1000 grams

1 litre = 1000 millitres

This might be a good time to review Dollars and Cents and Rounding.

Exercise 2

Round to the nearest cent.

a. $2.438
b. 84.8¢
c. 0.9¢
d. $0.051
e. 10.9¢
f. $12.479

Answers to Exercise 2

a. $2.44
b. 85¢
c. 1¢
d. $0.05
e. 11¢
f. $12.48

Exercise 3

Decide which item in each group is the “best buy” by figuring out the unit price. Round the unit price to the nearest cent and put a checkmark next to the best buy.

Frozen Waffles

Amount	Price	Unit price	Best buy
200 g	$4.99	$0.024/g ≈ $0.02/g	
1 kg (1000 g)	$11.99	$0.011/g ≈ $0.01/g	✓

$4.99 ÷ 200 = $0.02495/g ≈ $0.02/g

$11.99 ÷1000 g = $0.0011/g ≈$0.01/g

Box of laundry soap

Amount	Price	Unit Price	Best buy
5 kg	$9.99		
8 kg	$16.99		

Granola bars

Amount	Price	Unit Price	Best buy
170 g	$4.49		
300 g	$3.98		

Garbage bags

Amount	Price	Unit Price	Best buy
20 bags	$2.29		
45 bags	$3.89		

Rice

Amount	Price	Unit Price	Best buy
1.4 kg	$3.69		
2 kg	$5.39		

Children's socks

Amount	Price	Unit Price	Best buy
2 pairs	99¢		
5 pairs	$2.58		

Answers to Exercise 3

Box of laundry soap

Amount	Price	Unit Price	Best buy
5 kg	$9.99	$2.00/kg	✓
8 kg	$16.99	$2.12/kg	

Granola bars

Amount	Price	Unit Price	Best buy
170 g	$4.49	$0.03/g	
300 g	$3.98	$0.01/g	✓

Garbage bags

Amount	Price	Unit Price	Best buy
20 bags	$2.29	$0.11/bag	
45 bags	$3.89	$0.09/bag	✓

Rice

Amount	Price	Unit Price	Best buy
1.4 kg	$3.69	$2.64/kg	✓
2 kg	$5.39	$2.70/kg	

Children's socks

Amount	Price	Unit Price	Best buy
2 pairs	99¢	$0.50/pr	✓
5 pairs	$2.58	$0.52/pr	

Rounding to the Nearest Tenth of a Cent

We do not have a coin that equals one tenth of one cent ($0.001), but this amount of money is often used to calculate prices and can be significant for large amounts.

The unit price information on store shelves also may include tenths of a cent.

One other place where you see tenths of a cent is at the gas station.

Gasoline is priced at cents per litre and is usually written like this, without the $ or ¢:

156.9 L (156.9¢/L) or **0.999 L** ($0.999/L)

Gas Pricing in the Past, Present, and Future

Gas prices have risen and fallen thousands of times over the years.

On the gas station signs, the cost is listed as cents per litre (¢/L).

Before 2010, it was unthinkable that gas would ever go over a dollar per litre. However, in the next ten years it came close to two dollars per litre in some parts of Canada.

Here are a few pump prices from the past for comparison:

Year	Average cost of gas in BC in ¢/L
1980	23.6
1990	58.5
2000	69.4
2010	114.3
2015	123.5
2019	149.1
April 2020 in some parts of BC	63.9

As you can see, gas prices rose steadily over the decades. In 2019, gas was as high as 169 cents per litre.

In early 2020, the COVID-19 pandemic led to a crash of the oil market, leading to extraordinarily low gas prices. By mid-April, gas in some parts of BC had dropped to below 65 cents per litre, which was the lowest it had been in over 20 years.

Exercise 4

1. What are gas prices this week in your town?
2. What was the lowest price seen during the COVID-19 crash of 2020?
3. What is your opinion? How do you think gas prices will be listed in the future? Is it more likely that we will continue to use cents per litre? Or will we transition to dollars per litre?

Answers to Exercise 4

Answers will vary. Show your work to your instructor

Topic A: Self-Test

Goal: Good Shopping!

Think about your grocery needs for this week while you do this activity.

- **Option 1**: Sit down with this week's grocery sale fliers and comparison shop. Work out the unit price for at least 4 items that are advertised by more than one store. Decide on the "best buy." Fill in the chart below with your information.
- **Option 2**: You may prefer to go to a store and copy down the prices and sizes of different brands of an item that you use. Decide which size in what brand is the best buy. Do this for 4 products. Fill in the chart below with your information.

Item	Amount	Price	Unit price	Best buy
Safeway Compliments dry spaghetti	900 g	$2.43	$0.0027	
Extra Foods Western Family dry spaghetti	500 g	$1.29	$0.0025	✓

Design Your Own House Project Part 3: Flooring

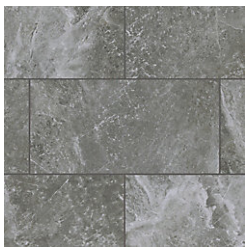
Mark: /20

Use the graph paper house sketch that you made in the **Design Your Own House Project Part 1** in Unit 2 – Topic B: Subtracting Decimals (#chapter-subtracting-decimals) to do this activity. **Clearly label and organize/show your work!**

a. What is the area of each room in the house? (area = length × width) **/5**

   - Bedroom 1:
   - Bedroom 2:
   - Bathroom:
   - Kitchen:
   - Living room:

b. Here are some choices for flooring. Calculate the cost per metre squared for each of them. **/6**

Picture	Flooring material	Covers	Price	Cost per metre squared
	Box of 20 peel and stick floor tiles	6.2 m²	47.99	
	Vinyl floor tiles	7.3 m²	94.80	
	Vinyl plank flooring	6.1 m²	72.86	
	Hardwood flooring	7.2 m²	148.61	
	Ceramic tile	6.9 m²	202.05	
	Carpet	1 m²	8.89	

c. Select a flooring material for each of your five rooms, and using your answer to question a,

calculate what the flooring would cost for each room. **/9**

- Bedroom 1 Flooring Material:
  Calculate cost:
- Bedroom 2 Flooring Material:
  Calculate cost:
- Bathroom Flooring Material:
  Calculate cost:
- Kitchen Flooring Material:
  Calculate cost:
- Living Room Flooring Material:
  Calculate cost:

d. What is the total cost of flooring for the whole house?
e. What is the average cost of flooring per room of the house?
f. Which of the flooring choices is the **best buy** from a cost perspective?
g. Do you think that flooring really is the best buy? Why or why not?

When you have finished this project, put your graph paper somewhere safe, because you will be using it again at the end of Unit 5 Topic B.

Marking Checklist for House Project Part 3

Calculations:

- The area of each room has been calculated correctly.
- The cost per metre squared of each flooring material has been calculated correctly.
- The cost of flooring for each room has been calculated correctly.
- The total cost of flooring for the whole house has been calculated correctly.
- The average cost of flooring per room has been calculated correctly.
- The **best buy** has been correctly identified.

Topic B: Decimal Word Problems

Keywords

Spend a few minutes reviewing the keywords that will help you identify addition, subtraction, multiplication and division word problems.

Some keywords that point to **addition** include:

- **sum**
- plus
- **total**
- total amount
- altogether
- combined
- complete
- entire
- in all
- added to
- increased by

Some keywords that point to **subtraction** include:

- **difference**
- **balance**
- minus
- amount left
- subtracted from
- decreased by
- reduced by
- taken away
- less
- compare

Some keywords which point to **multiplication** include:

- **product**
- **total**
- altogether
- of

Some keywords which point to **division** include:

- separated
- split
- cut
- shared
- What is the cost per…?
- **unit price**
- What is the distance per…?
- average (speed, cost, weight, time)

Read over some of the problems that you have done in each unit to remind yourself of the patterns to expect for different operations.

Steps for Solving Word Problems

Carefully review the **five steps** to use when solving problems:

Step 1: Question

- **Read** the problem carefully.
- What is the question being asked?
- Does the problem have two parts?
- Draw a picture to help you see the problem described.

Step 2: Information

- What information is necessary to solve the problem?
- Often you are given extra numbers and information that are not needed.
- Keep the question (destination) in mind.
- Circle the information you need.
- Write that information on the picture you drew.

Step 3: Operation

- Decide what arithmetic operation to use.
- Do you need to add, subtract, multiply, or divide?
- If the problem has two parts, decide what operation you need to do for each part.
    - Keywords often point to the operation needed.
    - Drawing a diagram or sketch is always helpful.
    - Write an equation (a number sentence).

Step 4: Estimate

- Estimate the answer to the problem.
    - Round the numbers so you can work with them quickly.
    - Use the operation you chose in Step 3 and come to a quick answer.
- Does this estimated answer make sense?
- Does it answer the question of the problem?
- Think carefully before you do Step 5.

Step 5: Solve

- Solve the problem using the actual numbers.
    - Check your arithmetic.
    - Compare your answer in Step 5 to your estimate from Step 4.
    - Think again about the question. Does your solution make sense?
    - When you write your answer, include the units.
      For example: 3 dozen eggs, 7.5 kilometres, 68 people

Exercise 1

a. The total weight of an A.T.V. is 293.937 kg. If a hunter who weighs 62.142 kg carried an extra 68.39 kg, how much would her entire A.T.V. weigh when loaded?
    - Estimation:
    - Actual solution:
    - Answer:

b. The Head Start shuttle bus drives a route that is 12.73 km long. It drives this route 5 times a day. How many kilometres does the bus drive in one day?
    - Estimation:
    - Actual solution:
    - Answer:

c. Mary bought a TV. She made a down payment of $75.00 and then made monthly payments of $56.19 for twelve months. How much did she pay for the TV altogether?
    - Estimation:
    - Actual solution:
    - Answer:

d. The total number of employee hours to be paid on the weekly payroll for the Dryer Company was 19 600 hours. The average rate of pay was $9.575 per hour. How much money was paid out in the payroll that week?
    - Estimation:
    - Actual solution:
    - Answer:

e. Joe's truck holds 94.5 L of gasoline. If he can drive from Vancouver to Vanderhoof (896 km) on that much gasoline, calculate the km/L of gasoline for his truck.
   Answer to the nearest hundredth of a litre.
    - Estimation:
    - Actual solution:
    - Answer:

f. Renee's landlord is going to put new carpet in her living/dining room. The area of the room is 24 square metres. Using the costs below, figure out how much the new carpet will cost Renee's landlord: (Note that this is a two-step problem.)
   carpet $19.95/m²
   underlay $4.50/m²

taxes $3.83/m²
labour charges $4.75/m²

- Estimation:
- Actual solution:
- Answer:

g. Andy went to Mark's and bought his daughter a pair of jeans for $29.95 and a top for $13.50. The sales tax was $5.21.

   a. How much did he spend altogether?

      - Estimation:
      - Actual solution:
      - Answer:

   b. Andy paid for his purchase with a fifty-dollar bill. How much change did he get?

      - Estimation:
      - Actual solution:
      - Answer:

h. In a recent 48-game season, the Rupert Rampage won 0.625 of their hockey games. How many games did they win? And how many games did they lose? Be sure that your games won and the games lost add up to 48 games when you are finished.

   - Estimation:
   - Actual solution:
   - Answer:

i. If Diane takes a job paying $28 606.60 a year, what will her monthly salary be (before deductions)?

   - Estimation:
   - Actual solution:
   - Answer:

j. Last year, Treena spent a total of $235.75 on her pay-as-you-go phone plan. What was her average cost per month?

   - Estimation:
   - Actual solution:
   - Answer:

k. Samantha's height and weight have both changed since she was fourteen. Her old height and weight were 160.02 cm and 56.82 kg. Her present height and weight are 165.1 cm and 58.18 kg. Find the increases of both her height and weight.

   - Estimation:
   - Actual solution:
   - Answer:

l. A 25-inch flat screen TV can be purchased for $199.99 cash. If you wish to buy it "rent-to-own" you must pay a $50.00 down payment and make monthly payments of $27.50 for six months.

   1. How much do you pay if you buy "rent-to-own"?
   2. How much do you save if you pay cash?

Answers to Exercise 1

a. Estimation: 300 kg + 60 kg + 70 kg ≈ 430 kg
Actual solution: 293.937 kg + 62.142 kg + 68.39 kg = 424.469 kg
Answer: The ATV weighed 424.469 kg when loaded.

b. Estimation: 13 km × 5 ≈ 65 km per day
Actual solution: 12.73 km × 5 = 63.65 km
Answer: The bus drives 63.65 km a day.

c. Estimation: $60 × 12 + $75 ≈ $795
Actual solution: $56.19 × 12 + $75.00 = $749.28
Answer: Mary paid $749.28 for the TV set.

d. Estimation: 20 000 hours × $10.00 ≈ $200 000
Actual solution: 19 600 hours × $9.575 = $187 670
Answer: The Dryer Company paid out $187 670 for the payroll that week.

e. Estimation: 900 km ÷ 90 L ≈ 10 km/L
Actual solution: 896 km ÷ 94.5 L = 9.48 km/L
Answer: Joe's truck uses 9.48 kilometres per litre.

f. Estimations: $20 + $5 + $4 + $5 ≈ $34, $35 × 25 m^2 ≈ $875
Actual solutions: $19.95 + $4.50 + $3.83 + $4.75 = $33.03, $33.03 × 24 m^2 = $792.72
Answer: The cost to have the new carpet is $792.72.

g.
   a. Estimation: $30 + $14 + $5 ≈ $49
   Actual solution: $29.95 + $13.50 + $5.21 = $48.66
   Answer: Andy spent $48.66.

   b. Estimation: $50 − $49 ≈ $1
   Actual solution: $50 − $48.66 = $1.34
   Answer: Andy got $1.34 change from his $50.

h. Estimations: 50 × 0.50 ≈ 25 games won, 50 × 0.50 = 25 games lost
Actual solutions: 48×0.625 =30 games won 48 × 0.375 =18 games lost

i. Estimation: $30 000 ÷ 10 ≈ $3 000
Actual solution: $28 606.60 ÷ 12 = $2 383.88
Answer: Diane's monthly salary will be $2 383.88.

j. Estimation: $250 ÷ 10 ≈ $25
Actual solution: $235.75 ÷ 12 = $19.65
Answer: Treena paid $19.65 monthly.

k. Estimation: 165 cm − 160 cm ≈ 5 cm, 58 kg − 57 kg = 1 kg
Actual solution: 165.1 cm − 160.02 cm = 5.08 cm
58.18 kg − 56.82 kg = 1.36 kg
Answer: Samantha's height has changed by 5.08 cm and her weight has changed by 1.36 kg.

l.
   1. $27.50 × 6 = $165
   $165 + 50 = $215
   Answer: If you pay on time, you will pay $215.

   2. $215 − $199.99 = $15.01
   Answer: If you pay cash, you will save $15.01.

Topic B: Self-Test

Mark /6 **Aim 5 / 6**

A. A machinist has to bore (drill) a hole through 2.6 cm of steel. He has drilled 1.25 cm. How much farther must he drill?

- Estimation:
- Actual Solution:
- Answer:

B. Sebastian picked 6.75 kg of berries and then sold them at a farmer's market for $2.95 a kg. How much did he make?

    - Estimation:
    - Actual Solution:
    - Answer:

C. Karla gets $12.75 per hour at her job. Yesterday she earned $57.38. How many hours did she work?

    - Estimation:
    - Actual Solution:
    - Answer:

Answers to Topic B Self-Test

A. Estimation: 3 cm − 1 cm ≈ 2 cm
Actual Solution: 2.6 cm − 1.25 cm = 1.35 cm
He has to drill 1.35 cm farther.

B. Estimation: 7 kg × $3 ≈ $21
Actual Solution: 6.75 kg × $2.95 = $19.91
Sebastian got $19.91 for his berries.

C. Estimation: $60 ÷ 12 ≈ 5
Actual Solution: $57.38 ÷ 12.75 = 4.5
Karla worked for 4.5 hours.

Design Your Own House Project Part 4: Fencing and Decorating

Use the graph paper house sketch that you made in Unit 2, Topic B: Subtracting Decimals (#chapter-subtracting-decimals) in the **Design Your Own House Project Part 1** do this activity.

Give your house a yard.

a. What is the perimeter of the yard?

b. Calculate the total area of your yard, not including the area of the house. (area = length × width)
There are two ways to do this. You can calculate the whole area and then subtract the area of the house, or you could calculate the area of each section of the yard (front, back, and two sides) and add them together.

c. Use a flyer from a hardware store or go online to look at types of fencing (for example, chain-link, cedar, metal, wood panel, picket, etc.). Choose a style of fencing for your yard. Write your choice here.

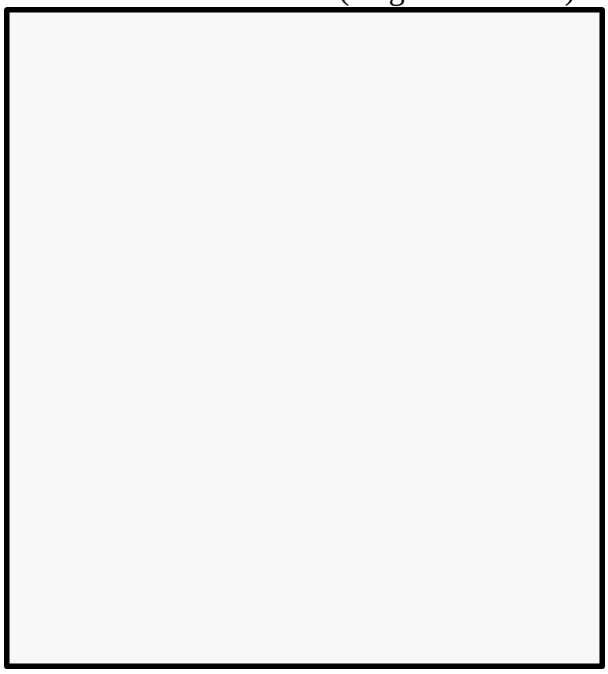
d. Decide what materials you will need to purchase to build your fence. List them here, along with the cost. Some costs will be per unit, and some will be per metre.

Material	**Quantity**	**Cost (Include units if applicable. e.g. per metre)**	**Total price of material**
Examples: *Fence posts, cedar, 2m*	24	$15.26 each	$366.24
Fence rails, cedar, 4m, pack of 4	10	$45.36 each	$453.60
		Total cost of fencing materials:	

e. Calculate the price per metre of your fence.

f. When making curtains, it is a good idea to use fabric that is 2.5 times the width of the window. Remember that each of your windows is 1m wide. What length of fabric will you need to buy to make curtains for all four windows?

g. Decorate your house with a piece of art that measures 46.5 cm by 83.8 cm. Sketch the art here. Add the dimensions (length and width).



h. You will need to build a frame for your artwork. You will need a piece of glass to cover it, and pieces of trim to frame it.

    - What size glass should you buy?
    - How much trim will you need to buy for your picture frame?

Marking Rubric for House Project Part 4

Sketch:

- The house has a yard and measurements have been clearly marked on the sketch.

Calculations:

- The perimeter of the yard has been calculated correctly.
- The area of the yard has been calculated correctly.
- The total price of each fencing material has been calculated correctly.
- The price per metre of the fence has been calculated correctly.
- The width of fabric necessary to cover all four windows has been calculated correctly.
- The size of glass necessary to cover the artwork has been calculated correctly.
- The amount of trim necessary for the picture frame has been calculated correctly.

Unit 5 Review

Use the skills you learned in this unit to figure out the best buy:

Dish Soap

Amount	Price	Unit Price	Best Buy
740 mL	$3.40		
4.3 L	$16.10		

Apples

Amount	Price	Unit Price	Best Buy
Bag of 7	$4.99		
1	$0.75		

Dog Food

Amount	Price	Unit Price	Best Buy
1 can	$2.59		
12 pack	$27.97		

Bread

Amount	Price	Unit Price	Best Buy
3 pack	$8.99		
1 loaf	$2.49		

Lightbulbs

Amount	Price	Unit Price	Best Buy
Pack of 4	$1.89		
Econo pack of 12	$5.97		

Answers to Unit 5 Review

Dish Soap

Amount	Price	Unit Price	Best Buy
740 mL	$3.40	$4.59/L	
4.3 L	$16.10	$3.74/L	✓

Apples

Amount	Price	Unit Price	Best Buy
Bag of 7	$4.99	$0.71 each	✓
1	$0.75	$0.75 each	

Dog Food

Amount	Price	Unit Price	Best Buy
1 can	$2.59	$2.59/can	
12 pack	$27.97	$2.33/can	✓

Bread

Amount	Price	Unit Price	Best Buy
3 pack	$8.99	$3.00/loaf	
1 loaf	$2.49	$2.49/loaf	✓

Lightbulbs

Amount	Price	Unit Price	Best Buy
Pack of 4	$1.89	$0.47/bulb	✓
Econo pack of 12	$5.97	$0.50/bulb	

Test time!

Please see your instructor to get your **Practice Test**.

When you are confident, you can write your **Unit 5 Test** and/or complete **Part 3 Flooring & 4 Fencing and Decorating** of the ongoing Project.

Congratulations!

Unit 6: Measurement

Topic A: Why Metric?

This unit will help you explore the system of metric measurement.

First, why metric?

- 98% of the countries in the world use the metric system.
- The International System of Units (SI) was established in 1960 as a result of a long series of international discussions. The SI sets the standards for the modern metric system. Because of SI, the use of the metric system provides exact measurements which have the same meaning worldwide.
- The metric system is patterned after the decimal number system – which means that the metric system focuses on **10**. The calculations within the metric system are done with **factors** such as 10, 100, 1000. Many such calculations can be done by simply moving the decimal point.
- The metric system uses the same prefixes with all the units. Once you understand the prefixes and the units, your knowledge can be applied to all the metric measures used in science, technology, and everyday life.
- The SI provides certain rules of style. Some of these are listed for your reference over the next few sections. Read them over now and then look back at them often as you work with metric measurement.

The end of this unit will look at how metric measurement (metres, litres, grams, etc.) and imperial measurement (inches, feet, cups, ounces, pounds, etc) compare to each other.

A Review of Measurement Units

The Metre

The metre is the base unit used to measure length, height, and distance.

Here are some ways we use length, height, and distance measurement in our everyday lives:

- I drove 371 km from Smithers to Prince George.
- It is 1755 km from Dease Lake to Vancouver.
- The height of a newborn baby is 50 cm.
- An average adult male is about 1.8 m tall.
- A standard doorway is 2 m high.
- A brand new pencil is about 18 cm long.

- The base of a pencil is about 8 mm in length.

The Gram

The gram is the unit for measuring mass. (We use the words mass and weight in the same way.)

Here are some ways we use the measurement of mass in our everyday lives:

- 1 paper clip is 1 g.
- 1000 paper clips is 1 kg, or 1000 g.
- A medium-sized raisin is about 1 g.
- A block of butter (known as 1 pound in the imperial system) is 453.5 g.
- A bag of flour can weigh 10 kg.
- A baby might weigh about 3.5 kg when born.
- A semi-trailer transport truck weighs about 425 000 kg.

The Litre

Litres are the everyday unit that we use to measure volume or capacity.

Volume or capacity tells how much a container can hold. For example, the volume of the classroom would be represented by the amount of air in the room. The capacity of a container would be the amount of liquid it could hold.

We use litres to measure liquids and gases such as air.

Here are some ways we use volume measurement in our everyday lives:

- A big plastic milk jug is 4 L.
- A juice box that goes in a child's lunch is 250 ml.
- There is 355 ml of pop in a regular pop can.
- Gas tanks can hold about 50 L of gasoline.
- The average person has about 3.8 L of blood in his or her body.

Celsius

Degrees Celsius is the common unit for measuring temperature. The symbol is °C.

The Celsius temperature scale was determined this way:

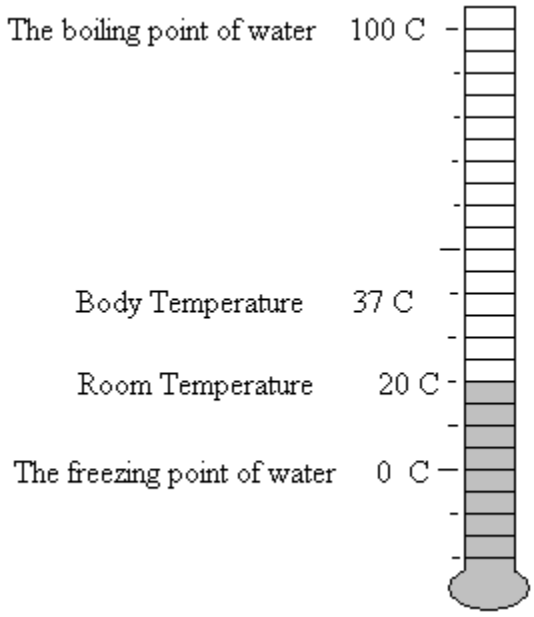
1. The freezing point of water was set at 0°C
2. The boiling point of water was set at 100°C

3. The interval between freezing and boiling of water was divided into 100 equal parts known as degrees Celsius

(The name Celsius comes from the 18th century Swedish scientist, Anders Celsius.)

We say that temperatures colder than the freezing point of water are “below zero” or “below freezing” and we put a minus sign in front of the number.

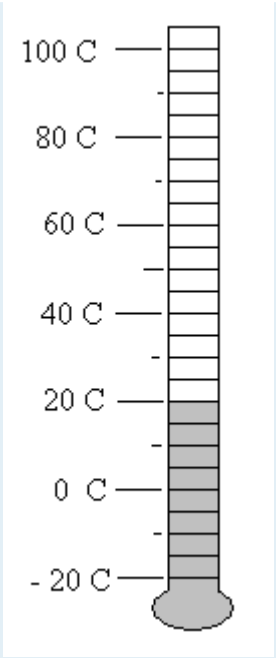
- Five and a half degrees below freezing is written −5.5°C
- Forty degrees below zero is written −40°C



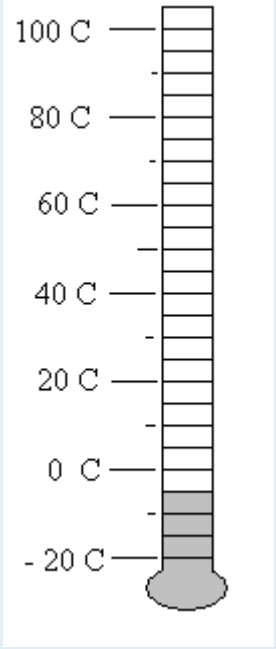
Exercise 1

What are the temperatures on the thermometers pictured on the page?

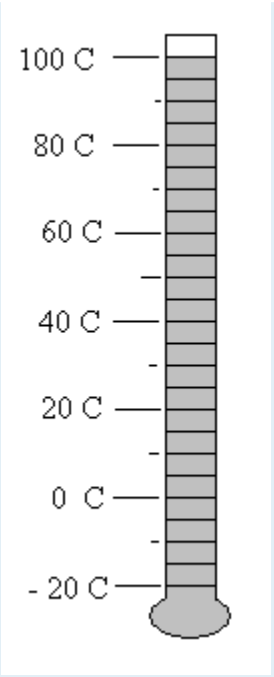
a.



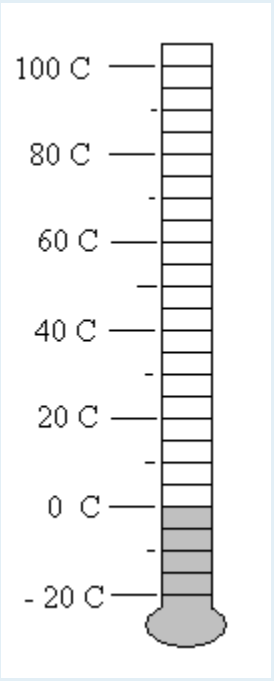
b.



c.



d.



Answers to Exercise 1

a. 20°C

b. −5°C

c. 100°C

d. 0°C

Body Temperatures

Temperature	Details
37°C	normal
38°C	slightly feverish
39°C	very feverish
40°C	dangerously high body temperature (equal to 104°F)

Air Temperatures

Temperature	Details
40°C	too hot – sit down in the shade and relax!
30°C	very warm summer's day
20°C	pleasant temperature for outdoor activities
10°C	quite cool, you need a coat
0°C	water is freezing
−10°C	brisk winter's day
−20°C	cold, watch for frostbite
−30°C	very cold
−40°C	extremely cold!!!

Exercise 2

Keep track of the morning temperatures each day for a week. Put a thermometer outside your window and fill in the following chart. This is a great activity to do with your kids. The purpose of this activity is to get familiar with reading a thermometer, which is practicing a scientific measurement.

Day of week	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Temperature in °C							

Rules of Style

Names of Units

The name of a unit starts with a lower case (small) letter except at the beginning of a sentence and except for degrees Celsius.

gram metre litre second

Use only one prefix at a time with a base unit. Do not use a hyphen (-) between the prefix and the base unit.

kilogram centimetre millilitre

Symbols

- With numerals, use the symbols for the metric units, not the full name.
    - For example:
        - 67 **km** not 67 **kilometres**
        - 2.1 **L** not 2.1 **litres**
- Write the full name of the unit and prefix if no numeral is used.
    - For example: Milk is measured in **litres**.
- Do not use a period after the symbols. A period is only used if the symbol is at the end of a sentence.
    - For example:
        - Matt drove 457 **km** yesterday.
        - Yesterday, Matt drove 457 **km**.
- Do not use an “S” with the symbols to mean more than one unit.
    - For example: Four kilograms is written 4 **kg** not 4 **kgs**
- Do not start a sentence with a symbol; write out the full name at the beginning of a sentence.
    - For example: “**Kilograms** are quite heavy” not “**Kg** are quite heavy”.
- If a unit is squared, an exponent is used.
    - For example: five square metres is written as **5 m^2**.

Numerals

- Leave a space between the last **digit** of the numeral and the symbol.
    - For example:

        - **45 km** not **45km**
        - **2.5 L** not **2.5L**
    - An exception is degrees Celsius, which is written as 27°C with no space.
- Use decimal fractions with metric units, not **common fractions**.
    - For example: **10.75** km not $10\frac{3}{4}$ km
- If a number is greater than ten, the preferred SI form is to use numerals, not the written-out number name.
    - For example: **15 L** not **fifteen litres**
- If you do write the number name instead of using numerals, write the full name of the metric unit also.
    - For example: **two kilometres, twenty-five metres**

Topic B: The Prefixes

The metric system uses the base units gram, metre, and litre. It would not be practical to use only the base units because sometimes the unit would be far too large and other times it would be too small.

- If your weight was written in grams, it might be **60 000 g** – that sounds massive!
- The distance from Vancouver to Montreal is approximately **4 800 000 m**.
- To measure a sewing seam or to select a wrench using only metres would mean using decimal amounts such as **0.007 m** for a wrench and **0.015 m** for the seam allowance on a dress.

These measures would all be correct but inconvenient to use. They would be easier to understand as:

- Your weight is **60 kg.**
- The distance from Vancouver to Montreal is approximately **4 800 km.**
- A **7 mm** wrench and **1.5** cm for a seam allowance.

The metric prefixes are similar to the **place values** in our number system. The prefix in front of a base unit tells how many of the base unit. Each prefix can be combined with almost any unit.

You will need to memorize the most common prefixes, their symbols, and their meaning.

In our everyday life and studies, we use only a few of these prefixes. However, it is interesting to look at the pattern of the prefixes and compare their pattern to the place value that you know so well.

The ones to memorize are marked with an *.

A Chart of the SI Prefixes

Prefix	Symbol	Number of Base Units
terra	T	1 000 000 000 000
giga	G	1 000 000 000
mega	M	1 000 000
kilo*	k	1 000
hecto*	h	100
deca*	da	10
no prefix	base	1
deci*	d	0.1
centi*	c	0.01
milli*	m	0.001
micro	μ	0.000 001
nano	n	0.000 000 001
pico	o	0.000 000 000 001

Exercise 1

Use the **Prefix Chart** to answer these questions.

a. Give the meaning and symbol for deca. *Deca means ten base units.*
b. Give the meaning and symbol for hecto.
c. Give the meaning and symbol for kilo.
d. Write the symbols for these units: metre, gram, litre
e. **Look at the prefixes** *deci, centi, milli,* (and also *micro, nano, pico*). These prefixes tell you that the measurement is **less than the base unit**; they give a fraction of the base unit.

    i. deci means: *one tenth of the unit*
    ii. centi means:
    iii. milli means:

    As a memory helper, notice that these three units which give a fraction of the base unit, all end with the letter **i**. You already know that *centi* is the Latin word for one-hundredth, and that one cent is one hundredth of a dollar.

f. Prefixes have been combined with base units in this exercise. Write the meaning and the symbol. The first two questions are done as examples.

    i. centimetre: *one hundredth of a metre, cm*
    ii. decagram: *ten grams, dag*

iii. kilogram:
iv. hectometre:
v. millilitre:
vi. kilometre:
vii. hectolitre:
viii. decametre:

Answers to Exercise 1

a. deca means ten base units. **da**
b. hecto means 100 base units. **h**
c. kilo means 1000 base units. **k**
d. metre m gram g litre. **L**
e.
   i. deci means one tenth of the unit
   ii. centi means one-hundredth of the unit
   iii. milli means one thousandth of the unit
f.
   i. one hundredth of a metre **cm**
   ii. ten grams **dag**
   iii. thousand grams **kg**
   iv. hundred metres **hm**
   v. one thousandth of a litre **mL**
   vi. thousand metres **km**
   vii. hundred litres **hL**
   viii. ten metres **dam**

Exercise 2

Symbol	Word Name	Meaning	Measures
kL	kilolitre	one thousand litres	capacity
hm	hectometre	one hundred metres	distance
dg	decigram	one tenth of a gram	mass
mm			
daL			
kg			
m			
mL			
dag			
cL			
cm			
hL			
hg			

Answers to Exercise 2

Symbol	Word Name	Meaning	Measures
kL	kilolitre	one thousand litres	capacity
hm	hectometre	one hundred metres	distance
dg	decigram	one tenth of a gram	mass
mm	millimetre	one thousandth of a metre	distance
daL	decalitre	ten litres	capacity
kg	kilogram	thousand grams	mass
m	metre	one metre	distance
mL	millilitre	one thousandth of a litre	capacity
dag	decagram	ten grams	mass
cL	centilitre	one hundredth of a litre	capacity
cm	centimetre	one hundredth of a metre	distance
hL	hectolitre	hundred litres	capacity
hg	hectogram	hundred grams	mass

Topic C: Measuring

Measuring Distance and Length

The metre is the base unit for this purpose. In Topic C, all the prefixes were combined with the base unit *metre*. But for everyday purposes, we use only kilo, centi, and milli with metre.

Use…	To Measure…
kilometres	**long distances**, such as road distances, length of rivers, to measure car speed per hour, highway signs.
metres	**medium lengths**, such as room size, track and field events, size of building lots, rope, extension cords, fabric, carpeting.
centimetres	common, **smaller things** such as a person's height, waist measurement, size of furniture, length of pants, width of wax paper, shoelaces, skis.
millimetres	**very small things** such as postage stamps, size of precise tools, length of screws and nails, fine sewing measurements, thickness of plywood and glass.

Exercise 1

Get a metre stick or tape measure. If you have problems, your instructor will assist you in reading the measuring tool that you use and will check your work.

a. Find the centimetre markings on the metre stick or tape measure. Remember that one centimetre is one hundredth of a metre, so there are 100 centimetres in each metre.
b. Using the centimetre markings, measure the following:
    i. your desk or table top, in both directions
    ii. the distance from the floor to your desk top (its height)
    iii. the cover of this book
    iv. the covers of two different-sized books
    v. the thickness of a fat dictionary
    vi. the height of your chair seat from the floor

    Your hand span is a handy measurement to know because you can use it as a measuring tool to make quick measurements of smaller objects. Knowing the length of your pace is also useful for quick measurements of room size, etc.
c. You will need a flexible tape measure for these measurements to be taken in centimetres.
    i. your height
    ii. your foot length

iii. your smile
iv. ear to ear
v. around your head
vi. the length of your arm

Exercise 2

The answers to questions a are listed below. Your instructor will check your other measurements and assist you as needed.

a. Look carefully at the measuring tool you have been using. Find the millimetre markings if they have been written on the tape or stick. You may have to look at a shorter ruler to find the millimetres marked.

   i. A millimetre is one thousandth of a metre.
   ii. _____ millimetres equal one metre.
   iii. _____ millimetres equal one centimetre.

b. Now measure these items in your classroom, first in centimetres and then in millimetres:

   i. the length of a pen
   ii. the length of a pencil
   iii. the length of an eraser
   iv. the length of two different pieces of chalk
   v. the length of your longest fingernail
   vi. the width of the fingernail on your small finger

c. Measure the longest (or widest) part of each picture in cm and in mm.

Answers to Exercise 2

a.
i. A millimetre is one thousandth of a metre.
ii. 1000 millimetres equal one metre.
iii. 10 millimetres equal one centimetre.

Exercise 3

Make the following measurements. Choose the most convenient unit (metres, centimetres, or millimetres) for each question. Draw a sketch of the shapes. Record your results carefully because you will use them at the end of the Unit Two.

a. Measure the length and width of your classroom.
b. Measure the length and width of the desk or table top that you use.
c. Estimate the length and width of the hallway outside your classroom. Make this estimate by counting the number of paces you must take. Your instructor will demonstrate how to do this if you are not sure of the method.
d. Measure the length and width of the top of a rectangular eraser.

Measuring Mass

Mass measures the weight of something. The unit for mass to which prefixes are attached is the gram – a very small mass. We use the kilogram (1 000 g) for many everyday purposes. In fact, SI uses the kilogram as the official base unit because it is the most used, most practical amount.

Let's look at the use of the common measurements for mass.

Use…	**To Measure**
tonne (t)	**Very large amounts** such as trucks and farm crops; loads on trucks, trains, and ships; coal; factory production.
kilogram	**Common amounts** such as our body mass, meat and vegetables, packaged foods, packaged household.
gram	**Small amounts of mass** such as breakfast cereals, light packaged food, newborn babies, ingredients in some recipes. The amount of certain nutrients that we should eat. Bulk and delicatessen foods may be priced per 100 g.
milligram	Extremely small amounts of mass such as in medicines (3 mg of pain-reliever in every tablet!); the vitamins and minerals in foods (check the nutrient information on a package); the recommended dose of daily vitamins.

The **tonne**, symbol **t**, has not been mentioned before. Notice that the name does not use a prefix or a base unit.

- 1 tonne = 1 000 kg
- 1 tonne = 1 000 000 g (Can you imagine the mass of one million raisins?)

Exercise 4

Use a scale marked in kilograms at a supermarket, at home, or in class for b. to e.

a. Find your own mass in kg.
b. Find the mass of a large turkey.
c. Find the mass of 4 L of milk.
d. Find the mass of 12 carrots.
e. Find the mass of any vegetables and fruit you buy in the next week.

Measuring Capacity (Volume)

The base unit for capacity is the litre. Capacity measures how much fluid a container will hold. The

fluid might be liquids such as milk, water, and blood or it might be a gas such as air or oxygen. The litre and the millilitre are the everyday measurements for capacity.

Use…	**To Measure**
litre	**Common large amounts** of liquids such as milk, gasoline, paint, household cleaners, bottled drinks (pop, juice, etc.), large cans of food; car engines may be described by the litres of air displaced in the cylinders (for example, a 1.5 L engine in a small car). The capacities of buckets, cookware and ice cream are given in litres.
millilitre	Liquids in **smaller containers** less than one litre such as food, soft drinks, and wine. Spices and flavouring for cooking (one teaspoon 5 mL). Measuring cups are often 250 mL or 500 mL.

Look at your home and around the grocery store to find items measured in litres and items measured in millilitres.

Look at measuring spoons to help you get a feeling for small amounts measured in millilitres.

Exercise 5

Write the measurement (prefix and unit) which would be most practical to measure these objects in real life. Answer every part of each question.

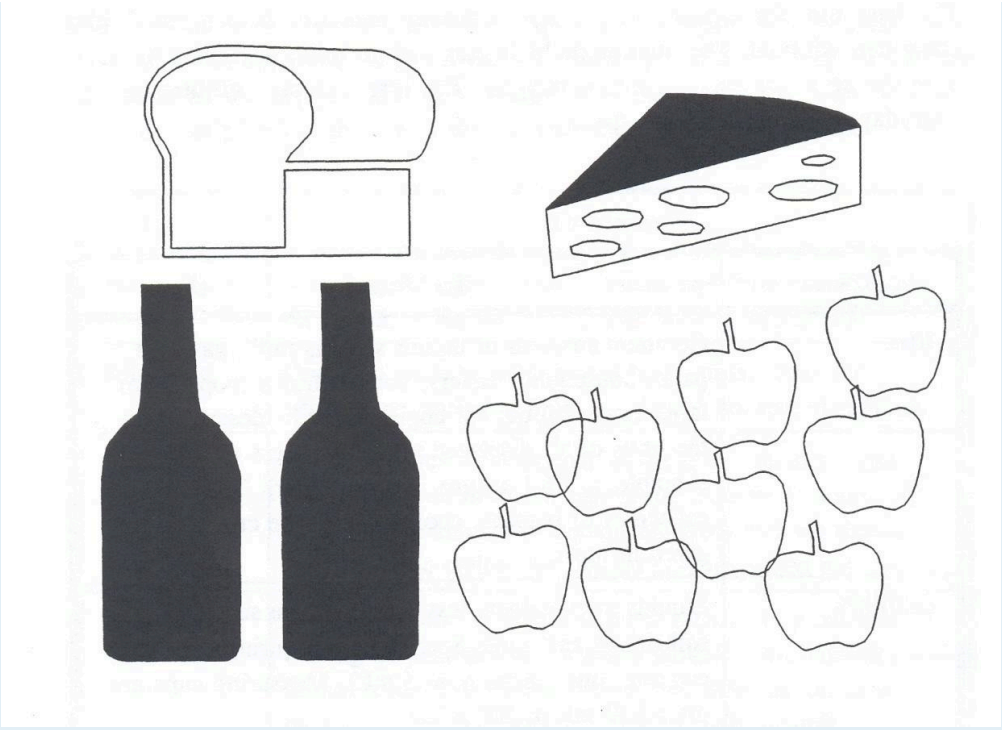
a. Example:

i. bread: mass grams (g); length centimetres (cm)

ii. apples: mass _____ ; distance around _____

iii. wine: mass _____ ; height _____ ; capacity _____.

iv. cheese: mass _____; height _____.

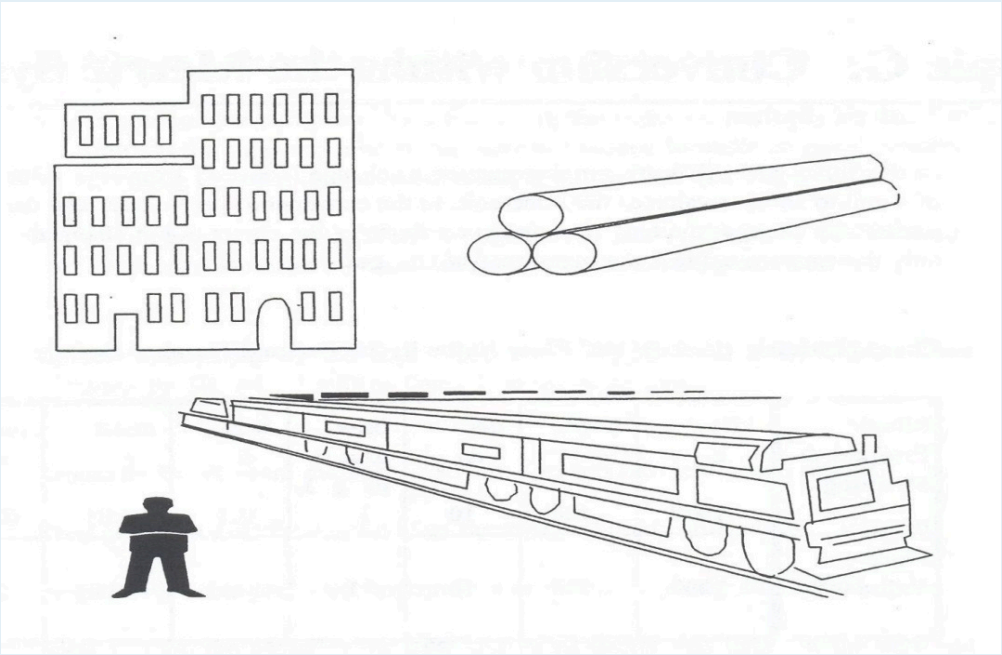


b. i. person mass _____ ; height _____ ; lung capacity _____.

ii. building: height _____ ; width _____.

iii. train: length _____ ; mass _____ ; distance the train travels per hour _____.

iv. logs: length _____ ; mass _____ ; distance across the cut end of one log _____.



Answers to Exercise 5

a. i. bread: grams, centimetres

ii. apples: kilograms, centimetres

iii. wine: kilogram, centimetre, litre

iv. cheese: kilograms, cm or mm

b. i. person: kilograms, centimetres, litres

ii. building: metres, metres

iii. train: metres, tonnes, kilometres

iv. logs: metres, kg or tonnes, cm

Topic D: Conversion within the Metric System

In this topic, you will learn a quick method to change (convert) between different units with the same base. In the conversion, the number and the prefix both change; the length or mass or volume of the object is **not** changed – only the way we express the measurement changes.

Are you a visual learner? If you are, then ask your instructor to show you the next skill. It will save you a lot of frustration. You may learn this skill much faster with a real life example.

Converting Within the Metric System Using the Chart

Chart of Metric Prefixes and Place Value in the Decimal Number System

Metric Prefixes	**kilo**	**hecto**	**deca**	**BASE UNIT**	**deci**	**centi**	**milli**
Mass	kg	hg	dag	g	dg	cg	mg
Volume	kL	hL	daL	L	dL	cL	mL
Length	km	hm	dam	m	dm	cm	mm
Place Value	1 000	100	10	1	0.1	0.01	0.001

Example A

A book weighs 12 g. Convert this amount to mg.

- **Step 1** – If there is no decimal point in the amount, place a . after the amount. 12 g = 12. g
- **Step 2** – Locate the prefix of the known amount. If no prefix is given, find the base unit (gram in the example) in the centre of the chart.
- **Step 3** – Find the prefix that you are changing to (**milli**gram in this example). It is to the right of the gram. Count the number of bars (|) between gram and milli. You cross three bars to move three places to the right.
- **Step 4** – Move the decimal point the same number of places in the same direction as you moved on the chart. Add zeros as needed.
    - 12. g = 12 000. mg
    - The cigar is 12 000 mg.

On the chart, every time you cross over a bar (|), the factor is **10**.

- If you cross a bar going from the left to the right → multiply by 10. The units to the right are smaller, so more are needed to make an equal amount. Crossing 3 bars is the same as multiplying by 1 000 (10 × 10 × 10).

- If you cross a bar going from the right to the left ← divide by 10. The units to the left are larger, so less are needed to make an equal amount.

Review Multiplying by 10, 100, 1 000 in Unit 3, Topic A (#chapter-428-section-3).

Example B

A room measures 450 cm long. Convert this measurement to m.

- **Step 1** – Place a decimal point after the known amount if needed. 450**.** cm
- **Step 2** – Find the prefix of the known amount on the chart. Find centi.
- **Step 3** – Find the prefix or the base unit (if no prefix was used) of the unit you are changing to. Is it left or right of centi? Count the bars between cm and metre. You cross two bars to move **two places to the left**. That is the same as dividing by 100.
- **Step 4** – Move the decimal point the same number of places in the same direction as you moved on the chart. Add zeros as needed.
    - 450. ← cm = 4.50 m × 450 cm = 4.5 m

Example C

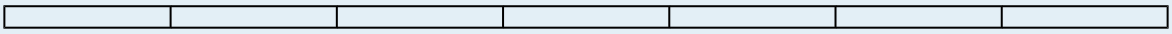
The container holds 45.5 dL. Write this amount in daL.

- **Step 1 and 2** – A decimal point is already in the amount. Find deci on the chart.
- **Step 3** – Find deca on the chart. Count the number of bars you cross going from deci to deca – 2 bars to move 2 places to the left (divide by 100).
- **Step 4** – Move the decimal point 2 places to the left. 45.5 dL = 0.455 daL (less than 1 daL)

Exercise 1

Complete the metric conversions. Some units are not common, but the practice in conversion is useful.

a. From memory, put the metric prefixes on the chart according to their place value. Check that your chart is correct before you use it.



b. 42 cm = ____ m; 8 241 m = ____ km
c. 358 mm = ____ cm; 5 hm = ____ m
d. 0.87 m = ____ mm; 0.5 kg = ____ g
e. 197 cm = ____ m; 4.5 kg = ____ dag
f. 28 m = ____ km; 890 dL = ____ kL

g. 8 L = ____ mL; 85 km = ____ m

h. Add 45 cm and 92 cm. Express the sum in metres.

- Example: 45 cm + 92 cm = 137 cm; 137 cm = 1.37 m

i. Add 245 m, 689 m, and 124 m. Express the sum in kilometres.

j. Multiply 250 mL by 6. Express the product in litres.

Answers to Exercise 1

a.

kilo	hecto	deca	base unit	deci	centi	milli

b. 0.42 m; 8.241 km

c. 35.8 cm; 500 m

d. 870 mm; 500 g

e. 1.97 m; 450 dag

f. .028 km; 0.089 kl

g. 8 000 mL; 85 000 m

h. See example

i. 1.058 km

j. 1.5 L

Why Do We Need to Convert Measurements?

The skill of converting within the metric system is very useful.

- Before we can do any math with measurements we must **be sure the measurements are all in the same unit value**. For example, we can only subtract litres from litres, multiply metres by metres, add milligram to milligrams.
- Measurements are usually written with small whole numbers. This is the simple form of the measurement. For example,
  - instead of 4 587 g, write 4.587 kg
  - instead of 52 000 mL, write 52 L
  - instead of 0.0065 m, write 6.5 mm

Before doing any calculations with measurements, convert them as needed so that the unit values are the same.

Example D

50 g − 275 mg = ?

Convert 50 g to mg: 50 g = 50 000 mg

$$\begin{array}{rr} & 50\,000\ \text{mg} \\ \text{Subtract} - & 275\ \text{mg} \\ & 49\,725\ \text{mg} \end{array}$$

OR

Convert 275 mg to g: 275 mg = 0.275 g

Subtract (add a decimal and zeros to make subtraction easier)

$$\begin{array}{rr} & 50.000\ \text{g} \\ \text{Subtract} - & 0.275\ \text{g} \\ & 49.725\ \text{g} \end{array}$$

Example E

Jill wants to put lace around her tablecloth. The bottom of the table cloth measures 2.6 m around. The lace trim is packaged in 75 cm lengths. How many packages of lace will Jill need to buy so she can trim the tablecloth?

First, convert the measurements to the same values. 2.6 m = 260 cm

This is a division problem. How many groups of 75 cm are in 260 cm? 260 cm ÷ 75 cm = 3.47

Jill will need to buy 4 packages. (She needs more than 3 packages and cannot buy a part of a package.)

Note: When dividing, you are finding out how many times something goes into something else, so you **do not use units in the answer**.

Exercise 2

Convert as needed to solve these word problems.

a. Complete this chart from memory for your use. Check that it is correct.

b. The new refrigerator is 175 cm high. The directions say that 10 cm must be left above the refrigerator for air circulation. The height of the space for the refrigerator is 1.9 m. Will the refrigerator fit?

c. The stairway is 89 cm wide. Bob is installing a carpet runner. The runner comes 1m wide. How much must be trimmed to make it fit on the stairway?

d. Julia is calculating how much juice to buy for the children's school party. How many 250 mL cups will she be able to fill from a 4 L bottle of juice?

e. Charles is 1.67 m tall. His wife Laura is 145 cm tall. How much taller is Charles than his wife?

Answers to Exercise 2

a.

kilo	hecto	deca		deci	centi	milli

b. Yes, with 5 cm to spare.
c. 11 cm
d. 16 glasses
e. 22 cm taller

Only use one unit for a measurement.

For example, use

- 2.75 m **not** 2 m, 75 cm
- 60.5 kg **not** 60 kg, 500 g
- 4.25 L **not** 4 L, 250 mL

When there is a mixed measurement such as shown in the examples, do this:

- convert the amount with the smaller unit value to the larger unit value (it will often be a decimal)
- add the amounts together

Example F

16 cm + 4 mm
4 mm = 0.4 cm
16 cm + 0.4 cm = 16.4 cm

Example G

1 km + 350 m
350 m = 0.350 km
1 km + 0.35 km = 1.35 km

Exercise 3

Write these measurements using only one unit.

a. 5 L + 750 mL =
b. 3 kg + 150 g =
c. 1 m + 5 cm =
d. 5 m + 7 dm =
e. 6 m + 345 cm =

Answers to Exercise 3

a. 5.75 L
b. 3.15 kg
c. 1.05 m
d. 5.7 m
e. 9.45 m

Exercise 4

Here is more conversion practice.

a.

b. 3.2 km = ___ m
c. 0.006 m = ___ mm
d. 1.64 kg = ___ g
e. 155 g = ___ hg
f. 2 m + 16 cm = ___ m
g. 1 L + 50 mL = ___ L
h. 89 m = ___ km
i. 457 m = ___ hm

Watch for different units! Use the simplest form for the answer.

j. 674 mm + 86 cm
k. 5.5 g − 40 dg
l. 45 mL + 16 cL
m. 9954 mL − 8.9 L =
n. 128 hm + 4 km =

Answers to Exercise 4

a.

kilo	hecto	deca		deci	centi	milli

b. 3 200 m
c. 6 mm
d. 1 640 g
e. 1.55 hg
f. 2.16 m
g. 1.05 L
h. 0.089 km
i. 4.57 hm
j. 153.4 cm (1534 mm)
k. 9.5 g (95 dg)
l. 205 mL (20.5 cL)
m. 1.054 L
n. 16.8 km

Dividing Two Items of the Same Units

Heads up – a new important twist for you!

When you are dividing two items of the same units, the units **cancel** themselves out. This means that your answer **will not have a unit.**

Follow this example:

- 5 000 g ÷ 40 g = 125 (no units in the answer!)
- 880 cm ÷ 11 mm = 8 800 mm ÷ 11 mm = 800 (no units!)

Exercise 5

a. 6 000 g ÷ 250 g =
b. 3.38 m ÷ .13 m =
c. 6 km ÷ .3 km =

Answers to Exercise 5

a. 24
b. 26
c. 20

Topic D: Self-Test

Mark /16 Aim 13/16

A. Give the measurement (unit with prefix as needed) that would be most practical to measure these items. (6 Marks)

a. a child‘s height
b. a big bag of flour
c. the distance from Ottawa to Toronto
d. a box of oranges
e. the distance from your seat to the door
f. the flavouring to put in the cake batter

B. Complete the metric conversions. (5 Marks)

a. 8 m = ____ cm
b. 5.2 hm = ____ km
c. 4.2 kg = ____ g
d. 242 dag = ____ kg
e. 28 mm = ____ cm

C. Calculate. Express the answer in simplest form. Watch the prefixes! (5 marks)

a. 8.2 L − 48 mL =
b. 42 mg + 2 dg =
c. 0.8 m ÷ 20 cm =
d. You need a strip of metal that is 97 cm in length. The piece of metal that you found in the workshop is 1.3 m. How much must be cut off the end to give you a 97 cm strip? (2 marks)

Answers to Topic D Self-Test

A. Give the measurement that would be most practical.

a. cm
b. kg
c. km
d. kg
e. m
f. mL

B. Complete the metric conversions.

a. 800 cm
b. 0.52 km
c. 4 200 g
d. 2.42 kg
e. 2.8 cm

C. Calculate.

a. 8.152 L
b. 242 mg
c. 4
d. 33 cm

Metric System vs. Imperial System

Originally, people would measure things compared to their body parts.

- In French, the word for inch is *pouce*, which means thumb. So, really, an inch came from the measurement of a thumb.
- We still use the foot for measurement. It came from the measurement of an average person‘s foot.
- If you have ever heard anyone talking about horses, you may have heard about a horse being a certain number of hands tall.

But the imperial system has problems. Measuring things with your own body is not practical because we are all different shapes. And if you have ever tried to divide a foot into 5 equal parts, you will know that it is not easily done. (A foot is 12 inches, which is not easily divided into 5 equal parts). This problem is found with almost all measurements in the imperial system.

Then, the International System (also known as Metric) was created to make it even easier for people to work with measurements. It is made on a Base Ten System. The Base Ten System is another name for the decimal number system that we use every day. Because we already use the Base Ten System as our decimal system, which many cultures around the world use, it is easy to measure things and divide them up or add them together.

Here are some of the measurements that you may see in the Imperial System and the Metric System:

Measurement	Imperial System	International System (Metric)
Length	Inch, foot, yard, mile	Millimetre, centimetre, metre, kilometre
Mass	Ounce, pound, ton	Milligram, gram, kilogram
Volume	Fluid ounce, cup, pint, quart, gallon	Millilitre, litre, kilolitre

Here are some conversions between the two systems:

Length

Imperial System	International System (Metric)
1 inch	2.54 cm
1 foot	0.30 m
1 mile	1.61 km
1.09 yards or 3.28 feet	1 m
0.62 miles	1 km

Mass

Imperial System	International System (Metric)
1 ounce	28.35 g
1 pound	0.45 kg
0.04 ounces	1 g
2.20 pounds	1 kg

Volume

Imperial System	International System (Metric)
1 fluid ounce	29.57 mL
1 quart	0.95 L
1 gallon	3.79 L
0.03 fluid ounces	1 mL
1.06 quarts	1 L

You may find this is useful information. It is not necessary to learn or memorize any of the above numbers.

Unit 6 Review

A. Complete these metric conversions:

a. 5 m = _____ cm

b. 3.3 dam = _____ mm

c. 53 mm = _____ dm

d. 1 km = _____ m

e. 38 cm = _____ dam

f. 47.39 m = _____ hm

g. 3.734 km = _____ mm

h. 47.32 m = _____ dm

i. 15 dam = _____ hm

j. 0.53 cm = _____ mm

k. 7 cg = _____ mg

l. 218 dag = _____ g

m. 31.4 hg = _____ dg

n. 3.843 kg = _____ g

o. 47.1 cg = _____ mg

p. 42 mg = _____ g

B. Write these measurements using only the larger unit.

a. 6 L and 650 mL =

b. 8 g and 45 cg =

c. 1 kg and 45 g =

d. 9 km and 35 013 dam =

e. 5 m and 8 dm =

f. 6 g and 345 cg =

C. Solve the following word problems:

a. Bamboo is a fast growing plant. It can grow 2 cm per hour. In 5 weeks, a bamboo reaches adult height of 18 m. If Yolanda planted a bamboo seedling that was 7 cm high, how much did it grow to reach 18 m?

b. The sediment at the bottom of a creek is usually 17 cm thick. Recent winter flooding washed 22 mm of the sediment away. How thick is it now?

c. A logging company needs to cut a 70 m long tree into 20 equal pieces before loading it onto a truck for shipping. How long will each piece be?

d. Robyn's son used to drink 1.33L of milk each day as a teenager. How much milk did he drink each week?

e. Veronica drank 368 mL of tea from her two litre teapot. How much tea is left in the pot?

Unit 6: Answers to Review

A. Complete these metric conversions.

a. 500 cm

b. 33 000 mm

c. 0.53 dm
d. 1 000 m
e. 0.038 dam
f. 0.4739 hm
g. 3 734 000 mm
h. 473.2 dm
i. 1.5 hm
j. 5.3 mm
k. 70 mg
l. 2180 g
m. 31 400 dg
n. 3 843 g
o. 471 mg
p. 0.042 g

B. Write these measurements using only the larger unit.

a. 6.65 L
b. 8.45 g
c. 1.045 kg
d. 359.13 km
e. 5.8 m
f. 9.45 g

C. Solve the following word problems.

a. It grew 17.93 m.
b. The sediment is now 14.8 cm.
c. The log will be cut into 3.5 m pieces.
d. He would drink 9.31 L or milk each week.
e. Veronica has 1.632 L of tea left in her pot.

Test time!

Please see your instructor to get your **Practice Test**.

When you are confident, you can write your **Unit 6 Test.**

Congratulations!

Book 4 Final Review

You will now practice all the skills you learned in Book 4. You can use this as a review for your final test.

If you can't remember how to do a question, go back to the lesson on this topic to refresh your memory.

The unit and topic for where each question came from is listed in the heading preceding the question. Example: 1B means Unit 1, Topic B.

1B

A. Write as decimals.

   a. fifty-seven hundredths
   b. six hundred ninety-five thousandths
   c. eight tenths
   d. three and two hundred six thousandths
   e. $\frac{3142}{10000}$

B. Write as common fractions and in words. *Example:* $0.4 - \frac{4}{10}$ *four tenths*

   a. 0.7
   b. 7.3
   c. 0.41
   d. 23.0501

C. Write the amount of money with numerals, using a $.

   a. seven dollars and twenty-four cents
   b. four cents
   c. two hundred thirty-three cents

1C

D. Cross out any extra zeros that are not needed.

   a. 314.6090
   b. 087.070

E. Show which number is larger by using < or >.

a. 0.736 _____ 0.763 b. 6.972 _____ 6.0972

F. Show if each pair of decimals is equal (=) or not equal (≠).

a. 1.51 _____ 1.051 b. 0.952 _____ 0.925

G. Round each of the following to the nearest whole number.

a. 8.17 b. 0.6

H. Round each of the following to the nearest tenth.

a. 1.559 b. 0.145

I. Round each of the following to the nearest hundredth.

a. 72.013 b. 0.4685

J. Round each of the following to the nearest thousandth.

a. 0.2795 b. 0.0108

2A

K. Find the sum.

a.
$$\begin{array}{r} 34.972 \\ 17.08 \\ 6.3 \\ +\ 76.504 \end{array}$$

c.
$$\begin{array}{r} 100.456 \\ 36.29 \\ 298.217 \\ +\ 42.942 \end{array}$$

b. 28.53 + 8.972 + 13.554 + 691 =

2B

L. Find the difference.

a.
$$\begin{array}{r} 83.026 \\ -\ 41.893 \end{array}$$

b. 79 − 25.086 =

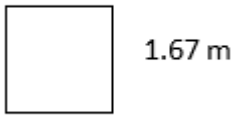
c. 172.257 − 69.088 =

M. Solve the following word problems.

a. Sylvia bikes 2 times a week. On Monday she biked 25.8 km and on Friday she biked 34.5 km. How far did she bike in total?

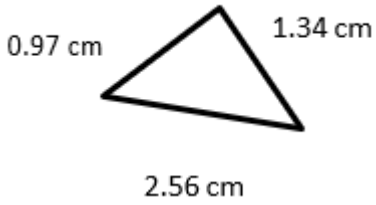
b. The average height of people in Denmark is 1.83 m. The average height of people in Canada is 1.79 m. How much greater is the average height in Denmark than the average height in Canada?

c. Roberta bought a pair of eyeglasses that cost a total of $346.98. The frames of the glasses were $234.56. How much did the lenses cost?



d. Find the perimeter.

e. Find the perimeter.



2C

N. Complete a bank transaction record using this information. Arrange the information in **chronological** order. That means put the information with the earliest date first, then the next date, and so on. The balance forward is $621.95.

Credits (cheques will have cheque number)

Date	Cheque number	Details	Transaction
2022-09-03	n/a	INTERAC PAYMENT Pharmacy	$28.81
2022-09-04	#207	Terrace Aquatic Centre	$101.00
2022-09-16	n/a	AUTOMATIC PAYMENT Car Payment	$291.00
2022-09-02	n/a	INTERAC PAYMENT Sally‘s Clothing Store	$132.55
2022-09-23	#208	Citywest Cable	$74.32
2022-09-08	n/a	WITHDRAWAL Cash	$150.00

Debits (cheques will have cheque number)

Date	Cheque number	Details	Transaction
2022-09-30	n/a	ELECTRONIC FUNDS TRANSFER Paycheque	$997.26
2022-09-15	n/a	ELECTRONIC FUNDS TRANSFER Paycheque	$948.74

Transaction Record

DATE	CHEQUE NO.	TRANSACTION	DEBIT	CREDIT	BALANCE
		BALANCE FORWARD			

O. Use this blank cheque to write out cheque #208 from question 14. Use any name and address you wish.

Your name _____
Your address _____
Your phone number_____ _____20_____ No. _____

PAY TO
THE ORDER OF_____ $ _____

_____ _____DOLLARS
100

ABE Bank
123 Any Street
Our Town, BC
Account # 456-789-0 ***SAMPLE ONLY***

MEMO _____ _____

3C

P. Find the product.

a. $\begin{array}{r} 3.56 \\ \times \quad 48 \end{array}$

b. $\begin{array}{r} 0.7059 \\ \times \quad 0.46 \end{array}$

c. $\begin{array}{r} 435.92 \\ \times \quad 1.4 \end{array}$

d. $\begin{array}{r} 2.583 \\ \times \quad 36 \end{array}$

Q. Find the area of the following rectangles.

a. l = 4.15 cm
w = 36.72 cm

b. l = 4.18 m
w = 19.2 m

R. Solve the following problems.

a. Shane worked 40.5 hours last week. His hourly wage is $22.19. How much is his pay before taxes?

b. A math textbook costs $12.87 (including the sales tax). If 14 students in the class each buy a book, how much money did the bookstore get?

c. A pool is 25.8 m by 22.5m. Calculate its perimeter and area.

4A

S. Solve the following division questions.

a. 7.83 ÷ 6 =

b. 504 ÷ 0.08 =

c. 33.2543 ÷ 2.9 =

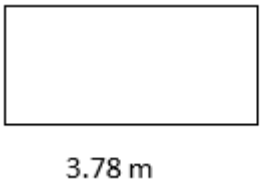
T. Solve the following word problems.

a. Lucy walked 12.75 km over 5 days. How far did she walk each day?

b. Examine the following rainfall chart. How much did it rain in total in January? If all the rain in January was spread out evenly between each of the 31 days of the month, how much rain fell each day? Round your answer to two decimal places.

Date	**Amount of rain in mm**
January 10	15.5 mm
January 14	2.4 mm
January 19	10.73 mm
January 24	1.9 mm
January 29	13.05 mm

c. Find the area and the perimeter.



d. Find the area and the perimeter.

5A

U. Unit Pricing Question:

a. Marissa wants to buy some juice. She can't decide between apple juice and orange juice. Calculate what the unit price is on each of these two brands, to the nearest cent, to decide which of these is the better buy.

- Apple Juice is 5 L for $8.79
- Orange Juice is 4 L for $7.29

6A & B

V. Fill in the following chart.

Unit	**Symbol**	**Measures**	**Examples**
metres			
grams			
seconds			

W. Prefixes have been combined with base units in this question. Write the meaning and the symbol. The first one is done for you.

a. centimeter = One hundredth of a metre = cm

b. decimeter = _____ = _____

c. decameter = _____ = _____

X.

			base unit			

6C

Y. Convert the following:

a. 45 daL _____ L
b. 57 g _____ cg
c. 101 cm _____ mm
d. 49 mL _____ hL
e. 255 mm _____ m
f. 5 km _____ dm
g. 0.75 kg _____ mg

Z. Write the measurements using only one unit.

a. 4 km, 29 m =
b. 17 L, 95 cL =

AA. Answer using only one unit.

a. $\begin{array}{rr} & 391\text{ cg} \\ + & 138\text{ mg} \end{array}$

b. $\begin{array}{rr} & 783\text{ daL} \\ - & 68\text{ mL} \end{array}$

c. 5 km − 99 m =
d. 6 075 cm ÷ 75 mm =

AB. Answer the following word problems.

a. How much fencing is needed to enclose a square field 45.6 m on each side?
b. A metal strip is being installed around three work benches that are 3.46 metres long and 1.2 metres wide. How much metal stripping is needed?
c. If the stripping in question b. costs $6.67 per metre, find the total cost of the stripping.
d. A curtain measures 1.8 metres by 2.1 metres. Find out how many square meters of material is needed for making four more curtains the same size.

Answers to Book 4 Final Review

A. Write as decimals.

a. 0.57
b. 0.695
c. 0.8
d. 3.206
e. 0.3142

B. Write as common fractions and in words.

a. $\frac{7}{10}$ seven tenths

b. $7\frac{3}{10}$, seven and three tenths

c. $\frac{41}{100}$, forty one hundredths

d. $23\frac{501}{10000}$, twenty three and five hundred one ten thousandths

C. Write the amount of money with numerals.

a. $7.24 b. $0.04 c. $2.33

D. Cross out any extra zeros that are not needed.

a. 314.609 b. 87.07

E. Show which number is larger.

a. < b. >

F. Show if each pair of decimals is equal or not equal.

a. ≠ b. ≠

G. Round to the nearest whole number.

a. 8 b. 1

H. Round to the nearest tenth.

a. 1.6 b. 0.1

I. Round to the nearest hundredth.

a. 72.01 b. 0.47

J. Round to the nearest thousandth.

a. 0.280 b. 0.011

K. Find the sum.

a. 134.856 b. 742.056 c. 477.905

L. Find the difference.

a. 41.133 b. 53.914 c. 103.169

M. Solve the word problems.

a. 60.3 km
b. 0.04 m
c. $112.42
d. 6.68 m
e. 4.87 cm

N. Complete the bank transaction record.

Transaction Record

DATE	CHEQUE NO.	TRANSACTION	DEBIT	CREDIT	BALANCE
		BALANCE FORWARD			$621.95
2022-09-02		INTERAC PAYMENT Sally's Clothing Store		132.55	489.40
2022-09-03		INTERAC PAYMENT Pharmacy		28.81	460.59
2022-09-04	207	Terrace Aquatic Centre		101.00	359.59
2022-09-08		WITHDRAWAL Cash		150.00	209.59
2022-09-15		ELECTRONIC FUNDS TRANSFER Pay	948.74		1158.33
2022-09-16		AUTOMATIC PAYMENT Car Payment		291.00	867.33
2022-09-23	208	Citywest's Cable		74.32	793.01
2022-09-30		ELECTRONIC FUNDS TRANSFER Pay	997.26		1790.27

O. Write out cheque #208.

Your name Joy Blackburn
Your address 222CollegeDr
Your phone number (250)444-444 September 23 2010 No. 208

PAY TO
THE ORDER OF Citywest's Cable $ 74.32

Seventy-four----------
32 DOLLARS 100

ABE Bank
123 Any Street Account # 456-789-0 ***SAMPLE ONLY***
Our Town, BC

MEMO _____ *J.Blackburn*

P. Find the product.

a. 170.88
b. 0.324714

c. 610.288

d. 92.988

Q. Find the area.

a. 152.388 cm^2

b. 80.256 m^2

R. Solve the problems.

a. $898.70

b. $180.18

c. perimeter = 96.6 m, area = 580.5 m^2

S. Solve the division questions.

a. 1.305

b. 6 300

c. 11.467

T. Solve the word problems.

a. 2.55 km each day

b. 43.58 mm, 1.41 mm

c. 5.103 m^2, 10.26 m

d. 2083.923 cm, 182.6 cm

U. Apple juice is the better buy at $1.76/L (orange juice is $1.82/L)

V. Fill in the following chart.

Unit	**Symbol**	**Measures**	**Examples**
metres	m	length	running race, height
grams	g	weight/mass	medication, baby's weight
seconds	s	time	time left on a test

W. Write the meaning and the symbol.

a. one hundredth of a metre = cm

b. one tenth of a metre = dm

c. ten metres = dam

X. Fill in the following chart.

kilo	hecto	deca	**base unit**	deci	centi	milli

Y. Convert the following.

a. 450 L

b. 5 700 cg

c. 1010 mm

d. 0.00049 hL

e. 0.255m

f. 50 000 dm

g. 750 000 mg

Z. Write the measurements using only one unit.

a. 4029 m

b. 1795 cL

AA. Answer using only one unit.

a. 4048 mg or 404.8 cg

b. 7 829 932 mL or 782.9932 daL

c. 5099 m or 5.099 km

d. 810

AB. Answer the word problems.

a. 182.4 m

b. 27.96 m

c. $186.49

d. 15.12 m^2

Final Test Time!

This is the review unit of your course, so, now is the time to write the final test!

See your instructor for the **Practice Final Test**, and when you are confident, write **the Final Test A or B**.

Congratulations!

Acknowledgments - 1st Edition

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Glossary

addends

The numbers to be added together in an addition question. In 3 + 5 = 8, the addends are 3 and 5.

axis

Any straight line used for measuring or as a reference.

balance

Balance has many meanings. In money matters, the balance is the amount left. It might be the amount left in a bank account (bank balance) or it might be the amount you still must pay on a bill (balance owing).

cancelled cheque

A cheque that has been cashed. The cheque is stamped, or cancelled, so it is no longer negotiable.

circumference

The distance around a circle; the perimeter of a circle.

commission

Salespeople may be paid a percentage of the money made in sales. The commission is part or all of their earnings.

common fractions

e.g., ⅔, ³⁄₇ , ⁴⁹⁄₅₀

cross multiply

In a proportion, multiply the numerator of the first fraction times the denominator of the second fraction. Then multiply the denominator of the first fraction times the numerator of the second fraction. In a true proportion, the products of the cross multiplication are equal.

denominator

The bottom number in a common fraction; tells into how many equal parts the whole thing has been divided.

diameter

The distance across a circle through its centre.

difference

The result of a subtraction question, the answer. Subtraction gives the difference between two numbers.

digit

Any of the ten numerals (0 to 9) are digits. This term comes from our ten fingers which are called digits. The numerals came to be called "digits" from the practice of counting on the fingers!

discount

An amount taken off the regular cost. If something is bought "at a discount" it is bought at less than the regular price.

divide

To separate into equal parts.

dividend

The number or quantity to be divided; what you start with before you divide.

divisor

The number of groups or the quantity into which a number (the dividend) is to be separated.

equal (=)

The same as

equation

A mathematical statement that two quantities are equal. An equation may use numerals with a letter to stand for an unknown quantity. 6 + Y = 9

equivalent

Equal in value; equivalent numbers (whole or fractions) can be used interchangeably; that is, they can be used instead of each other.

estimate

Make an approximate answer. Use the sign ≈ to mean approximately equal.

factors

The numbers or quantities that are multiplied together to form a given product. 5 × 2 = 10, so 5 and 2 are factors of 10.

fraction

Part of the whole; a quantity less than one unit.

horizontal

In a flat position, e.g. we are horizontal when we lie in a bed. A horizontal line goes across the page.

improper fraction

A common fraction with a value equal to or more than one.

infinite

Without end, without limit.

invert

To turn upside down.

like fractions

With the same denominators.

lowest terms

When the terms of a common fraction or ratio do not have a common factor (except 1), the fraction or ratio is in lowest terms (also called simplest form).

minuend

The first number in a subtraction question.

mixed decimal

A whole number and a decimal fraction. 1.75

mixed number

A whole number and a common fraction. 1 ¾

multiple

If a certain number is multiplied by another number, the product is a multiple of the numbers. Think of the multiplication tables. For example, 2, 4, 6, 8, 10, 12, 14... are multiples of 2.

multiplicand

The number to be multiplied.

multiplier

The number you multiply by.

negotiable

Something which can be cashed, that is, exchanged or traded as money.

numbers

Numbers represent the amount, the place in a sequence; *number* is the idea of quantity or order.

numerals

The digits 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 are also called numerals. These ten digits are combined to make infinite numerals. Digits are like letters, numerals are like words, and numbers are the meaning.

numerator

The top number in a common fraction; the numerator tells how many parts of the whole thing are being considered.

overdrawn

If the value of the cheques or money taken from a bank account is higher than the amount of money in the account, then the account is overdrawn. The account is "in the hole" or "in the red" are expressions sometimes used.

parallel

Two objects or lines side by side, never crossing and always the same distance from each other. Railway tracks are parallel, the lines on writing paper are parallel.

percent (%)

For every one hundred.

perimeter

The distance around the outside of a shape.

place value

We understand numbers by the way the digits (numerals) are arranged in relationship to each other and to the decimal point. Each position has a certain value. Our number system is a **decimal system**. The place value is based on **ten**.

prime number

A number that can only be divided evenly by itself and 1.

product

The result of a multiplying question, the answer.

proper fraction

A common fraction with a value less than one.

proportion

Generally, proportion is a way of comparing a part of something to the whole thing. E.g., his feet are small in proportion to his height. In mathematics, proportion is used to describe two or more ratios that are equivalent to each other.

quotient

The result of a division question; the quotient tells how many times one number is contained in the other.

radius

The distance from the centre of a circle to the outside of the circle.

ratio

The relationship between two or more quantities. E.g., the ratio of men to women in the armed forces is 10 to 3 (10:3)

reciprocal

A number, when multiplied by its reciprocal, equals 1. To find the reciprocal of a common fraction, invert it. $\frac{3}{5} \times \frac{5}{3} = 1$

reduce

Write a common fraction in lowest terms. Divide both terms by same factor.

remainder

The amount left when a divisor does not divide evenly into the dividend. The remainder must be less than the divisor.

sign

In mathematics, a symbol that tells what operation is to be performed or what the relationship is between the numbers.

+ plus, means to add
− minus, means to subtract
× multiplied by, "times"
÷ divided by, division
= equal, the same quantity as
≠ not equal
≈ approximately equal
< less than
> greater than
≤ less than or equal to
≥ greater than or equal to

simplify

See *reduce*.

subtrahend

The amount that is taken away in a subtraction question.

sum

The result of an addition question, the answer to an addition question.

symbol

A written or printed mark, letter, abbreviation etc. that stands for something else.

term

a) A definite period of time, such as a school term or the term of a loan.

b) Conditions of a contract; the terms of the agreement.

c) In mathematics, the quantities in a fraction and in a ratio are called the *terms* of the fraction or

the *terms* of the ratio. In an algebra equation, the quantities connected by a + or − sign are also called terms.

total

The amount altogether.

transaction

One piece of business. A transaction often involves money. When you pay a bill, take money from the bank or write a cheque, you have made a transaction.

unit

Any fixed quantity, amount, distance or measure that is used as a standard. In mathematics, always identify the unit with which you are working. E.g., 3 km, 4 cups, 12 people, $76, 70 books, 545 g.

unit price

The price for a set amount. E.g., price per litre, price per gram.

unlike fractions

Fractions which have different denominators.

vertical

In an up and down position, e.g., we are vertical when we are standing up. On a page, a vertical line is shown from the top to the bottom of the page.

Versioning History

This page provides a record of edits and changes made to this book since its initial publication. Whenever edits or updates are made in the text, we provide a record and description of those changes here. If the change is minor, the version number increases by 0.01. If the edits involve substantial updates, the version number increases to the next full number.

The files posted by this book always reflect the most recent version. If you find an error in this book, please fill out the Report an Error (https://collection.bccampus.ca/report-error/) form.

Version	Date	Change	Details
1.00	October 3, 2014	Book initially published in the BC Open Collection.	
2.00	March 23, 2023	Book updated and republished in Pressbooks as the second edition.	
2.01	May 23, 2024	Corrected exercise answer.	Corrected calculation and answer in Exercise 1b in Topic B: Decimal Word Problems in Unit 5: Using Decimals in Real Life.
2.02	March 10, 2025	Corrected errors and formatting.	Corrected content and formatting errors in all units, including incorrect answers, erroneous formatting, and typographical errors.
2.03	April 29, 2025	Corrected errors and formatting.	
2.04	May 16, 2025	Corrected content errors.	
2.05	September 19, 2025	Corrected errors and formatting.	Corrected errors and added content in the following sections: • Topic A: Part of the Whole Thing in Unit 1 • Topic B: Reading & Writing Decimals in Unit 1 • Topic D: Rounding Numbers in Unit 1 • Unit 1 Review • Topic A: Adding Decimals in Unit 2 • Topic C: Bookkeeping in Unit 2 • Unit 2 Review • Topic A: Multiplying Decimals in Unit 3 • Unit 3 Review • Topic B: Decimal Word Problems in Unit 5 • Book 4 Final Review
2.06	December 17, 2025	Corrected errors and formatting.	Corrected errors and formatting in various sections.