Grade 10 Essential Mathematics (20S)

A Course for Independent Study

Field Validation Version

Manitoba

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Grade 10 Essential Mathematics (20S)

Introduction

Introduction to the Course

Course Content

Welcome to *Grade 10 Essential Mathematics*! This course is a continuation of the concepts you have been studying in previous years, as well as an introduction to new topics. You will put to use many of the skills that you have already learned to solve problems and do basic arithmetic operations. This course helps you develop the skills, ideas, and confidence that you will need to continue studying math in the future.

Problem solving, communication, reasoning, and mental math are some of the themes you will discover in each module. You will engage in a variety of activities that promote the connections between symbolic math ideas and the world around you.

There are four main areas that you will be exploring: Personal Finance, Shapes and Space, Numbers, and Decision Making.

There are two appendices included in this course. Appendix A consists of conversions that you learned in Grade 10 Essential Mathematics. Appendix B is a glossary of terms and definitions.

This course is divided into eight modules, organized as follows:

- Module 1: Gross Pay, Time Cards, and Percents
- Module 2: Net Pay
- Module 3: Measurement
- Module 4: Geometry
- Module 5: Working with Angles
- Module 6: Consumer Decisions
- Module 7: Trigonometry
- Module 8: Transformations

What Will You Need?

Please note that you do not need a textbook to complete this course. All of the content is included with this package.

Required Resources

Here is a list of things that you **must** have to complete this course:

- a scientific calculator
- a metric ruler (15 cm long is fine)
- an imperial ruler (6 inches long is fine)
- geometry set including a set of compasses, a protractor, and a set square

Optional Resources

- Access to a computer with spreadsheet and graphing capabilities will be an advantage, but not a requirement. Use of the Internet may be suggested as a resource in some places, but if you do not have access to an online computer you can still complete the related learning activities and assignments without it.
- Access to a photocopier would be helpful because it would let you make a copy of your assignments before you send them to your tutor/marker. That way, if you and your tutor/marker want to discuss an assignment, you would each have a copy to refer to.

Resource Sheet

When you write your midterm exam you will be allowed to take a Midterm Exam Resource Sheet with you into the exam. This sheet will be one letter-sized page, 8½ " by 11", with both sides in your handwriting or typewritten. It is to be submitted with your exam. The Midterm Exam Resource Sheet is not worth any marks.

Many students have found making a resource sheet an excellent way to review. It also provides you with a summary of the important facts of each module available when you need it. Each student is asked to complete a resource sheet for each module to help with your studying and reviewing. The Lesson Summaries are written for you to use as a guide, as are the Module Summaries at the end of each module.

As you complete each module's resource sheet, you will then be able to try to summarize the sheets from Modules 1, 2, 3, and 4, to prepare your Midterm Exam Resource Sheet. Remember, the midterm is based only on the first four modules of the course.

How Will You Know How You're Doing?

You will know how well you are learning by your successful completion of the following course components:

Learning Activities

Each learning activity has two parts—Part A has BrainPower questions and Part B has questions related to the content in the lesson.

Do not mail learning activities to your tutor/marker.

Part A: BrainPower

The BrainPower questions are provided as a warm-up activity for you before trying the other questions. Each question should be completed quickly and without the use of a calculator. Most should be able to be completed without writing out multiple steps on paper. Some of the questions will directly relate to content you are learning in this course. Some of the questions will be a review of content from previous courses that you need to be able to efficiently answer questions from this course.

Being able to do these questions in a few minutes will be helpful to you as you continue with your studies in mathematics. If you are finding it is taking you longer to do the questions, you can try one of the following:

- work with your learning partner to find more efficient strategies for completing the questions
- ask your tutor/marker for help with the questions
- search online for websites that help you practise the computations so you can become more efficient at completing the questions.

None of the assignment questions or exam questions will require you to do the calculations quickly or without a calculator. However, it is for your benefit to complete the questions, as they will help you in the course. Also, being able to successfully complete the BrainPower exercises will help build your confidence in mathematics. BrainPower questions are like a warm-up you would do before competing in a sporting event.

Part B: Lesson Content

One of the easiest and fastest ways to find out how much you have learned is by completing Part B of the learning activities. These have been designed to let you assess yourself by comparing your answers with the answer keys at the end of each module. They are found in every lesson, including this one.

Some lessons have more than one. You will need a notebook or looseleaf to write your answers in.

Make sure you complete each learning activity. Besides giving you instant feedback, they will help you practice what you have learned and prepare you to successfully complete hand-in assignments and exams. Many of the questions on the exams will be similar to the questions in the learning activities. So, if you were able to answer them correctly, you are likely to do well on your exams. If you did not answer them correctly, you need to go back to the lesson and review the instructions and examples. Don't skip ahead without learning. If you do, you will be wasting your time, and you won't be able to complete later lessons.

Assignments

There are two types of assignments that you must submit to your tutor/marker. Each module has a cover assignment, which you can complete at any time during the module. Lesson assignments are located at the end of every lesson, and include questions similar to the questions in the learning activities of that lesson. The cover assignments and lesson assignments have space provided for you to write your answers on the question sheets. You need to show all your steps as you work out your solutions and make sure your answers are clear (include units, where appropriate). There is no answer key for either of the assignments included at the end of the module because your tutor/marker will correct these assignments and then return them to you. These assignments make up 75% of your final mark. You must complete each assignment in order to receive a final mark in this course. **You will mail these assignments to your tutor/maker along with the appropriate cover page once you complete each module.**

Midterm and Final Exams

The course contains a midterm exam and a final exam. You will write both exams under supervision. The midterm exam is based on Modules 1 to 4 and is worth 12.5% of the final course mark. You will write it when you have completed Module 4. In order to do well on the midterm exam, you should review all of the work you have completed from Modules 1 to 4, including all learning activities and assignments. The conversion formula tables that are shown on the following page are on the exam. All other formulas are not provided on the exam. As a student, you can use your Midterm Exam Resource Sheet to bring any formulas you have not memorized into the exam with you. You will be required to bring the following supplies to the midterm exam: pens/pencils (2 or 3 of each), blank paper, a scientific calculator, and your Midterm Exam Resource Sheet.

The final exam is not cumulative, so it is based on Modules 5 to 8. It is worth 12.5% of the final course mark. You will write it when you have completed Module 8. In order to do well on the final exam, you should review all of the work that you have completed from Modules 5 to 8, including all learning activities and assignments. Formulas are not provided on the exam. You can use your Final Exam Resource Sheet to bring any formulas you have not memorized into the exam with you. You will be required to bring the following supplies to the final exam: pens/pencils (2 or 3 of each), blank paper, a scientific calculator, a ruler, a protractor, a compass, and your Final Exam Resource Sheet.

Basic Conversion Formulas between Systems

	Imperial	Metric
Mass	2.2 pounds 1 pound 1 ounce	1 kg 454 g 28.4 g
Capacity	1 gallon (Canadian) 1 fl. oz. (Canadian) 1 gallon (US) 1 fl. oz. (US)	4.54 L 28.41 mL 3.785 L 29.57 mL
Distance	1 mile 0.62 mile 1 inch 1.094 yards	1.61 km 1 km 2.54 cm 1 metre

Area Conversion Formulas

Imperial		Metric
1 $in.^2$		6.4516 cm^2
1 $ft.^2$	144 $in.^2$	0.0929 m^2
1 $yd.^2$	9 $ft.^2$	0.8361 m^2
1 acre	4840 $yd.^2$	4046.9 m^2
1 $mile^2$	640 acres	2.59 km^2

Metric		Imperial
1 cm^2	100 mm^2	0.1550 $in.^2$
1 m^2	10 000 cm^2	1.1960 $yd.^2$
1 hectare (ha)	10 000 m^2	2.4711 acres
1 km^2	100 ha	0.3861 $mile^2$

You are responsible for applying for the exams and make arrangements to have the exams sent to your proctor from the Independent Study Option office. Before you finish Module 4 you will need to make arrangements to write your midterm exam. Before you finish Module 8, you will need to make arrangements to write your final exam. When you write either of these exams, you will be supervised by a proctor. Contact the Independent Study Option (referred to as ISO) at 1-800-465-9915 if you need help arranging this.

Here is how you apply for an exam:

If you are attending school, ask your school's ISO Facilitator to add your name to the ISO exam eligibility list. Do this at **least three weeks prior** to the next scheduled exam week.

If you are not attending school, check the **Examination Request Form** for options available to you. The Examination Request Form was mailed to you with this course. Fill in this form and mail or fax it **three weeks before** you are ready to write your exam. The address is:

ISO Registration
555 Main St.
Winkler, MB R6W 1C4
Fax: 204-325-1719
Phone: 1-800-465-9915

Practice Exams and Answer Keys

To help you succeed in your midterm and final exams, you need to write the practice exams that are found at <www.edu.gov.mb.ca/k12/dl/downloads/index.html>.

These exams are very similar to the actual exams that you will be writing. They also include an answer key, so that you can check your answers when you have finished writing them. This will give you the confidence that you need to do well on your exams. If you do not have access to the Internet, contact the Independent Study Option at 1-800-465-9915 to get a copy of the practice exams.

What If You Need Help?

Here are two people who can help you be successful in your course.

Your Tutor/Marker

The first person who can help you is your tutor/marker. Tutor/markers are experienced teachers who tutor ISO students and mark assignments and exams. If you are having difficulty at any time during this course, be sure to contact your tutor/marker by phone or email. They are there to help you. If you are not sure how to contact your tutor/marker, phone the Independent Study Option at 1-800-465-9915.

The first learning activity and assignment for this course will involve contacting your tutor/marker.

Your Learning Partner

The next person who can help you with your course is a learning partner. A learning partner is someone you choose who will help you learn. It may be someone who knows something about math, but it doesn't have to be. A learning partner could be someone else who is taking this course, a teacher, parent, sibling, or a friend, or anybody else who can help you. Most importantly, a learning partner should be someone you feel comfortable with and who will support you as you work through this course.

Your learning partner can help you keep on schedule, check your work, help you make sense of assignments, read your course with you, or look at your learning activities and respond to them. You may even study for your exam with your learning partner.

One of the best ways that your learning partner can help you is by reviewing your midterm and final practice exams with you. These are found at <www.edu.gov.mb.ca/k12/dl/downloads/index.html>, along with their answer keys. Your learning partner can administer your practice exam, check your answers with you, and then help you learn the things that you missed.

How Much Time Will You Need?

Learning through independent study has several advantages over learning in the classroom. You are in charge of how you learn and can choose how quickly you will complete the course. You don't have to wait for your teacher or classmates, and you can work as quickly as you want. You can also complete as many lessons at a time as you want. Read the next few pages to get an idea of how to pace yourself. You have one full year from the date of your registration to complete this course, but the pace at which you complete the course is up to you.

Chart A: Semester 1

Here is a **suggested timeline** that you can follow if you start your course in September and need to complete it by the end of January.

Module	Completion Date
Module 1	mid-September
Module 2	late-September
Module 3	mid-October
Module 4 and Midterm Exam	early-November
Module 5	mid-November
Module 6	late-December
Module 7	mid-December
Module 8 and Final Exam	mid-January

Chart B: Semester 2

Here is a **suggested timeline** that you can follow if you start your course in January and need to complete it by June.

Module	Completion Date
Module 1	mid-February
Module 2	late-February
Module 3	mid-March
Module 4 and Midterm Exam	early-April
Module 5	mid-April
Module 6	early-May
Module 7	mid-May
Module 8 and Final Exam	mid-June

Chart C: Full School Year (Not Semestered)

Here is a **suggested timeline** that you can follow if you have registered for this course in September and would like to complete it by June.

Module	Completion Date
Module 1	late-September
Module 2	late-October
Module 3	late-November
Module 4 and Midterm Exam	mid-January
Module 5	mid-February
Module 6	mid-March
Module 7	mid-April
Module 8 and Final Exam	late-May

Do not wait until the last minute to complete your work, since your tutor/marker may not be available to mark it immediately. Make sure that you leave enough time for your work to travel through the mail, as that might take over a week. It may also take a few weeks for your tutor/marker to mark everything and send the marks to your school.

If you need this course to graduate this school year, remember to schedule and complete your final exam by June 1.

When Do You Send in Your Assignments?

You'll be mailing your assignments to your tutor/marker once you have completed an entire module. Each time you mail something, you must include the appropriate Cover Sheet, found at the end of the Introduction.

What Are the Guide Graphics For?

Graphics have been placed inside the margins of the course to identify a specific task. Each graphic has a specific purpose to guide you. A description of each graphic is described below:

Lesson Introduction: The introduction sets the stage for the lesson. It may draw upon prior knowledge or briefly describe the organization of the lesson. It also lists the outcomes for the lesson. These describe what you will learn.

Learning Activity: Complete this learning activity to help you review or practice what you have learned and prepare for your assignment and exam. You will **not** send learning activities to your tutor/marker.

Assignment: This is an assignment that you complete and send to your tutor/marker. You will be sending in your assignments at the end of every module.

Mail-in: Indicates when it is time to mail in your assignments.

Tutor/Marker: Indicates when the tutor/marker is referenced in helping the student.

Learning Partner: Indicates when the student may seek help from their learning partner.

Resource Sheet: Indicates material that may be valuable to include on your resource sheet.

Math Goals

In Module 1, the first learning activity involves you having a conversation with your tutor/marker. Having this conversation with your tutor/marker has two important purposes. First, it introduces you to a very valuable resource—your tutor/marker. He or she is available for you to answer questions, explain concepts and guide you through this course. You can discuss your math learning and progress. Feel free to contact your tutor by phone or email at anytime during this course.

The second important purpose of this assignment is to get you thinking about your math goals. You may have a future career in mind and this course is getting you one step closer to it by filling a prerequisite for a future required course. There may be specific skills or topics you are interested in learning about and they are covered in this course. If you are unsure of your math goals or why they are important consider this:

- goals give you a sense of direction and purpose in taking this course
- goals help motivate you to learn and do your best, even when its tough
- when you accomplish your goals, there is a great sense of achievement and success.

Good goals need to be realistic, specific and they should reflect what is important to you. They should give you direction and take you further down the path from where you have been to where you want to go.

From the diagram you can see that goals can be long term or short term, but they are the pathway that takes **you** from where you were/are, closer to where you want to go.

Getting Started

Now that you have contacted your tutor/marker and set some goals, take some time right now to skim through the course material, locate your Cover Sheets, and familiarize yourself with how the course is organized. Get ready to learn!

Notes

Grade 10 Essential Mathematics (20S)

Module 1
Gross Pay, Time Cards, and Percents

Module 1:
Gross Pay, Time Cards, and Percents

Introduction

In this module, you will learn to calculate your gross earnings for when you start a job. In Lesson 1 and 2 you will review and use your skills with percentages and fractions in solving problems. There are many methods of being paid for your work, many of which will be examined in Lessons 3 and Lesson 4.

Many jobs require workers to "punch" a time card, or more commonly scan the bar code on their name tags. The bar code machine records exactly when the employees actually start work each day, and the length of time they are on the job. You will use time cards to calculate gross pay in Lesson 5. Lesson 6 compares different pay options, and assesses why some might be better than others, depending upon a person's circumstances.

Lesson 7 presents some unique problems related to gross pay. You will be asked to do a small project researching three jobs in your area.

Assignments in Module 1

To obtain credit for Module 1, you will need to complete the following seven assignments, along with the cover assignment.

Lesson	Assignment Number	Assignment Title
	Cover Assignment	Yearning for Earnings
1	Assignment 1.1	Percents
2	Assignment 1.2	Fractions and Percent Rate of Change
3	Assignment 1.3	Gross Income
4	Assignment 1.4	Overtime Pay
5	Assignment 1.5	Time Cards and Late Penalties
6	Assignment 1.6	Comparisons
7	Assignment 1.7	Job Exploration Project

Once you have completed all the hand-ins, you will need to send them to your tutor/marker for marking at the address below. Note that the learning activities in each lesson need not be sent in for marking. Don't forget to include the Module 1 Cover Sheet for identification and for keeping track of your marks.

ISO Tutor/Marker
555 Main Street
Winkler, Manitoba
R6W 1C4

Resource Sheet

When you write your midterm exam you will be allowed to bring a Midterm Exam Resource Sheet with you into the exam. This sheet will be one letter-sized page, 8½ " by 11", with both sides in your handwriting or typewritten. It is to be submitted with your exam. The Midterm Exam Resource Sheet is not worth any marks.

Many students have found making a resource sheet an excellent way to review. It also provides you with a summary of the important facts of each module available when you need it. You are asked to complete a resource sheet for each module to help with your studying and reviewing. The Lesson Summaries are written for you to use as a guide, as are the Module Summaries at the end of each module.

In an attempt to prepare yourself for making such a sheet, a list of instructions is provided below for you to complete as you work through Module 1. You might use your Module 1 Resource Sheet for math terms, formulas, sample questions, or a list of places where you often make mistakes. You might write out what you need or you might refer to page numbers in the lessons to be especially reviewed when studying for the exam.

As you complete each module's resource sheet, you will then be able to try to summarize the sheets from Modules 1, 2, 3, and 4, to prepare your Midterm Exam Resource Sheet. Remember, the midterm exam is based only on the first four modules of the course.

Resource Sheet for Module 1

1. List the math terms that are introduced in each lesson.
2. List any formulas stated in each lesson.
3. What strategies for making calculations were discussed in each lesson?
4. What questions need to be copied onto your resource sheet as being representative of the questions in each lesson?
5. What questions were the most difficult? List page numbers on your module resource sheet so that you can redo these questions before the exam. If any of these problems are "sticklers," you could then write the problems and solutions on your Midterm Exam Resource Sheet so that you have them with you during the exam.
6. What other reminders do you need to make to yourself to help you prepare for the exam?

Notes

Learning Activity 1.1

This learning activity is the only one that does not include a BrainPower section, although it does have two parts. Be sure to complete both before starting the lesson.

Part A: Your Tutor/Marker

Fill in the following blanks using information provided with your course:

My tutor/marker's name is _____

I can phone my tutor/marker at 1-866-_____

My tutor/marker's email is _____

Be ready to discuss the following topics and the reasons for your answers with your tutor/marker during your phone conversation. If you'd like, make some notes below before you call in order to help you feel prepared. Feel free to add other questions or comments that you may have as well.

1. I am taking this course by distance education because…

2. What I like about math and can do mathematically is… (favourite topic, skill, where you use math, etc.).

3. What I dislike about math or have difficulty doing is …

4. Previous math experiences that influence the way I feel about math are…

5. The next math course I would like to take is…

6. What I am hoping this course will help me accomplish and learn for the future…

7. What I am doing/how I will organize things to help me succeed in this course…

_____

_____

_____

_____

During your phone conversation, jot down a sentence or two about what you and your tutor/marker talk about, in the spaces above. For example, if you are taking this course because it doesn't fit into your schedule at school or because you travel a lot with your basketball team and this is more convenient, state that in the space below question 1.

Part B: Your Math Pathway

Use the answers to the questions from the conversation with your tutor/marker as a starting point and fill in the following diagram. In the Math History box, jot down point form notes about your prior experience and knowledge about math (Questions 2, 3, and 4). In the Math Destination box, jot down what completing this course will help you accomplish in the future (Questions 5 and 6).

In between the boxes, write down what you will need to do to move down the pathway from your History to your Destination.

Math History	Pathway	Math Destination

For example, if your destination includes needing a 75% in this course so that you can feel confident going into Grade 11 Essential Mathematics, or you need to learn how to make smart consumer decisions, what will help you accomplish this? It may mean figuring out how you best learn and study math. It may mean setting up a schedule so you complete the assignments on time. You may need to find your calculator manual and figure out how to use it, set up regular appointments with your learning partner, research a topic on the Internet, or read a textbook about a certain math concept or skill. Your pathway is unique to you.

As you move through this course and work on achieving your goals, self-assessment becomes important. It is the way for you to determine if you are getting closer to your destination, and if the steps along your pathway are taking you in the right direction. You will need to periodically ask yourself: Am I doing my assignments? Are my note-taking skills improving? How often have I contacted my tutor/marker or worked with my learning partner? Have I found useful homework websites? Is my schedule working? What do I need to change or adjust so I can get to my destination?

Several times during this course, you will go through this cycle of looking at where you have been, where you want to go, and where you currently are. At anytime you may want to revise your goals or set new ones, as you evaluate your own progress and learning.

- Look back/history—reflect on what you know, how far you have come
- Look around/pathway—assess if you are achieving your goals, determine if new learning or understanding has occurred, and check your progress
- Look forward/destination—determine what you want to know, set goals

Each time you go through these steps you will become better at mathematics!

It is important that you keep this diagram handy, as you will revisit it at other points in this course.

Lesson Focus

In this lesson, you will

- ❑ convert percents to decimals
- ❑ convert decimals to percents
- ❑ demonstrate an understanding of calculations using percents

Lesson Introduction

You will use your skills with percents this module. You must have a solid understanding of what percents mean, and how to use them. In this lesson, you will look at how percents are determined. You will also look at how short cuts can be used to simplify converting a percent to a decimal. Employing your skills in solving problems using percents demonstrates your solid understanding.

Decimals and Percents

Percents are everywhere—at school, in the mall, even in the sports pages. You will encounter percents in many situations, and you need to understand how they work.

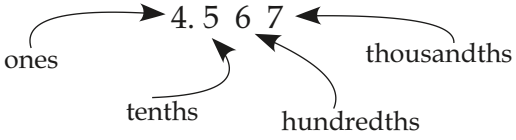
The term "cent" means 100. There are 100 cents in a loonie. There are 100 centimetres in a metre. The term "per" indicates "out of." So, a percent is a value out of 100.

If you scored 65% on a test, that means you earned 65 marks out of a possible 100. When weather forecasters say "there is 100% chance of snow," that indicates there will definitely be snow!

Converting Percents to Decimals

All operations with percents require that you first convert them to decimals.

Recall the place values for decimals.



You may want to include this on your Resource Sheet for this module.

Example 1

Change 42% to a decimal.

Solution:

Since percent means out of 100, then 42% means 42 out of 100. Written as a fraction, 42% is $\frac{42}{100}$ or 42 hundredths. When the fraction is changed to a decimal, the hundredths means there are two decimal places to the right of the decimal point. Thus, 42% is written in decimal form as 0.42.

Example 2

Change 37.5% to a decimal.

Solution:

Given a value of 37.5%, you would write the fraction form of the percent as $\frac{37.5}{100}$. Since there is a decimal in the numerator of the fraction, it must be removed by multiplying the top and the bottom of the fraction by 10.

$$37.5\% = \frac{37.5}{100} = \frac{37.5 \times 10}{100 \times 10} = \frac{375}{1000} = 0.375$$

Thus, 37.5% can be changed to 375 thousandths and is written as 0.375 in decimal form.

Example 3

Change 37.5% to a decimal by using your calculator.

Solution:

You could also use your calculator to do the division for the fraction $\frac{37.5}{100}$.

Just type

37.5	/	100	Enter

You will see the answer of 0.375.

To find a percentage of a value, you convert the percent to a decimal, and then multiply.

Example 4

Find 26% of 500.

Solution:

26% would be written as 0.26 in the equation.

Thus, 26% of 500 would be written as 0.26×500.

Using your calculator, the answer is $0.26 \times 500 = 130$.

Learning Activity 1.2

Complete the following, and check your answers in the learning activity keys found at the end of this module.

Part A: BrainPower

You should be able to complete the following five questions in a few minutes without the use of a calculator or pencil and paper. Especially for the first few times you do these questions, your learning partner can help you figure out strategies to solve these questions in your head.

1. You are going for a walk. You walk north for 5 blocks, turn around, and walk south for 16 blocks. How many blocks are you from where you started? State if you are north or south.
2. If Evan eats $\frac{3}{5}$ of a pizza and Nick eats $\frac{4}{5}$ of a pizza, how many pizzas do they have to order so that both can eat as much as they like?
3. Write the following fraction in simplest terms: $\frac{6}{2}$.
4. Evaluate: 50% of 680 is 340. 25% of 680 is _____ .
5. If you buy a shirt for $8 and jeans for $32, how much do you spend all together (before taxes)?

continued

Learning Activity 1.2 (continued)

Part B: Converting Percents to Decimals

Remember, these questions are similar to the ones that will be on your assignments and midterm exam. So, if you were able to answer them correctly, you are likely to do well on your assignments and midterm exam. If you did not answer them correctly, you need to go back to the lesson and learn them.

1. Convert these percents to decimals.
   a) 70% _____
   b) $12\frac{1}{2}\%$ _____
   c) 6% _____
   d) 125% _____
2. Your friend writes 4% as 0.4 in decimal form. What did he do wrong, and how should 4% be written as a decimal?
3. Find 40% of 600.

Converting Decimals to Percents

The process of converting decimals to percents is the exact reverse of the previous activity.

If you are given a number in decimal form, you can rewrite the decimal as a fraction using the question: "How many hundredths? You don't ask how many tenths or how many thousandths because percent means out of one hundred, not out of ten, or out of a thousand.

Example 1

Change into percents.

a) 0.37

b) 0.8

c) 0.09

Solution:

a) If you were to read 0.37 out loud using place values, and since 0.37 has two decimal places you would say 37 hundredths. As a fraction, this would be $\frac{37}{100}$, which is 37%. Thus, 0.37 = 37%.

b) 0.8 can be rewritten with two decimal places as 0.80. This decimal number is read as 80 hundredths or 80 out of one hundred. In fractional form, 0.80 is $\frac{80}{100}$ or 80%.

c) 0.09 reads as 9 hundredths or $\frac{9}{100}$ which is 9%.

Some values get a little more complicated, but you still read them in terms of "how many hundredths."

Example 2

Change into percents.

a) 1.65

b) 0.047

Solution:

a) 1.65 is read as 1 and $\frac{65}{100}$. Here you have a mixed number that needs to be changed into an improper fraction. Given that $1 = \frac{100}{100}$ and to that you add $\frac{65}{100}$, you get the improper fraction of $\frac{165}{100}$. Now you have a fraction out of one hundred and the percent is 165%. You could also write

$$1.65 = 1 + 0.65 = \frac{100}{100} + \frac{65}{100} = \frac{165}{100} = 165\%$$

b) 0.047 has three decimal places and is read as 47 thousandths or $\frac{47}{1000}$.

To change it to a fraction out of 100 you would need to divide the top and bottom of the fraction by 10.

$$0.047 = \frac{47}{1000} = \frac{47 \div 10}{1000 \div 10} = \frac{4.7}{100}$$

Now you have a fraction out of one hundred, so the percent value is 4.7%.

Learning Activity 1.3

Complete the following, and check your answers in the learning activity keys found at the end of this module.

Part A: BrainPower

You should be able to complete the following five questions in a few minutes without the use of a calculator or pencil and paper. Especially for the first few times you do these questions, your learning partner can help you figure out strategies to solve these questions in your head.

1. Rank the numbers highest to lowest: 0.5, 0.05, 0.3, 0.09, 0.25.
2. Evaluate the following: $2 - 3 + 6 \times 2 - 5 \times 4$.
3. Solve for i: $4i + 3 = 15$.
4. Is an angle that measures 140° acute, obtuse, straight, or reflex?
5. Write the next two numbers in the pattern: 1, 2, 4, 8, ___ , ___ .

Part B: Converting Decimals to Percents

Remember, these questions are similar to the ones that will be on your assignments and midterm exam. So, if you were able to answer them correctly, you are likely to do well on your assignments and midterm exam. If you did not answer them correctly, you need to go back to the lesson and learn them.

1. Convert these decimals to percents.
   a) 0.34 _____
   b) 0.08 _____
   c) 0.065 _____
   d) 2.45 _____
2. Your friend wrote 0.072 as 72%. Identify the mistake she made, and correct it.
3. Find $8\frac{1}{2}\%$ of 900.

Shortcuts

As you were doing these percent questions, you might have noticed a pattern each time you did a conversion.

Example 1

Change each to a percent and comment on the pattern you notice regarding the placement of the decimal point.

a) 0.79

b) 0.045

Solution:

Notice the pattern when you change a decimal to a percent.

a) $0.79 = \frac{79}{100} = 79\%$

b) $0.045 = \frac{45}{1000} = \frac{45 \div 10}{1000 \div 10} = \frac{4.5}{100} = 4.5\%$

The decimal point has been moved two places to the right and a percent sign has been attached.

The shortcut when converting a decimal to a percent follows this pattern. The answer always shows the decimal point moved 2 place values to the right, and a percent sign included at the end.

It may be helpful to include this shortcut on your Resource Sheet.

Example 2

Change each to a decimal and comment on the pattern you notice regarding the placement of the decimal point.

a) 64%

b) 3.25%

Solution:

Notice the pattern when you change a percent to a decimal.

a) $64\% = \frac{64}{100} = 0.64$

b) $3.25 = \frac{3.25}{100} = \frac{3.25 \times 100}{100 \times 100} = \frac{325}{10\ 000} = 0.0325$

The decimal point has been moved two places to the left and there is no percent sign.

The shortcut, when converting a percent to a decimal, follows this pattern. The answer always shows the decimal point moved 2 place values to the left and the percent sign is removed.

Once you are comfortable with decimal and percent conversions, you might try using the shortcuts. But be careful, as sometimes using shortcuts can lead to mistakes.

This shortcut would also be helpful to have on your Resource Sheet.

Students often do not understand the meaning of a percent as being out of 100. For example, 2% is not written as 0.2. Rather, to avoid errors, 2% should first be read as 2 hundredths or $\frac{2}{100}$, and then written as 0.02.

Percents and Sales Tax

In 2010, Manitobans had a Provincial Sales Tax (PST) of 7%, and the federal government Goods and Services Tax (GST) of 5%. These taxes are added to the price of most purchases and services.

Include the two taxes and their percentages on your Resource Sheet.

Example 1

You go to a store to purchase some jeans that cost $29. Find the total price including the taxes.

Solution:

GST = 5% of $29.00 = 0.05 × $29 = $1.45

PST = 7% of $29.00 = 0.07 × $29 = $2.03

The taxes are added to the purchase price. The total cost of the jeans includes the taxes.

Total price = $29 + $1.45 + $2.03 = $32.48

Why Do You Pay Tax?

The provincial government uses income or revenue from the PST to fund hospitals, schools, roads, jails, tourism, and many other public works. The federal government uses income or revenue from the GST to fund Canada's military, the RCMP, immigration, prisons, passport distribution, and many other projects.

Lesson Summary

In this lesson, you reviewed skills for converting percents to decimals, and converting decimals to percents. You explained each process and looked for patterns and shortcuts. You applied your skills to the problem of finding the percentage of a number, sales tax, and the total price.

You used several mathematical words, including percent, cent, place value, ones, tenths, hundredths, thousandths, decimal, improper fraction, percentage, PST, and GST.

The next lesson involves conversions with fractions and percents along with finding the "percent rate of change."

Notes

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