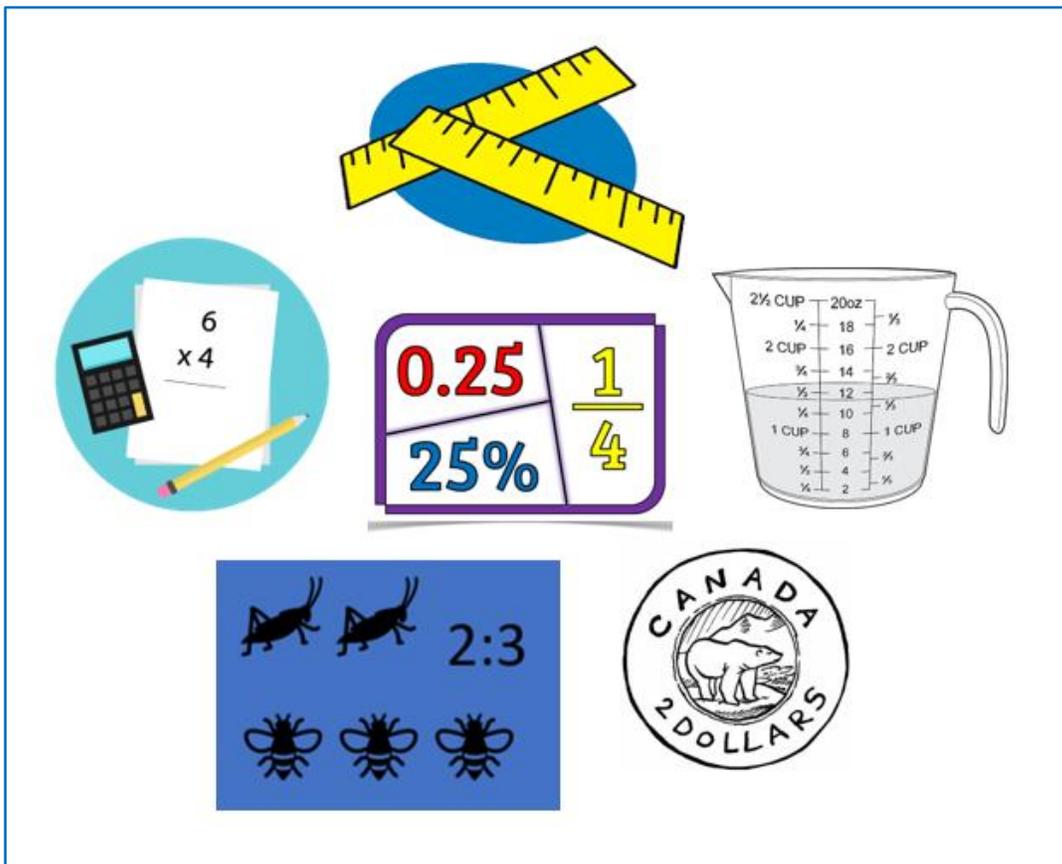

MODULE 4

Understand and Use Numbers



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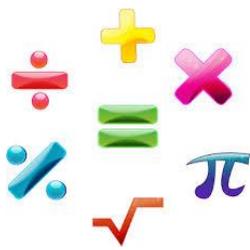
Workplace Skills Manual

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Understanding and Using Numbers



Many jobs require math skills. If you work in a trade, you will need to understand measurements and fractions. If you work in a service job, you might need to make change or add up a bill. This module will cover some of the workplace math skills you may need before starting a new job. Math can be a tricky subject, and if you need assistance with any of these lessons, please ask your instructor for help.

Pre-Module Activity: Brainstorming

Think of different types of jobs. Come up with a list of math skills that you might need at these jobs and write them on the lines below. You may work with a partner if you would like.

Lesson 1: Working with Coins

If you are working at a cash register, the register will tell you the amount of change to return to the customer once they have paid. Your job will be to enter the correct amount and then offer the right amount of change for the customer. This lesson will offer some activities and tips to help with this job.

Counting Change

When giving change to a customer, start with the largest amount of money and work your way down adding the change as you go. For example: You owe a customer \$12.55. Start with the \$10 then the \$2, then add the two quarters and then the nickel.

Quarters go up by 25. Write in the value of each coin as you add one to another.



Dimes are counted by 10s. Write in the value of each dime.



Nickels are counted by 5s. Write the value of each nickel as you count them. How many more nickels would you need to make \$1.00? _____



A \$2 coin (toonie) is counted by 2s. Write the total of the coins below.



Activity 1: Counting Money Practice

Count the money below. This is change you are giving your customer. Start with the largest amount, then the next largest, and so on.



Activity 2: Making Change

Look at the amounts on the cash registers below and write what change you would give the customer. The first one is completed for you.



1 ten-dollar bill, 2 toonies, 1 quarter and 1 dime



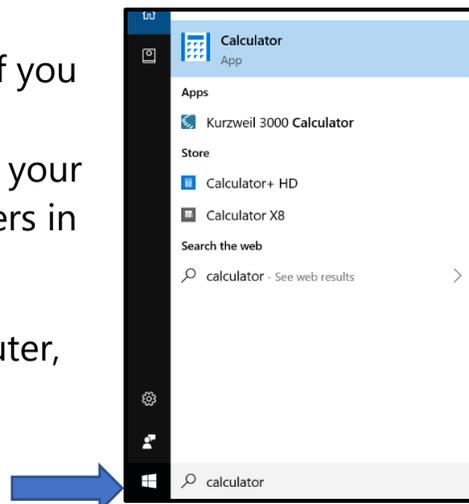




Lesson 2: Using a Calculator

Everyone has access to a calculator these days. If you do not have a portable calculator that you carry around, then you are probably using the one on your phone. There is also a calculator on the computers in your classroom.

If you need to find the calculator on your computer, just click in the search box beside your start or windows button located at the far left of your computer's Task Bar and type **Calculator**.



At some jobs, you are not allowed to have your phone on the floor, and you will not have access to a computer, so ask your boss if you can have a pocket calculator on the job. You never know when it might come in handy.

Knowing how to use a calculator and having one available can help you if you find some of the workplace math difficult.

This module will require you to use a calculator for some lessons and activities. Using a calculator is a good practical idea and is acceptable when studying workplace math.

Activity 1: Getting Information from a Video



Open the calculator on your computer or phone or ask for a basic calculator from your instructor. Have one ready while you are watching the following video.

Open your Internet browser and type the following site into your address bar:

<https://www.youtube.com/watch?v=x-2HjO4iGXI>

or go to YouTube.com and enter: **How to Use a Basic Calculator by Frank LoSchiavo** in the YouTube search box.

Activity 2: Basic Operations on the Calculator

Using the information from the video, try the following math problems using a calculator. Be sure to double-check your answers.

a) $456 \times 777 = \underline{\hspace{2cm}}$

b) $999 \div 33 = \underline{\hspace{2cm}}$

c) $\$29.99 - \$12.44 = \underline{\hspace{2cm}}$

d) $45.898 + 54.22 + 291.444 = \underline{\hspace{2cm}}$

e) $\$67.50 \times 12 = \underline{\hspace{2cm}}$

Lesson 3: Rounding Numbers

Rounding is a way of making numbers simpler and easier to understand and can help when you quickly need to add or subtract amounts. Rounding can be used when you need an idea of how much money you need for a purchase, for example, when you are on a budget at the grocery store. Rounding can also be used when you need more of a general number.

In 2019, at the time this was written, 37,434,172 people lived in Canada (<http://worldpopulationreview.com/countries/canada-population/>), but that number changes every day. You probably will never need to know or tell someone the exact amount of people who live in your country, so it is okay to round the number. To find out how to do that, read the section below.

When rounding, first find the "round-off" digit. The round-off digit is the place value of the number you're rounding to. For example, if you want to round a number to the nearest ten, the round-off digit is the number in the tens' place. If you want to round a number to the nearest hundred, the round-off digit is the number in the hundreds' place.

Please see the chart below if a review of place value is needed.

Decimal Place Value Chart													
Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	Decimal point ←	Tenths	Hundredths	Thousandth	Ten-Thousandths	Hundred-Thousandth	Millionths
Whole part							•	Decimal part					

For example, if the number you need to round is 3,457, and you want to round it to the hundreds' place, perform the following steps:

↻
3,457

Look at the number to the right of the round-off digit. If that number is less than 5, do not change the round-off digit. If that number is 5 or more, add one to the round-off digit.

In the example, the number to the right (in the tens' place) is 5. This means that you round the number in the hundreds' place one higher.

3,457 becomes 3,500

You may notice when rounding, you must change all the digits to the right of the round-off place to zeros.

It can be difficult to round when working with larger numbers, like the population of Canada. For this example, because the number will change every day, we are going to round the number to the hundred thousands' place.

37,4[^]34,172

Since the number to the right of our place is 3, which is less than 5, the number in the hundred thousands' place will stay the same.

37,434,172 becomes 37,400,000

The population of Canada is approximately 37,400,000 people.

Activity 1: Rounding Numbers

1. Go online and search for the population of Ireland. Round the number you find to the ten thousands' place.

Number online: _____ Number rounded: _____

2. Round the following numbers to the tens' place

56 _____ 438 _____ 107 _____ 42 _____ 322 _____ 13,456 _____

3. Round the following numbers to the thousands' place

1,236 _____ 20,309 _____ 165, 999 _____ 81,700 _____ 4,672 _____

Activity 2: Rounding Decimals

Rounding decimals is a little different than rounding whole numbers. The big difference is that instead of changing the numbers to the right of the place you are rounding to zeros, you instead simply drop those numbers (remove them).

Open your web browser, and type in the following web address:

http://www.learnalberta.ca/content/kes/pdf/or_cf_math_num_c_04_rounddec.pdf

Print out this exercise, complete the activities, and hand them in to be marked with this module.

Activity 3: Using Rounding at the Store

You are grocery shopping and need to buy five things. You only have \$20.00. Round each item you need to the nearest dollar on the line beside the item, so you can decide if you can afford all five items.

Shopping List	
Eggs \$2.79	_____
Milk \$4.19	_____
Bread \$2.99	_____
Banana \$0.89	_____
Hamburger \$6.79	_____

Total from rounding to nearest dollar: _____

Do you have enough to buy these items? **YES** or **NO**

Lesson 4: Introduction to Fractions

Credit: TR Leger School, Educational Assistant Preparatory Course

Fractions can be difficult to understand. If you find the following review challenging, you can ask your instructor for more help or work on the subject at any time.



Fractions show a part of something. If you cut a pizza into ten slices, then each slice is one tenth of the pizza.

The bottom number (denominator) in a fraction shows the number of parts something is divided into, and the top number (the numerator) shows you how many parts you have.

For example, if you make an apple pie and cut it into eight pieces and your friend eats $\frac{3}{8}$ of the pie, then your friend has had three out of the eight pieces of the pie; that would leave you $\frac{5}{8}$ of the pie. You would have five out of eight pieces left.

You use fractions in many ways in real life. You can do this when measuring with rulers, measuring cups, and other measuring tools. You also use fractions when talking about sales or time and when you want to give very accurate information about parts of a group.

You can also use decimals to describe some of these as well. Decimals will be discussed in the next lesson of this math module.

Activity 1: Musical Fractions

Please read the directions for this fun, fractions exercise below. You may try this activity yourself or with a partner.



STEP ONE: Fill a set of containers that are all the same size (glasses or measuring cups) with the same amounts of liquid as the photo above.

STEP TWO: Line each glass up from smallest amount to largest.

STEP THREE: Use a teaspoon to “play each glass” and listen to the different sounds.

STEP FOUR: Share any observations with your instructor and/or classmates.

Activity 2: Fractions in Daily Life

Answer the following with yes or no:

1. Do you use fractions to represent time, like a $\frac{1}{2}$ hour or a $\frac{1}{4}$ (a quarter) to? _____
2. Do you use measuring cups when you bake? _____
3. Do you use fractions when giving directions, for example: half a kilometre? _____
4. Have you used fractions when measuring with a tape measure?



Multiples and Factors

In the following example, each number increases by 5.

Fractions - Simplifying

$\frac{9}{15} = \frac{3}{5}$

Factors are 1, 3, 9
HCF, So $9 \div 3 =$

Factors are 1, 3, 5, 15
HCF, So $15 \div 3 =$

5, 10, 15, 20, 25, 30....

This is your 5 times table or the multiples of 5.

$$5 \times 1 = 5 \quad 5 \times 2 = 10 \quad 5 \times 3 = 15$$

$$5 \times 4 = 20 \quad 5 \times 5 = 25 \quad 5 \times 6 = 30$$

5 is a multiple of both 5 and 1

5 and 1 are the factors of 5

Let us look at the number 30.

5 and 6 are also multiples of 30. But those factors are not the only ones.

3 and 10 are also factors of 30: $10 \times 3 = 30$

They are also factors, because they both divide evenly into the number 30.

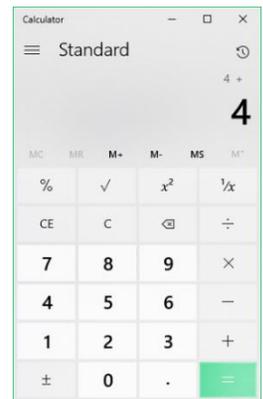
Math Tricks: Help with Factoring

If you have difficulty remembering your times table or just want to learn an easy way to add and subtract fractions, here is a great trick for finding common denominators.

$$\frac{3}{4} \text{ (numerator)} \\ \text{4 (denominator)}$$

$$\frac{1}{5} \text{ (numerator)} \\ \text{5 (denominator)}$$

Step 1: Type the first denominator into your calculator and add that number to itself. For example, $4+4=$



Continue to press equal. As you do, you will see all the numbers that are multiples of 4. Write down the answers in the first row of the table below.

Step 2: Repeat this process using the denominator of 5 from the second fraction to make the second row in the table below.

4	4, 8, 12, 16, 20, 24, 28, 32,
5	5, 10, 15, 20, 25, 30

Find the number that is the same for each denominator:

4	4, 8, 12, 16, 20 , 24, 28, 32
5	5, 10, 15, 20 , 25, 30

The common denominator is 20.

Step 3: For the first fraction, you must multiply 4 by its other factor to get the number 20.

To find out the other factor count from 4 to the common denominator; you will see that 20 is the 5th number in the factoring.

4	4, 8, 12, 16, 20, 24, 28, 32
5	5, 10, 15, 20, 25, 30

$$4 \times 5 = 20$$

Step 4: Do the same with the second denominator:

$$5 \times 4 = 20$$

Step 5: Whatever is done to the denominator of a fraction, must also be done to the numerator. In this example, that means:

$$\frac{3}{4} \times \frac{5}{5} = \frac{15}{20} \quad \frac{1}{5} \times \frac{4}{4} = \frac{4}{20}$$

You will get this equation:

$$\frac{15}{20} + \frac{4}{20} = \frac{19}{20}$$

*Add the numerators to get your answer. The denominator *always* stays the same when adding or subtracting.

Finding the Lowest Common Denominator (LCM)

You can use this trick to find the lowest common denominator when adding and subtracting fractions.

The denominator must be the same for both fractions if you want to add or subtract them.

This is because you need to have the same sized part and groups to add fractions.

You can do this by using the factors as you were shown in our calculator/chart math trick above.

For example: It is $\frac{1}{4}$ km from your work to the supermarket and $\frac{1}{3}$ km from the supermarket to your home. How much would you be driving if you went from your work and then to the supermarket and then home?

$$\frac{1}{4} + \frac{1}{3}$$

The lowest common denominator here is 12.

$$4 \times 3 = 12 \text{ and } 3 \times 4 = 12$$

$$\frac{3}{12} + \frac{4}{12} = \frac{7}{12}$$

Activity 3: Practice Factoring

Try this math trick with the following equations:

$$\frac{1}{4} - \frac{3}{20} =$$

$$\frac{7}{4} + \frac{5}{8} =$$

Reviewing Mixed and Improper Fractions

Please watch the following video from Khan Academy to learn about mixed numbers and improper fractions. If you still need help after the video, please ask your instructor.

<https://www.khanacademy.org/math/arithmetic/fraction-arithmetic/arith-review-mixed-number/v/changing-a-mixed-number-to-an-improper-fraction>

Activity 4: Changing Mixed Numbers into Improper Fractions

$$2\frac{1}{4} \text{ _____}$$

$$5\frac{4}{6} \text{ _____}$$

$$9\frac{2}{3} \text{ _____}$$

Activity 5: Fraction Word Problem



Sheryl bought two bags of fruit for the office today. One bag weighs $3\frac{1}{2}$ pounds and the other weighs $1\frac{3}{4}$ pounds.

1. How much do they weight altogether? _____
2. How much more does one bag weigh than the other? _____

Multiplying and Dividing Fractions

When you multiply fractions, you simply multiply the two numerators and then the two denominators. $\frac{2}{3} \times \frac{2}{3} = \frac{4}{9}$

When you divide fractions you also multiply. The only difference is that you multiply across diagonally instead of straight across.

$$\frac{2}{3} \times \frac{2}{3} = \frac{6}{6} = 1$$

Activity 6: Multiply and Divide Fractions

$$\frac{1}{5} \times \frac{9}{11} = \quad \frac{2}{3} \div \frac{9}{13} = \quad \frac{11}{13} \times \frac{1}{2} = \quad \frac{7}{8} \div \frac{1}{3} =$$

Lesson 5: Calculators and Decimals

When using a calculator, always double-check your number to make sure that you have included your decimals in the right place.

When you divide numbers, the calculator will show the remainder as a decimal.

$15 \div 6 = 2$ with a remainder of 3 (R3).

Try this on your calculator. The calculator will show this as 2.5. This is because 3 is half (0.5) of 6, so the number 6 divides into the number 15 exactly 2.5 times.

Fractions can be converted to decimals using your calculator.

If you wish to find out what a fraction is as a decimal, take the numerator (the top number) and divide it by the denominator (the bottom number).

$$\frac{2}{5} \text{ is equal to } 0.4 \qquad \frac{2}{5} = 0.4$$

$$\frac{1}{4} \text{ is equal to } 0.25 \qquad \frac{1}{4} = 0.25$$

Activity 1: Find the Decimal Value

$$1. \frac{7}{8} = \underline{\hspace{2cm}} \qquad 2. \frac{2}{9} = \underline{\hspace{2cm}}$$

$$3. \frac{1}{5} = \underline{\hspace{2cm}} \qquad 4. \frac{3}{11} = \underline{\hspace{2cm}}$$

Lesson 6: Decimals, Fractions and Percentages

If you want to find the percentage of a decimal number on your calculator, all you need to do is multiply it by 100.

For example: $0.25 \times 100 = 25$ percent (%)

You can also do this with a fraction. Take the numerator of your fraction and divide it by the denominator to get the decimal, then multiply that decimal by 100 to get the percentage. Percentages are always out of 100.

Example

$$\frac{160}{200} = .08 \quad .08 \times 100 = 80\%$$

Activity 1: Calculating Percentages from Fractions

Jennifer is calculating the yearly attendance for the office's company picnic and award's ceremony. She needs to know who has missed the least number of scheduled shifts. Her boss wants her to find the attendance percentage for each employee. Look at Jennifer's list and calculate the percentage of time each employee has attended work for the year. Note: The denominators will vary as the employees work both full time and part-time shifts at the office. Remember to round to the hundredths' place value, so your percentage does not have decimals.

Who will receive the best attendance prize at the picnic? _____

Employee Attendance	
Amari, Medina	$\frac{180}{200} = \underline{\hspace{1cm}}\%$
Attenborough, Gus	$\frac{234}{260} = \underline{\hspace{1cm}}\%$
Flores, Miguel	$\frac{254}{265} = \underline{\hspace{1cm}}\%$
Ito, Kaori	$\frac{162}{180} = \underline{\hspace{1cm}}\%$
Moon, Farah	$\frac{175}{190} = \underline{\hspace{1cm}}\%$
Peterson, Jennifer	$\frac{238}{266} = \underline{\hspace{1cm}}\%$
Richards, John	$\frac{238}{266} = \underline{\hspace{1cm}}\%$
Torres, Sami	$\frac{120}{150} = \underline{\hspace{1cm}}\%$

Math Tricks: Solving Percentages with Your Mind

There is a short cut when calculating a percentage of something when the numbers are multiples of 10.

For example: Maria is pricing a sale and a customer finds a sweater that is 20% off. The sweater costs \$29.99. The customer asks how much the sweater is with the discount. Maria has learned rounding in math, so she knows that 29.99 rounds up to 30.

She wants to help the customer and quickly figure out how much the sweater will be before tax, but sadly, her cellphone battery has run out and she cannot use her calculator.

She uses this quick math trick.

She thinks 20% of 30. And she remembers that when finding percentages ending in zeros, she can drop the zeros and multiply the numbers left to find out how much the discount is.

$$20\% \text{ of } 30 = 6$$

After dropping the zeros, she multiplies 2 x 3 and finds the amount of the discount.

Maria now knows to subtract \$6.00 from the sweater price, which means it is \$24.00 (30.00 - 6.00).

Maria can do this because she knows that the zeros in this equation will cancel each other out as she divides them by 10.

Here is the original math equation:

$$\frac{20}{100} \times \frac{30}{1}$$

Maria cancels out the zeros in the equation $\frac{20}{100} \times \frac{30}{1}$ or as it was written above: $20\% \text{ of } 30 = 6$

Activity 2: Percentage Trick

Try this short cut by cancelling out the zeros in these math problems to get a quick answer.

1. 30% of 10 _____
2. 40% of 80 _____
3. 60% of 30 _____

Using a Calculator for Percentages

Knowing how to use a calculator when working with percentages is a useful skill. Read the following examples to learn how to answer these math problems on a calculator.

EXAMPLE 1: Finn's customers want to tip 15% on their meal. Their dinner comes to \$25.00. They ask Finn to tell them what 15% of \$25.00 is.

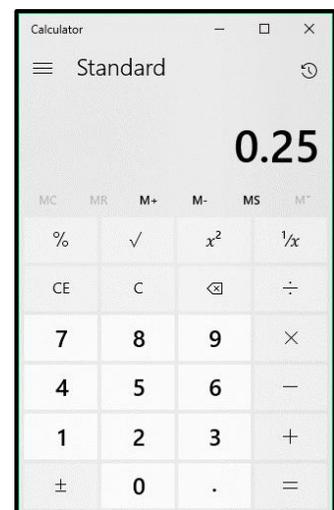
Finn must enter the formula for finding the amount from a percentage into his calculator:

$25 \times 15\%$ = to get his answer
The tip amount will be \$3.75.

EXAMPLE 2: Juan knows that the text books the customer he is helping needs to buy for college are 30% off today at the school bookstore where he works. The books will total \$240. His customer asks how much these books will cost after the discount. To find the total after the discount, Juan must enter this formula for subtracting a percentage into his calculator:

$240 - 30\%$ = to get his answer
The amount of the books will be \$168.00.

EXAMPLE 3: Ming is buying new boots and wants to figure out how much they will be with HST added (13%). The boots are \$75.95. She must enter this equation into her calculator for adding a percentage to a number:



$75.95 + 13\% =$ to get her answer
The cost of the boots will be \$85.82.

Activity 3: Percentages with a Calculator

Please use the information on calculator use above to answer these multi-step word problems.

1. Leilani is an assistant kitchen manager and has \$975.00 to spend on a new dishwasher for the kitchen at the restaurant. She finds an industrial dishwasher for \$1300.00. It is currently on sale for 35% off.

a) How much is 35% of \$1300.00? _____

b) How much is the dishwasher after the 35% is deducted?

c) How much will the dishwasher be once the HST is added?

d) Does Leilani have enough to buy this dishwasher for her restaurant's kitchen? **Yes** or **No**?

e) Show the math equations (calculator formulas) that prove your answer in the box below.

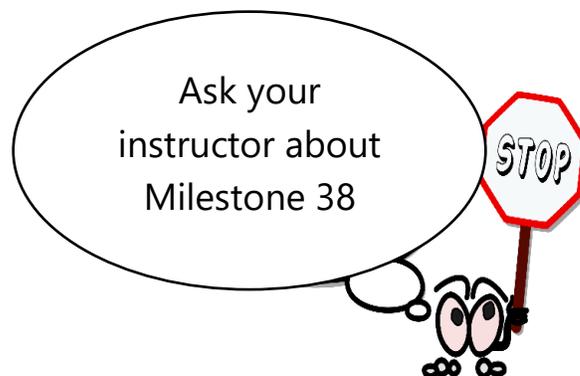
2. Abdul needs to add 5% for commissions to all the employees' December incomes and needs to include how much each employee made in commissions for that month. Fill in the table on the next page and remember to properly round to your hundredths place when dealing with money.

Name	December Earnings	Earning with 5% Commission	Amount of 5% Commission
Benito, Carla	\$1,330.75	\$1397.39	\$66.54
Craven, Harper	\$941.78		
Chen, Delyn	\$1004.65		
Jones, Mitchell	\$754.20		
McDougall, Brian	\$1123.46		
Thompson, Joe	\$899.43		

3. At the Frosted Tips Hair Salon, they mark each product up 20% from the wholesale price. Look at their inventory list below and fill in the new store price what the item will be sold at after markup.

Inventory	Whole Sale	20% of Whole Sale	Store Price
Beauty Life Hairspray	\$10.00		
Beauty Life Leave in Conditioner	\$19.00		
Beauty Life for Curly Hair	\$15.50		
Beauty Life Hair Oil	\$12.50		
Golden Lux Mousse	\$9.50		

Milestone Stop



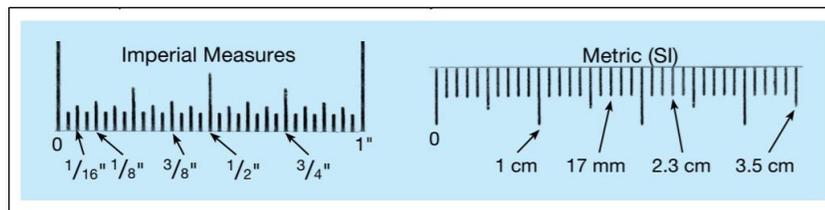
Lesson 7: Measurement and Calculations

Credit: Tape measure section adapted from <https://www.canada.ca/en/employment-social-development/programs/essential-skills/tools/trades-math.html>

Measurement is the way that numbers are used most often in the trades. Three workplace examples of measurement and calculation in trades include the following:

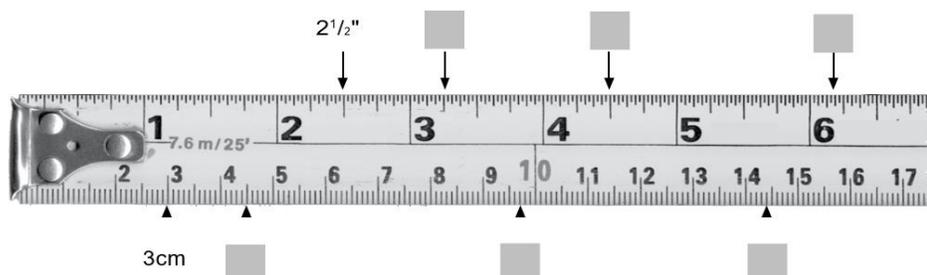
- **Construction electricians** take measurements to make sure that electrical work meets electrical code regulations.
- **Carpenters** need precise measurements to make sure buildings are safe.
- **Plumbers** perform calculations to design, fabricate, and install pipe that needs to go around obstacles.

Trades persons who build things in their work use measuring tapes, survey equipment, scales, and other tools to measure daily. They work with both imperial (feet, inches, yards) and metric measurements (millimetres, centimetres, metres) on the job.



Activity 1: Using a Tape Measure

1. Enter the length beside each arrow on the measuring tape. Remember to include the correct unit (inches or centimetres) Two examples are provided for you:



2. Draw an arrow to these measurements on the tape measure below. Place the letter of the question above the measurement. The first one is done for you.



- a) $1\frac{1}{4}$ in b) 12 cm c) $6\frac{1}{8}$ in d) 6.5 cm e) 2 in f) 4.75 cm ($4\frac{3}{4}$)

3. Choose an item to measure in your classroom, for example: the length of a doorway, the computer keyboard, or the height of one of your classmates. Use a tape measure to do this. Record the item you measure and the length in imperial and metric below.



Item/Person: _____

Imperial _____ Metric _____

Formulas and Conversions

Different contractors and forepersons will use different units of measurements. Metric is the system taught in schools now, but many trades people will still use imperial. Ask your instructor for a copy of the following formulas and conversion charts for measurements. The chart below, shows you important formulas that you will need for the job and the conversions (how to calculate from metric to imperial). Use this chart on the next page to answer the questions in your next activity.

METRIC CONVERSIONS

Distance

Imperial	=	Metric
1 inch	=	2.540 centimeters
1 foot	=	0.3048 meter
1 yard	=	0.9144 meter
1 rod	=	5.029 meters
1 mile	=	1.609 kilometers

Metric	=	Imperial
1 centimeter	=	0.3937 inch
1 meter	=	3.281 feet
1 meter	=	1.094 yards
1 meter	=	0.20 rods
1 kilometer	=	0.6214 mile

Capacity

Imperial	=	Metric
1 pint	=	0.568 liters
1 gallon	=	4.546 liters
1 bushel	=	36.369 liters
1 fluid oz.	=	28.41 ml
1 quart	=	1.137 liters

U.S.	=	Metric
1 pint (U.S.)	=	0.473 liter
1 quart (U.S.)	=	0.946 liter
1 gallon (U.S.)	=	3.785 liters
1 barrel oil	=	158.99 liters
1 cup-8 fl. ounces	=	227.00 ml

Metric	=	Imperial
1 liter	=	1.76 pints
1 liter	=	0.220 gallon
1 liter	=	.88 quart

1 tablespoon	=	14.21 ml
1 teaspoon	=	4.74 ml

Weight

Imperial	=	Metric
1 ounce (troy)	=	31.103 grams
1 ounce (avoir)	=	28.350 grams
1 pound (troy)	=	373.242 grams
1 pound (avoir)	=	453.592 grams
1 ton (short)	=	1 tonne
(2000 lb)	=	0.907 tonne*

Metric	=	Imperial
1 gram	=	0.032 ounce (troy)
1 gram	=	0.035 ounce (avoir)
1 kilogram	=	2.679 pounds (troy)
1 kilogram	=	2.205 pounds (avoir)
	=	1.102 ton (short)
1 tonne	=	1000 kilograms

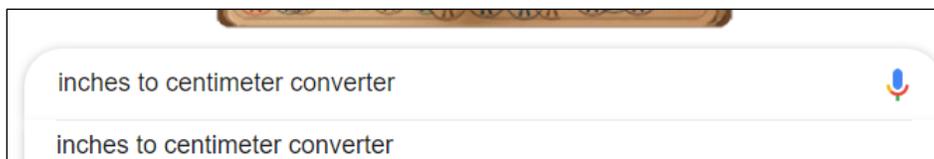
Chart credit:

https://tradesecrets.alberta.ca/SOURCES/PDFS/exams/entrance/077_Entrance_Study_Guide.pdf

Activity 2: Conversions

1. Using the chart above, use multiplication to change the imperial measurements into metric.

Tip: If you are ever unsure of a conversion, you can search for conversion sites online on your smartphone or computer. For example: if you needed to convert inches to centimetres, you would simply search inches to centimetres converter in the search box of your search engine.



The search will bring up a conversion tool. To do the conversions, type the number into the box shown on the screen.

Try using an online converter for the following conversions:

- a) 6 ounces = _____ grams
- b) 10 gallons = _____ litres
- c) 20 tablespoons = _____ millilitres
- d) 10 yards = _____ metres
- e) 2.5 miles = _____ kilometres

2. Open your browser and use your search engine to search for a Fahrenheit to Celsius temperature converter, then use it to convert the following temperatures.

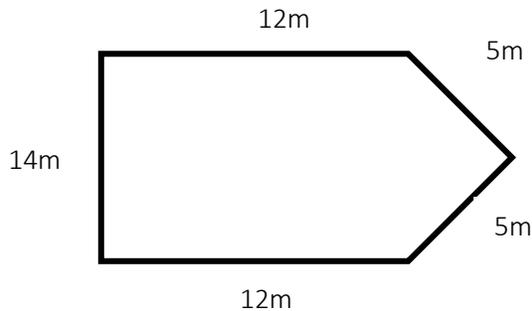
- a) $425^{\circ}\text{F} = \text{_____}^{\circ}\text{C}$
- b) $86^{\circ}\text{F} = \text{_____}^{\circ}\text{C}$
- c) $32^{\circ}\text{F} = \text{_____}^{\circ}\text{C}$
- d) $450^{\circ}\text{F} = \text{_____}^{\circ}\text{C}$
- e) $15^{\circ}\text{C} = \text{_____}^{\circ}\text{F}$

Formulas for Perimeter, Area, and Volume

When adding up the length of a perimeter, you add all the sides of the shape you are measuring. The total of all sides is the perimeter.

If you need to know the perimeter of a house, you would add all the sides together to find out that perimeter.

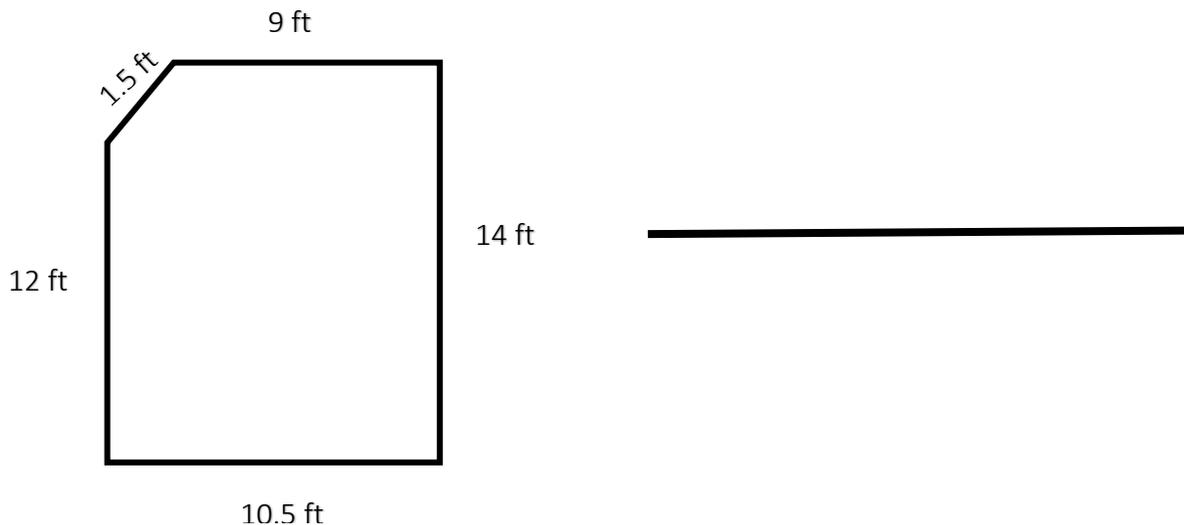
This formula works for any shape that is not circular. It can be a rectangle, square, pentagon, trapezoid, and so forth.



$$12m + 5m + 5m + 12m + 14m = 48m$$

Activity 3: Finding Perimeter

Calculate the perimeter for the following shape, using the information that you have just read.



Circumference

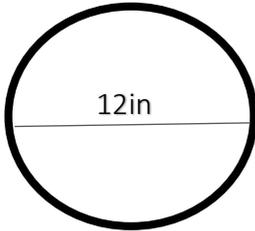
The perimeter of a circle is called a circumference. Calculating formulas with circles is a little different. It is different because you need to use pi (π) in the formula. Pi is the ratio of the circumference of a circle to its diameter (d).

The diameter of a circle is the line that passes directly through the centre of the circle. The radius (r) of a circle is half its diameter (or $2r = d$).

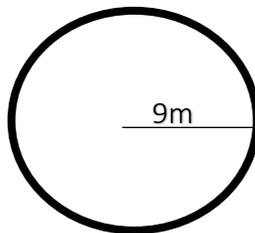
Pi has many, many numbers after its decimal point, but for these simple mathematic equations it is rounded to 3.14.

The formula for the circumference of a circle is $C = 2\pi r$.

Note: If you know the diameter of a circle you must first divide that by 2 to get the radius of the circle.



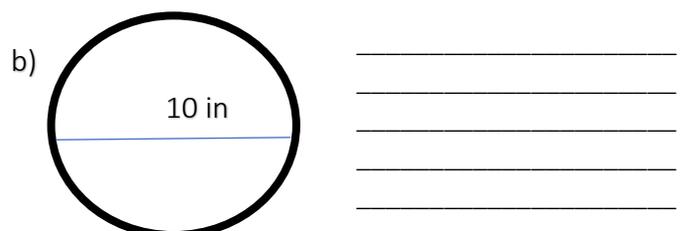
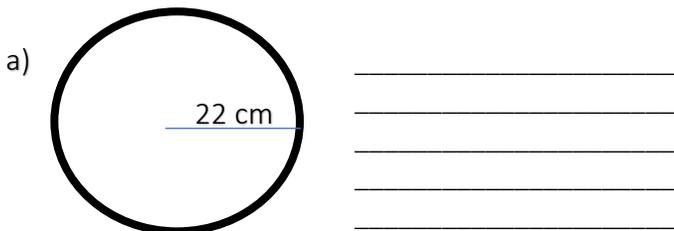
$$\begin{aligned}d/2 &= r \\12/2 &= 6 \\r &= 6 \\C &= 2\pi r \\C &= 2 \times 3.14 \times 6 \\C &= 37.68 \text{ inches}\end{aligned}$$



$$\begin{aligned}r &= 9 \\C &= 2\pi r \\C &= 2 \times 3.14 \times 9 \\C &= 56.52 \text{ m}\end{aligned}$$

Activity 4: Finding Circumference

Find the circumference of the circles below:



Finding Area

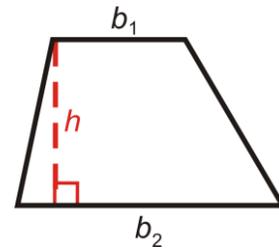
Here are some useful formulas for area (A):

Rectangle	$A = l \times w$	l=length	w=width
Square	$A = \text{unit}^2$	s = side	
Circle	$A = \pi r^2$	r = radius	

Tip: When a number is squared (s^2), you multiply the number by itself.

Example: calculating a square with a side that is 4cm long

$$4^2 = 4 \times 4$$
$$A = 16\text{cm}^2$$



Trapezoid $A = \frac{h}{2} (b_1 + b_2)$ h = height

b_1 = length of one base

b_2 = length of second base

Area is measure in square units.

Not every room or space is a perfect shape. When finding area, you can cut uneven spaces into sections, then find the area for both shapes and add them together. If you do not know the size of one of the sides, then use the information there to figure out the difference. Look at the diagram below for a hallway that needs to be tiled. The measurements are in metres.

For example: We do not know the length of side a. But we know that the entire length is 12 and the length of the section above is 2, so $12 - 2 = 10$.

$$A = (l \times w) + (l \times w) + (l \times w)$$

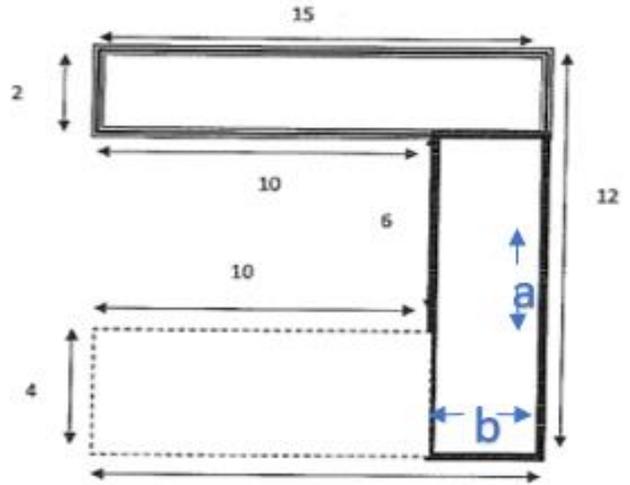
$$A = (2 \times 15) + (a \times b) + (4 \times 10)$$

$$A = (2 \times 15) + (10 \times 5) + (4 \times 10)$$

$$A = 30 + 50 + 40$$

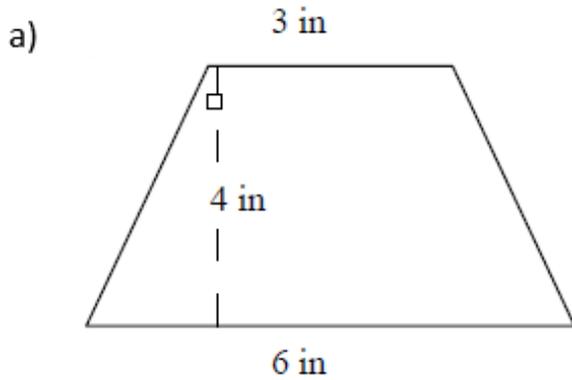
$A = 120$

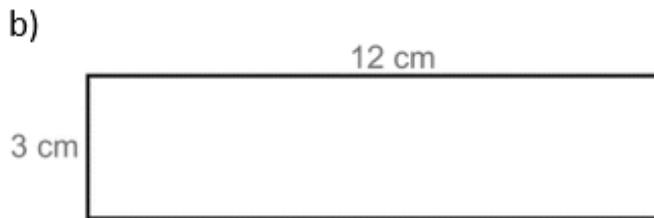
The area is 120 m^2 . The tiles need to cover 120 m^2 .

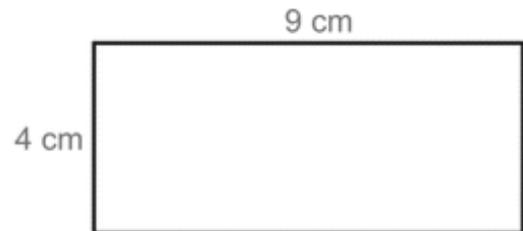


Activity 5: Measuring Area

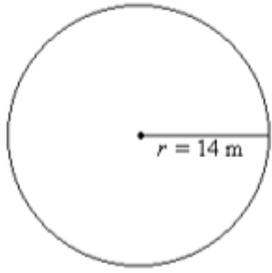
- Using the formulas and information from the lesson, find the area of the following shapes. Please show your work. Remember all units of measurement will be squared in your answers.







c)

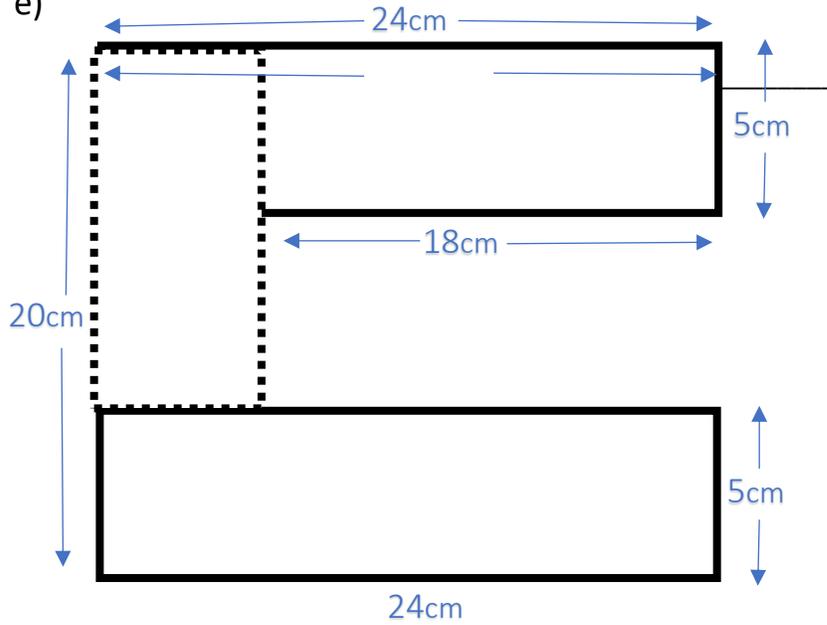


d)



5 cm

e)



2. For some extra practice understanding area, type the following website into your address bar and complete some of the area builder exercises.

https://phet.colorado.edu/sims/html/area-builder/latest/area-builder_en.html

Calculating Volume

The volume of an object is the amount of space inside that object.

You can use volume formulas to calculate the volume of three-dimensional shapes.

Volume is measured in cubic units.

Study the diagram to the right and rewrite the formulas for the three-dimensional shapes shown in the chart on the lines below:

Cube: _____

Sphere: _____

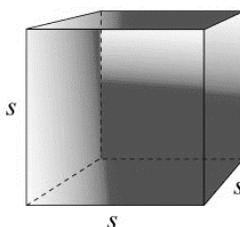
Cone: _____

Prism: _____

Cylinder: _____

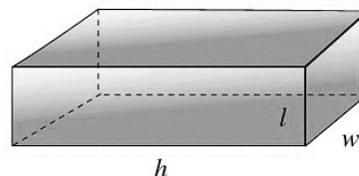
Pyramid: _____

CUBE



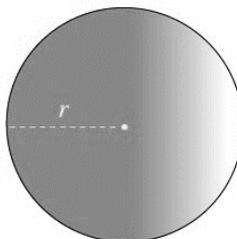
$$V = s^3$$

RECTANGULAR PRISM



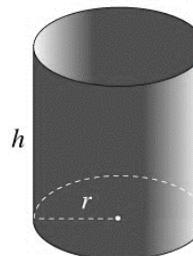
$$V = lwh$$

SPHERE



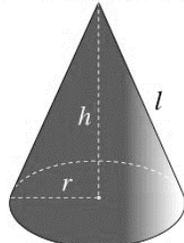
$$V = \frac{4}{3} \pi r^3$$

RIGHT CIRCULAR CYLINDER



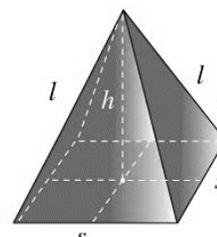
$$V = \pi^2 h$$

RIGHT CIRCULAR CONE



$$V = \frac{1}{3} \pi r^2 h$$

RIGHT SQUARE PYRAMID



$$V = \frac{1}{3} s^2 h$$

When working with volume, it is important to measure not only the length and width of sides but also the height.

Look at this example below that uses one of the formulas for volume.

Seth is installing a pool for the Surfside Swim Company. The client asks how many gallons of water the pool can hold. Seth knows that one cubic foot is equal to 7.5 gallons of water and he has the pool length, width, and height measurements with him.

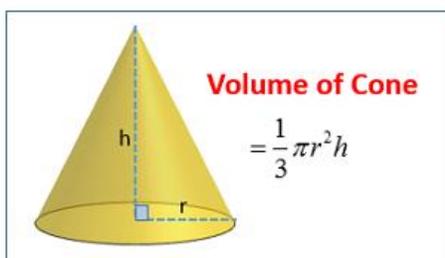
The pool is rectangular and measures 15ft wide by 40ft long and is 4.5ft deep.



$$l \times w \times h = 2,700 \text{ ft}^3$$

$$2,700 \text{ ft}^3 \times 7.5 = 20,250 \text{ gallons}$$

The pool can hold 20,250 gallons of water.



Ahmed is trying to figure out how many cone paper cups the office needs for each water-cooler bottle. A water-cooler bottle holds 18.9 litres of water.

The cone paper cups are 10cm in height and 8cm in diameter.

When figuring out the height of the cone it is important to multiply it by $\frac{1}{3}$ because the cone slants inward. If it is not multiplied by $\frac{1}{3}$ the volume, results will be for a whole cylinder and not a cone.

Activity 6: Finding Volume

Using the formula from the diagram, calculate the volume in cubic centimetres for the office's cone paper cups.

Remember radius is $\frac{1}{2}$ diameter.

Tip: Calculate your exponent r^2 first

$$\frac{\pi r^2 h}{3}$$

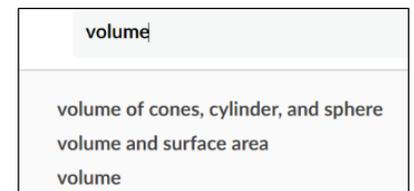
Search online for a cubic centimetre to litres converter. Put in the answer you have come up with into the converter. _____ cm^3 = _____ L

Take the number of litres from your converter and divide it by 18.9 L. This is the number of litres a water-cooler bottle will hold.

How many cups will the water-cooler bottle fill? _____

The paper cone cups come in sleeves of 100 or 150. Which package will Ahmed need to buy? _____

3. For a better understanding of volume, open your search browser and search for Khan Academy. When you have arrived at this site, type **volume** in the search box. Choose a video on volume and discuss what you learned on the lines below.



Lesson 8: Math in the Kitchen

Working in a restaurant, cafeteria, café, or food truck involves many numeracy tasks. This lesson will cover some of the important tasks you might be asked to do while working in the food industry.

Buying by the Pound

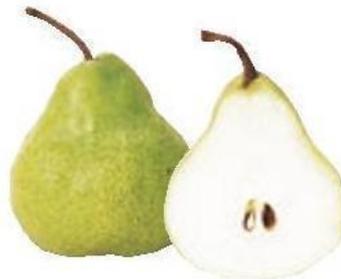
The Sunny Hill Retirement Home has run out of fruit and sweet potatoes and needs to buy more for tomorrow's breakfast. They ask one of their servers to go to the store and buy some using the home's petty cash funds.



Fiona is sent to the store with \$45.00 and a grocery list.

She needs to buy:

- 5lbs of bananas
- 7lbs of oranges
- 3lbs of grapes
- 6lbs of pears
- 8lbs of sweet potatoes



Packham Pears
Product of
Argentina
Extra Fancy Grade

1.49
/lb
3.28/kg



She uses the grocery store scale to weigh all the fruit and make sure that it is as close to what is needed by the home as possible. Some weights are

slightly more or less than the exact target number, but she rounds the weights to estimate cost to make sure she will have enough money.

Note: When you know the two parts but need to find the total you use multiplication. When you know the total but need to find a missing part, that is when you use division.

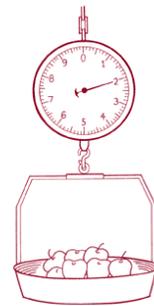
Examples:

Multiplication: You have 10 crates of 8 oranges, and you need to find the total of the oranges that you have: $10 \times 8 = 80$

Division: You know you have 80 oranges and that there are 10 crates, and you need to find out how many oranges are in each crate: $80 \div 10 = 8$

Activity 1: Calculating Cost by Pound

Help Fiona figure out how much she will be spending by multiplying the cost per pound by the number of pounds she needs to see if she has enough money. Use a calculator for this practice exercise.



5lbs of bananas $5 \times \$0.69 = \3.45

7lbs of oranges _____

3lbs of grapes _____

6lbs of pears _____

8lbs of sweet potatoes _____

Total cost: _____

Does Fiona have enough money for this purchase? **YES** or **NO**

Activity 2: Calculating Costs from Flyers

Search online flyers for fruits and vegetables that are on sale. Using the name of the item you are searching, and the word flyer should help you when searching online.

Find the following items and calculate how much it would cost to buy them.

6lbs of McIntosh apples _____

10lbs of red onions _____

2lbs of sweet peppers _____

Find the price per pound for each item listed below using the total and the number of pounds purchased.

\$3.10 for 5lbs of bananas = _____ per pound

\$18.60 for 7.5lbs of brussels sprouts = _____ per pound

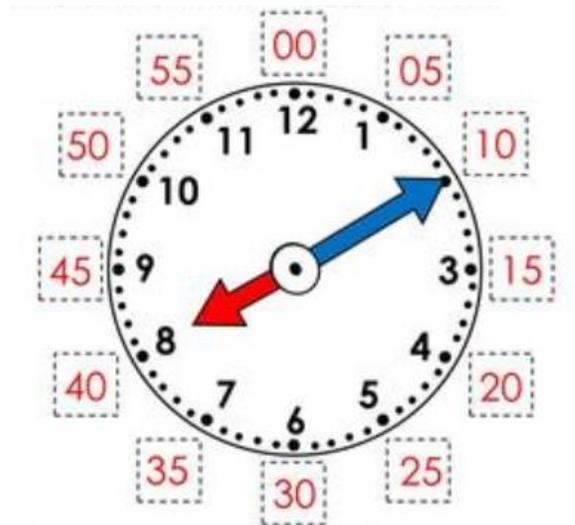
Cooking Times

When adding and subtracting time, we need to remember that 60 is the number of minutes in an hour.

1 hour = 60 minutes

If you are cooking, you may have bake times that go over or under the hour mark.

For example: If your chicken goes in at 11:45 and cooks for a half hour (30 minutes), the next hour starts at 12:00. So, 15 minutes of the cooking time is from 11:45 to 12:00 (15 minutes). The other 15 minutes would be added to the next hour, so the cooking time is from 11:45 to 12:15.



Each number on a clock goes up by 5 minutes, therefore you can count minutes on a clock by 5s.

What each number on the clock represents is shown on the clock on the last page.

The long hand is the minute hand and the short hand is the hour hand. The hour is the number shown on the clock's face.

The hours are the numbers shown on the clock and go up by 1.

Activity 3: Calculating Cooking Times

1. a) The peas need to be cooked on the stove top for 5 minutes. If you start them at 10:15, when will they be done? _____
b) The pizza goes into the oven for ten minutes at 550°F. You put it in at 6:30. When will it be finished? _____
c) Jan starts boiling the eggs for the Cobb salad at 6:20. They take 15 minutes to boil. When will they be ready? _____
d) The bakery's zucchini breads take 55 minutes to cook. They go in at 2:10. When will they be ready? _____

2. What time will it be in 15 minutes?

9:45 _____ 7:20 _____ 3:15 _____ 5:25 _____

Working with Ratios in the Kitchen

A ratio compares values. A ratio says how much of one thing there is compared to another thing. If you are cooking in a kitchen, you will need to understand ratios to make food. If you are cleaning a restaurant or another type of business, you will need to understand ratios to mix cleaning solutions.

Example 1: A recipe for pancakes asks for 3 cups of flour to 2 cups of milk, a 3:2 ratio. This makes enough pancakes for 3 people.

You must cook for a reservation of 12 and need to increase the recipe 4 times to make enough pancakes for everyone.

This means multiplying the ratio by 4, $(3 \times 4):(2 \times 4)$, making it 12:8.

Example 2: The kitchen must be cleaned at the end of the night. The cleaning solution for the floor has a ratio of 1:10 with water. This means that you must add 1 cup of product to 10 cups of water. The staff uses a measuring cup and measures using these directions for the cleaning solution. The cleaning staff uses 30 cups of water; therefore, they know that they need to mix in 3 cups of cleaning product $(1 \times 3):(10 \times 3)$ The ratio becomes 3:30.

Activity 4: Ratios in the Kitchen

Joe is prepping rice for the dinner rush. The instructions on the rice show that one cup of uncooked rice will make 3 cups of cooked rice. The ratio of uncooked rice to cooked rice is 1:3.

1. He needs to make 9 cups of cooked rice, how many cups of uncooked rice should he use? _____
2. What is the ratio of cooked rice to uncooked rice now?

3. Two slices of bread make one cup of bread crumbs. Write the ratio of bread to bread crumbs here: _____
4. How many slices would you need to make two cups of bread crumbs?

Activity 5: Ratios in Other Workplaces

1. Ming is applying for a job in an office. She can type 50 words per minute and writes the ratio on her resume.

50:1 wpm.

How many words could Ming type in 5 minutes? _____

2. Harriet works as an assistant at Sunny Shine Daycare. The ratio of staff to children there is 2 adults to every 7 students (2:7). Friday is a PD day and Harriet must call in enough staff to cover the 49 children who will be there all day.

How many staff members will she need to call? _____.

Write the ratio of total staff to total students for the PD day.
_____:

3. Carlos is baking for his office fundraiser and needs to make 180 cookies. He has three hours to make them.

What is the ratio of cookies to hours that Carlos is trying to meet? _____

How many cookies must he make per hour to meet his goal?

4. A trade's helper is gathering bags of concrete. The carpenter he is helping is making posts. The ratio of bags of concrete to posts is 2.5:1

The carpenter is making 9 posts. How many bags will the helper need to bring to the carpenter? _____

Optional Suggestions for Further Study

Interested in exploring and learning more math?

Here are some links to workplace-related math that you can try at any time.

Trades Math Workbook, Government of Canada

<https://www.canada.ca/en/employment-social-development/programs/essential-skills/tools/trades-math.html>

Kitchen Math Workbook, Northwest Literacy

https://www.nwtliteracy.ca/sites/default/files/resources/kitchen_math_2017_13_9886_0.pdf

Workplace Math Prep, Adult Training Network

https://www.nwtliteracy.ca/sites/default/files/resources/kitchen_math_2017_13_9886_0.pdf

Milestone Stop

