Skills for Success Curriculum Resource Cover Page

Organization

CESBA

Curriculum Resource

Trades Math Essentials

OALCF Alignment

Competency	Task Group	Level
Competency A -Find and Use Information	**A1. Read continuous text**	**2**
Competency A -Find and Use Information	**A2. Interpret documents**	**2**
Competency A -Find and Use Information	**A3. Extract information from films, broadcasts, and presentations**	**2**
Competency B - Communicate Ideas and Information	**B2. Write continuous text**	**2**

Competency C - Understand and Use Numbers	**C3. Use measures**	**2**
Competency C - Understand and Use Numbers	**C4. Manage data**	**2**
Competency D - Use Digital Technology	**N/A**	**2**
Competency E - Manage Learning	**N/A**	**2**

Goal Paths (check all that apply)

☒ Employment
☒ Apprenticeship
☒ Secondary School Credit
☒ Postsecondary
☒ Independence

Embedded Skills for Success (check all that apply)

☐ Adaptability
☐ Collaboration
☐ Communication
☐ Creativity and innovation
☒ Digital
☒ Numeracy
☒ Problem Solving
☒ Reading
☒ Writing

Notes: Suggested Milestones 45, 46 and 54

This course follows level 2 of the Ontario Adult Literacy Curriculum Framework and can be completed by learners who demonstrate a solid understanding of OALCF level 1 number use.

Some materials in this resource have content and modified materials from CESBA's 2021 Work Skills course. CESBA (2019) Adult Education Curriculum, Work Skills Manual from https://cesba.com.

Trades Math Essentials

Includes Answer Guide

Pathway Pillar – Integration of LBS Services to Support Apprenticeship

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Trades Math Essentials

Apprentices and trades people need to be confident with their math skills. Numeracy (use of math) is very important in the trades.

Being confident and accurate in these numeracy operations will help you be successful in your apprenticeship.

Some of these numeracy skills might include:

- Measuring in both imperial and metric
- Converting and using fractions and decimals
- Using formulas

Lesson 1: 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:

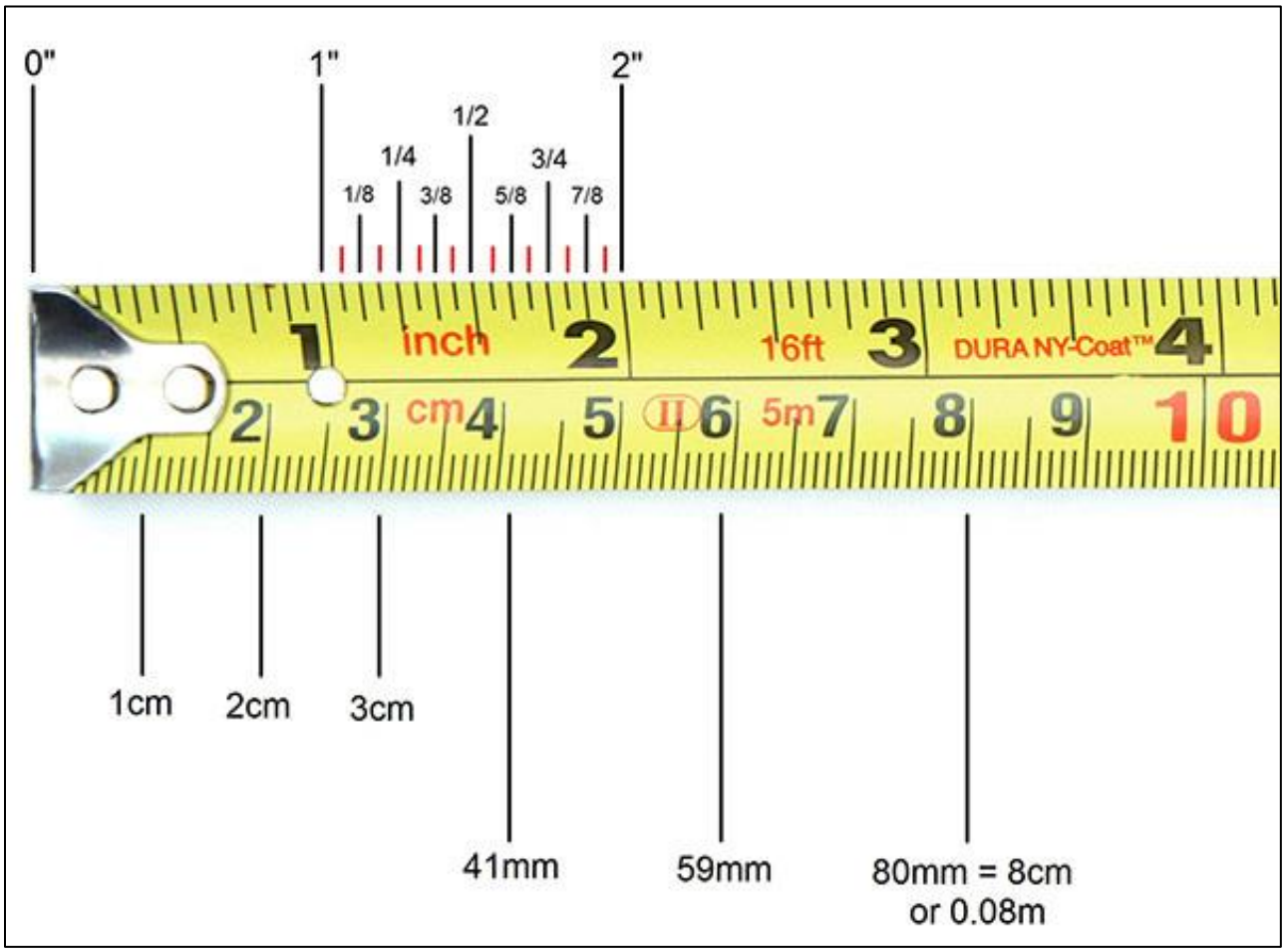
- **Construction electricians** take measurements to make sure that electrical work meets electrical code regulations.
- **Carpenters** need precise measurements to make sure buildings are safe.
- **Plumbers** perform calculations to design, fabricate, and install pipe that needs to go around obstacles.

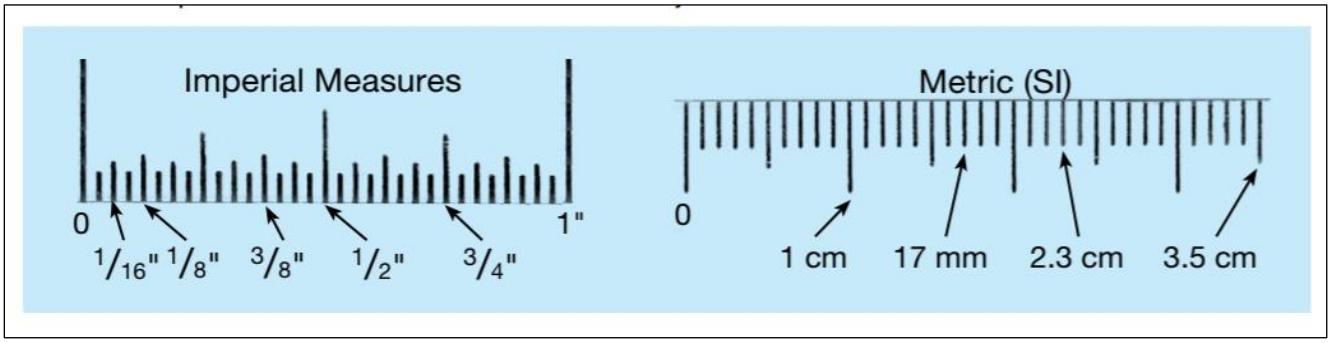
Trades people who build things in their work use measuring tapes, survey equipment, scales, and other tools to measure each day. They

work with both imperial (feet, inches, yards) and metric measurements (millimetres, centimetres, metres) on the job.

It is very important as a trades person to measure correctly. When measurements are incorrect materials such as lumber, carpet, wood flooring, and wires are wasted.

Using a measuring tape accurately is an important skill in the trades.





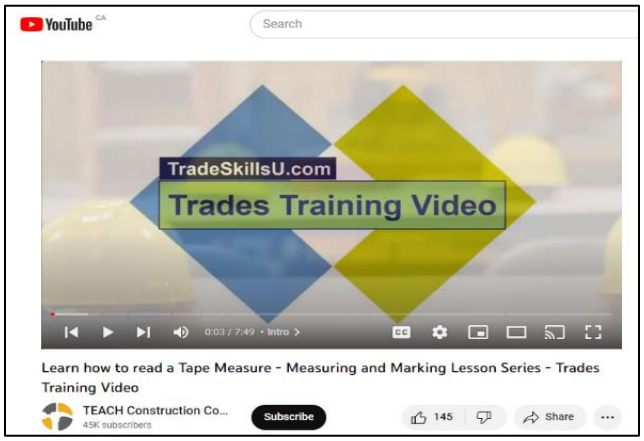
Activity 1: Learning How to Read a Tape Measure

1. To prepare for this course, watch the following video to learn about reading a tape measure. There are many variations of tape measures that you can buy, as shown in this video.

Learn how to read a Tape Measure - Measuring and Marking Lesson Series - Trades Training Video - YouTube

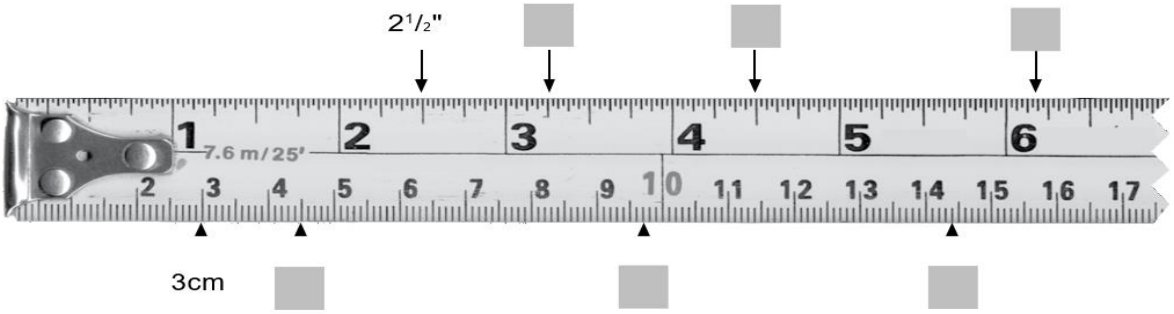
https://www.youtube.com/watch?v=m8I9TcpZ6xI&list=PLfZcU0E-cRgA8UeD3HJxxV3tsf4-VF4N0&index=2

or search YouTube “Learn how to read a tape measure trades training video”



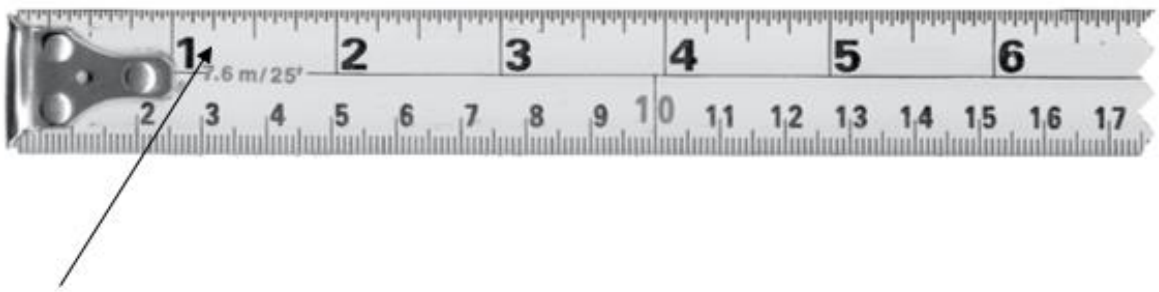
Activity 2: Using a Tape Measure

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 some items to measure in your classroom or home, 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 #1 _____

Imperial _____ Metric _____

Item #2 _____

Imperial _____ Metric _____

Item #3 _____

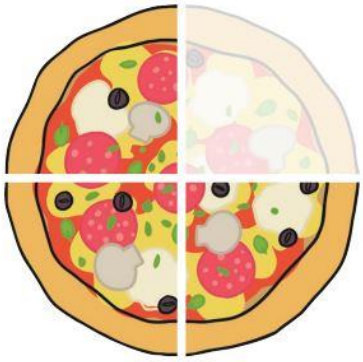
Imperial _____ Metric _____

Lesson 2: Fractions

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. $\frac{1}{10}$

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.



$\frac{3}{4}$

Numerator

How many equal parts do you have?

Denominator

How many equal parts is the whole divided into?

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 items on sale or time and when you want to give accurate information about the parts of a group.

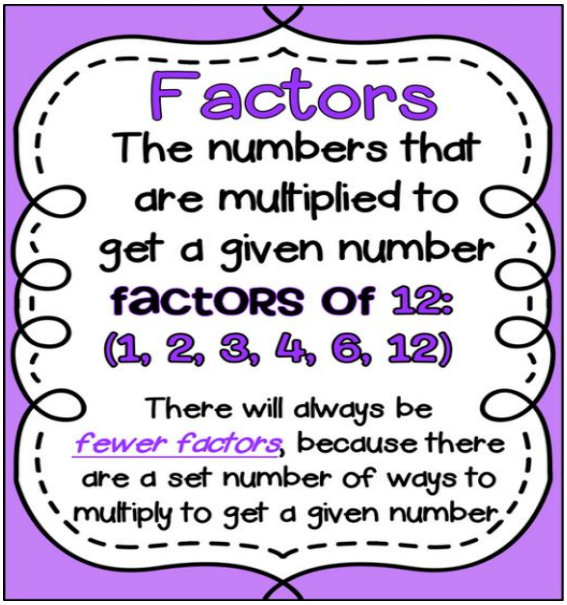
You can also use decimals to describe some of these as well. Decimals will be discussed in the next lesson.

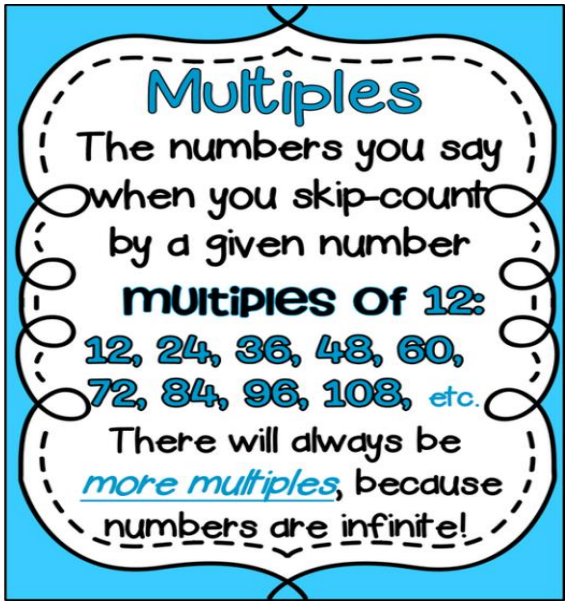
Activity 1: Fractions in Daily Life

Answer the following with yes or no:

1. Do you use fractions to represent time, like a ½ hour or a ¼ (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





Credit: https://mrsrclassroom.weebly.com/factors-and-multiples.html

In the following example, each number increases by 5.

5, 10, 15, 20, 25, 30….

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

5x1=5 5x2=10 5x3=15 5x4=20 5x5=25 5x6=30

5 is a multiple of both 5 and 1.

5 and 1 are the factors of 5.

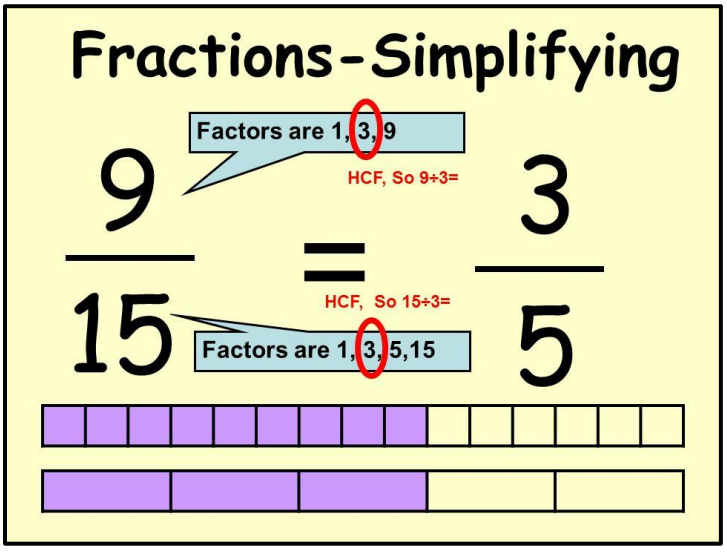
Let us look at the number 30.

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

3 and 10 are also factors of 30: 10x3=30

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

Math Tricks: Helping with Fractions



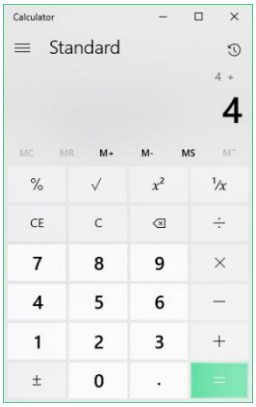
Finding Common Denominators

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

Please see the example below:

3 numerator	1 numerator
4 denominator	5 denominator

Step 1: Type the first denominator into a standard 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.

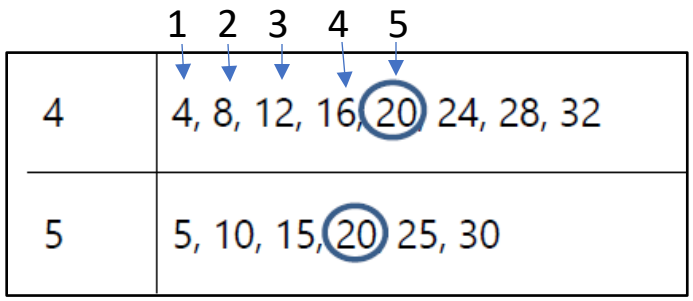
4	4, 8, 12, 16, 20, 24, 28, 32,
5	5, 10, 15, 20, 25, 30

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 times 4 by its other factor to get the number 20.
To find out the other factor count from 4 to the common denominator. 20 is the 5th number in the factoring



4 x 5 = 20

Step 4: Do the same with the second denominator:
5 x 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:

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

You will get this equation: $\frac{15}{20} + \frac{4}{20} = \frac{19}{20}$

*Add the numerators to get your answer. The denominator stays the same.

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.
4x3=12 and 3x4=12

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

You would be driving $\frac{7}{12}$ km.

Activity 2: Practice Factoring

Try this math trick with the following equations:

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

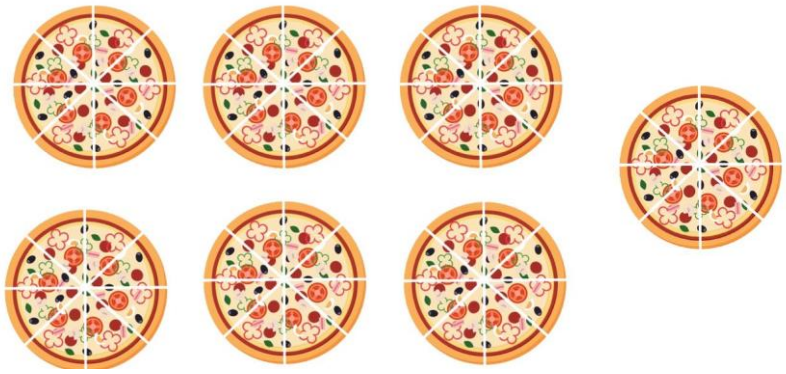
$$\frac{2}{4} + \frac{4}{8} =$$

Reviewing Mixed and Improper Fractions

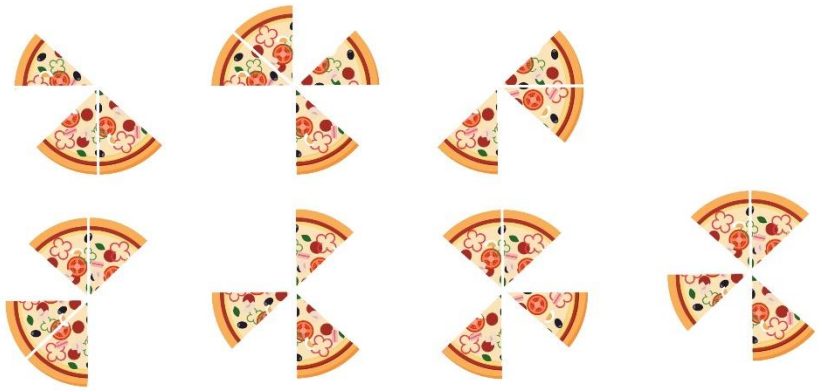
A mixed number is a whole number and a fraction. For example: $5\frac{1}{2}$

An improper fraction is when the top of the fraction (numerator) is higher than the denominator (bottom number). For example: $\frac{32}{4}$

Ming orders 7 pizzas for her workplace's pizza lunch. Each pizza is cut into 8 pieces. The pizzas are different kinds and people eat different amounts of pieces out of each one.



There are 25 pieces of pizza left in total.



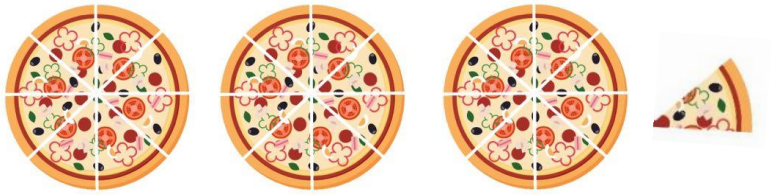
The improper fraction for this is $\frac{25}{8}$.

25 pieces of pizzas that were cut into 8.

When Ming divides the number 25 by 8. She finds out 8 divided into 25 3 times with 1 piece left over.

She sees that she has 3 whole pizzas left over plus one extra slice.

The mixed fraction for this is $3\frac{1}{8}$.



Both the mixed and improper fractions are equal, and they show the same amount leftover.

$$\frac{25}{8} = 3\frac{1}{8}$$

Please watch the following video from Khan Academy if you need to learn more about mixed numbers and improper fractions.

If you still need help after the video, please ask your instructor.

Type the link below in your browser's address bar or search 'writing mixed numbers as improper fractions' on the Khan Academy site at

www.khanacademy.org

https://www.khanacademy.org/math/cc-fourth-grade-math/imp-fractions-2/imp-mixed-numbers/v/changing-a-mixed-number-to-an-improper-fraction

Activity 3: Changing Mixed Numbers into Improper Fractions

1. To change a mixed number to an improper fraction, multiply the denominator by the whole number and add the numerator.

Look over the example on the next page. Afterwards, change the mixed numbers shown into improper fractions.

Example: $5\frac{2}{4}$

To change this mixed fraction into an improper fraction.

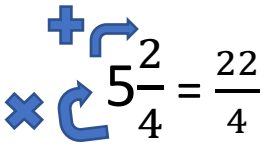
Step 1 – multiply the denominator (4) by the whole number (5)

4 x 5 = 20

Step 2 – add the answer to the numerator (2)

20 + 2 = 22

The denominator (4) will stay the same.



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

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

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

2. To change an improper fraction to a mixed number divide the numerator by the denominator and subtract the difference.

Example: $\frac{13}{3}$

3 does not divide evenly into 13 but 12 divided by 3 is 4 with 1 left over. There is $\frac{1}{3}$ left over.

$\frac{13}{3} = 4\frac{1}{3}$

Change these improper fractions into mixed numbers. The first one is completed for you.

1. $\frac{27}{5} = 5\frac{2}{5}$

2. $\frac{7}{2} =$

3. $\frac{19}{9} =$

4. $\frac{33}{10} =$

5. $\frac{19}{7} =$

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. There is one difference. **You must flip** (change the numerator with the denominator) **the second fraction** and then multiply.

$$\frac{1}{3} \div \frac{1}{2} \xrightarrow{\text{FLIP}} = \frac{1}{3} \times \frac{2}{1} = \frac{2}{3}$$

Activity 4: Multiply and Divide Fractions

$\frac{1}{5} \times \frac{9}{11} =$

$\frac{2}{3} \div \frac{9}{13} =$

$\frac{11}{13} \times \frac{1}{2} =$

$\frac{7}{8} \div \frac{1}{3} =$

Activity 5: Fraction Word Problems

1. Nancy bought $8\frac{4}{7}$ gallons of paint but she used $\frac{3}{7}$ gallons of paint. How much paint does she have left?

_____

2. Dean has a piece of wood that is $\frac{3}{4}$ of a foot long. He needs to cut pieces that are $\frac{1}{16}$ of a foot long. How many pieces can Dean cut?

_____

_____

3. Marcy is working on some projects that requires $3\frac{1}{2}$ metres of ribbon per project. She has 28 metres of ribbon. How many projects will Marcy be able to complete with the ribbon she has?

_____

_____

Reducing Fractions

A fraction is in its simplest form if the **greatest common factor** (GCF) of its numerator and denominator can only both be divided by 1.

For example: $\frac{3}{7}$

There is no number other than 1 that can go into (divide evenly into) both 3 and 7.

In simplest form, fractions will be reduced until there is no greatest common factor that can go into both the numerator and denominator evenly.

The following fraction is **not** in its simplest form - $\frac{6}{9}$

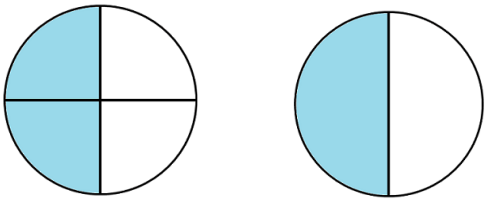
$\frac{6}{9}$ is not in simplest form since the numerator and denominator share a common factor of 3.

To reduce a fraction, divide both the numerator and denominator by the GCF. This is also known as writing the fraction in lowest terms. The fraction is reduced to $\frac{2}{3}$

Activity 6: Reducing Fractions to Simplest Form

Look at the images below to see how a fraction looks the same in its simplest form. Afterwards, reduce the fractions shown to their simplest form.

Here, both the numerator and denominator in the first fraction can be divided by 2.

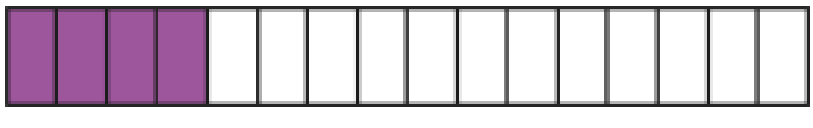


$\frac{2}{4} \begin{matrix} \div 2 \\ \div 2 \end{matrix} = \frac{1}{2}$

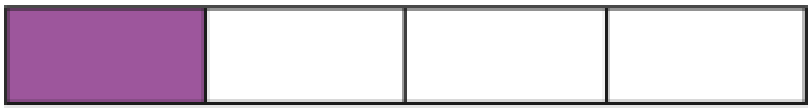
The simplest form of this fraction is $\frac{1}{2}$

1. Fill in the blanks

$\frac{4}{16}$



$\div$ _____



= ___

2. Reduce these fractions to their simplest form.

a. $\frac{7}{21}$= b. $\frac{10}{40}$ = c. $\frac{4}{12}$ = d. $\frac{8}{18}$ =

Lesson 3: 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 ÷ 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 15: 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).

Examples:

$\frac{2}{5}$ is equal to 0.4 $\frac{2}{5}$ = 0.4 (2 divided by 5)

$\frac{1}{4}$ is equal to 0.25 $\frac{1}{4}$ = 0.25 (1 divided by 4)

Practice: Find the equal decimal value for these fractions

1. $\frac{7}{8}$ = _____ 2. $\frac{2}{9}$ = _____ 3. $\frac{1}{5}$ = _____ 4. $\frac{3}{11}$ = _____

Decimals of a foot

Sometimes, it is easier to use decimals when measuring in inches and feet.

There are 12 inches in a foot. When trying to figure out the decimal of a foot, you divide the amount on inches by 12 (number of inches in a foot) to get the decimal value of the inches.

For example: 7 inches ÷ 12 = 0.583 of a foot.

Inch	Decimal of a Foot
1 inch	0.0833
2 inches	0.167
3 inches	0.250
4 inches	0.333
5 inches	0.417
6 inches	0.500
7 inches	0.583
8 inches	0.667
9 inches	0.750
10 inches	0.833
11 inches	0.917
12 inches	1.000

The following chart shows the decimals for each number of inches.

A measurement of 12 feet and 3 inches (12’3”) would be written in decimals as 12.25 feet.

Using the examples in this lesson, turn the following measurements into decimals of a foot.

Activity 1: Using Decimals

1. 4 inches = _____ft
2. 3 ft, 11 inches _____ft
3. 4’10” _____ ft
4. 24’1” _____ ft
5. 6” _____ ft

Conversions

Different contractors will use different units of measurements.

Metric is the system taught in schools now, but many trades people still use imperial.

You can use the conversion chart on the next page when you need to make calculations for conversions.

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

METRIC CONVERSIONS

Distance

Imperial		Metric		Metric		Imperial	
1 inch	=	2.540	centimeters	1 centimeter	=	0.3937	inch
1 foot	=	0.3048	meter	1 meter	=	3.281	feet
1 yard	=	0.9144	meter	1 meter	=	1.094	yards
1 rod	=	5.029	meters	1 meter	=	0.20	rods
1 mile	=	1.609	kilometers	1 kilometer	=	0.6214	mile

Capacity

Imperial				U.S.			
1 pint	=	0.568	liters	1 pint (U.S.)	=	0.473	liter
1 gallon	=	4.546	liters	1 quart (U.S.)	=	0.946	liter
1 bushel	=	36.369	liters	1 gallon (U.S.)	=	3.785	liters
1 fluid oz.	=	28.41	ml	1 barrel oil	=	158.99	liters
1 quart	=	1.137	liters	1 cup-8 fl. ounces	=	227.00	ml
Metric							
1 liter	=	1.76	pints	1 tablespoon	=	14.21	ml
1 liter	=	0.220	gallon	1 teaspoon	=	4.74	ml
1 liter	=	.88	quart				

Weight

Imperial			Metric		
1 ounce (troy)	=	31.103 grams	1 gram	=	0.032 ounce (troy)
1 ounce (avoir)	=	28.350 grams	1 gram	=	0.035 ounce (avoir)
1 pound (troy)	=	373.242 grams	1 kilogram	=	2.679 pounds (troy)
1 pound (avoir)	=	453.592 grams	1 kilogram	=	2.205 pounds (avoir)
1 ton (short)		1 tonne		=	1.102 ton (short)
(2000 lb)	=	0.907 tonne*	1 tonne	=	1000 kilograms

Example: Converting ounces and grams

1 ounce is 28.3495 grams

If you needed to find out how many grams 5 ounces would be you would do the following calculation.

5 ounces x 28.3495 would give you the number of grams.

If something is 120 grams you would divide it by 31.103 to get the number of ounces.

Example: Converting pounds and kilograms

To find kilograms from pounds you multiply by 2.205.

To find pounds from kilograms you divide by 2.205.

Activity 2: Calculating Conversions

Using this process, and a calculator, convert the following into the units provided.

a) 20 litres = _____gallons

b) 8 gallons = _____ litres

c) 42 feet = _____ metres

d) 70 metres = _____feet

e) 202 km = _____ miles

f) 8 miles = _____ km

Lesson 4: Calculating Perimeter, Area, and Volume

Perimeter

Perimeter is the distance around the edge of a shape.

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

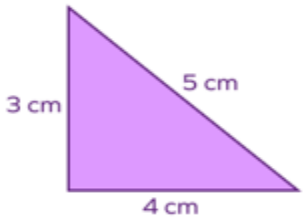
If you need to know the perimeter of a fenced yard, you will add the length (measurements) of all the sides together. Perimeter is measured in linear units, centimeters, meters, inches, or feet.

Perimeter = Sum (total) of all sides

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

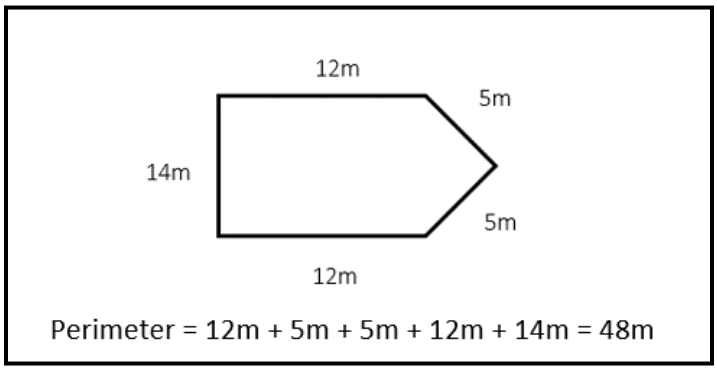
Examples of Calculating Perimeter

We know that the perimeter of a shape is the sum (total) of all it's sides.



Perimeter = 3 cm + 5 cm + 4 cm

Perimeter = 12 cm

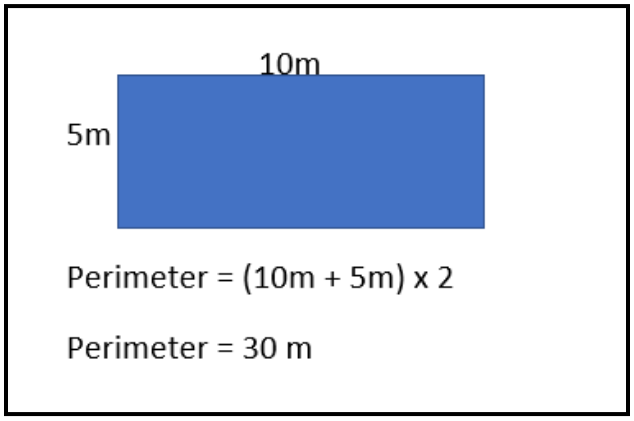


Perimeter = 12m + 5m + 5m + 12m + 14m = 48m

Perimeter of a square and rectangle

We know that to find the perimeter (the distance) around a shape, we need to add up all the side lengths. When finding the perimeter of a rectangle we can do this by adding the length and the width and then multiplying this sum by 2 since there are two of each lengths.

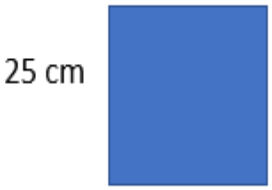
Perimeter of a rectangle = (length + width) x 2



Perimeter = (10m + 5m) x 2

Perimeter = 30 m

When calculating the perimeter of a square, since all of the sides of a square are equal the perimeter of a square will be 4 times its side.



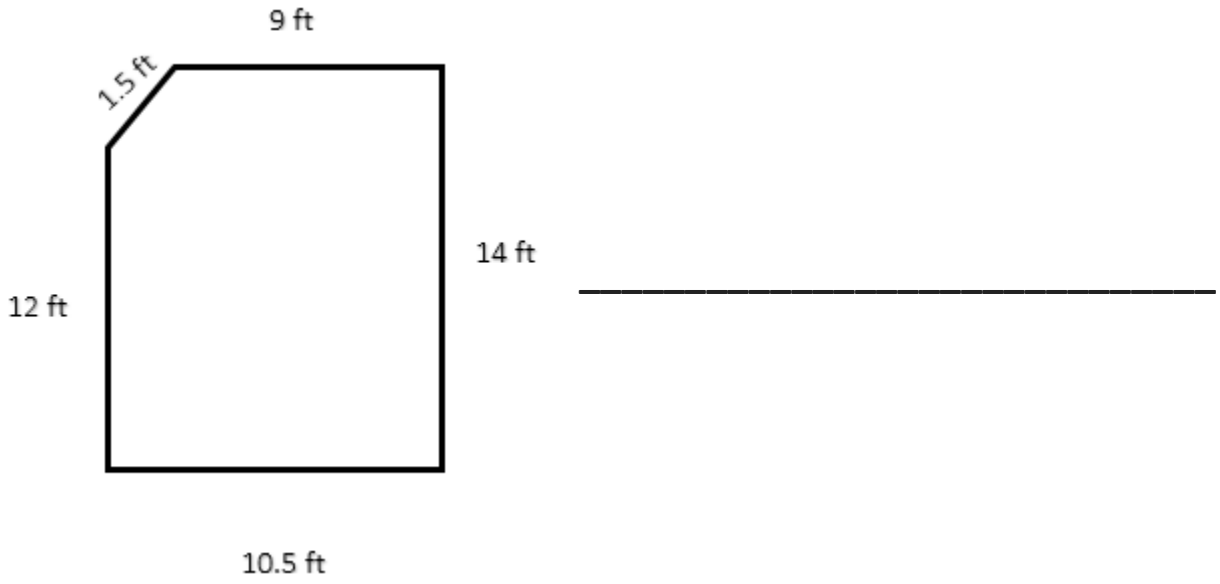
Perimeter = 4 x s (where s is the length of each side)

Perimeter = 4 x 25 cm

Perimeter = 100 cm

Activity 1: Finding Perimeter

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



2. Draw 2 diagrams, label them with measurements and calculate the perimeter. Remember to include the unit (for example: cm, m, ft).

Shape 1

Shape 2

3. A construction site that is 27 m by 76 m needs to be fenced in before the excavation begins. How many meters of fencing should you order to enclose this site?

_____

Rolls of fencing comes in 50 metres. How many rolls will you need to order to do this job? _____

Circumference

The perimeter of a circle is called a circumference. It is the distance all the way around the outer edge. 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 the distance from the edge of the circle to the centre of the circle.

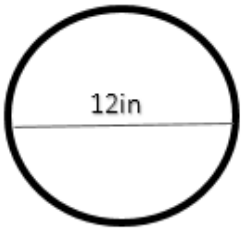
Pi has many, many numbers after its decimal point, but for these simple mathematic equations it is rounded to 3.14.

The formula for the circumference of a circle is C= 2πr.

Pi (π) = 3.14	C = 2 πr

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

Examples of Calculating Circumference



d = diameter r = radius

C = Circumfrance

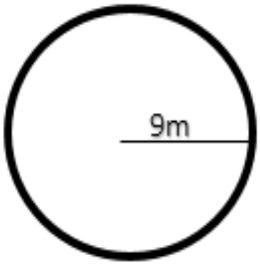
d/2 = r

12/2 = 6

r = 6

C= 2πr

C = 2 x 3.14 x 6



r = 9

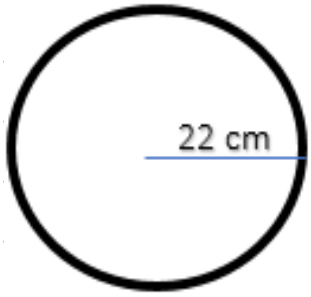
C= 2πr

C = 2 x 3.14 x 9

C = 56.52 m

Activity 2: Finding Circumference

1. Find the circumference of the circles.



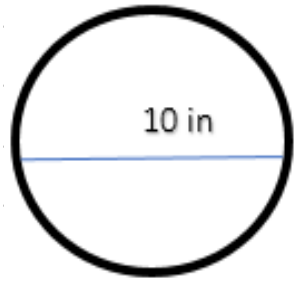
_____

_____

_____

_____

2.



_____

_____

_____

_____

Finding Area

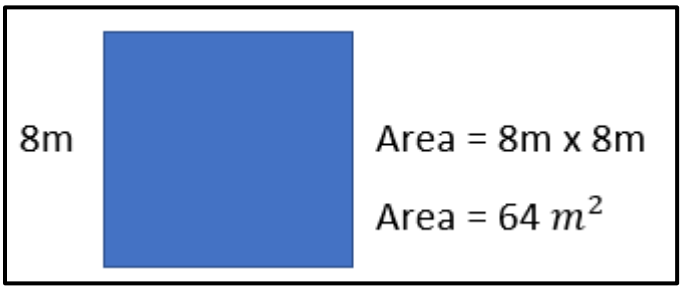
The area is the size (measurement) of a surface, or how much space there is inside a shape. Being able to find the area of a shape or surface is useful in many ways. For example, when you are painting a room, you would need to know how much paint to buy to cover each wall. When you are planting grass seed you would need to know the area of the space to make sure you buy enough grass seed for the space. When you are tiling a floor you need to cover the whole floor with tiles, so you need to know the area.

Area is measured in square units. For example: m^2 or cm^2

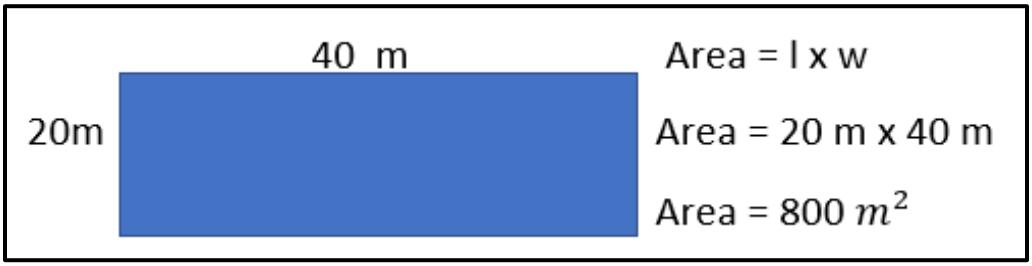
Area = l (length) x w (width)

To find the area of a square or rectangle you multiply the length times the width.

Example of Calculating Area for a Square



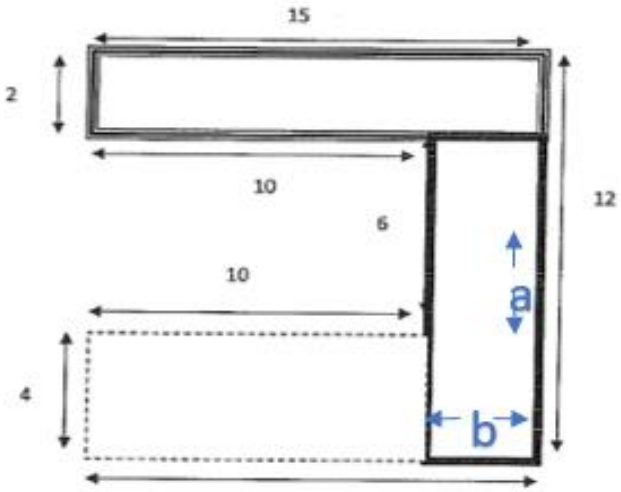
Example for Calculating Area for a Rectangle



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 given 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.



Therefore, a is 10 m.

A= (l x w) + (l x w) + (l x w)

A = (2 x 15) + (a x b) + (4 x 10)

A = (2 x 15) + (10 x 5) + (4 x 10)

A = 30 + 50 + 40

A = 120

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

Area of a Circle

Area = πr^2 (pi times radius squared)

Tip: When a number is squared (s^2) you multiply the number by itself.
For example: When calculating a square with a side that is 4cm long.
4^2= *4 x 4*
A = 16cm^2

Example Calculating the Area of a Circle

A = πr^2

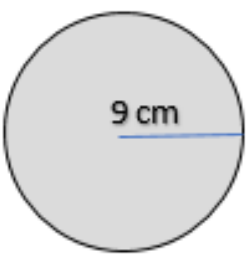
A = π (9)cm^2

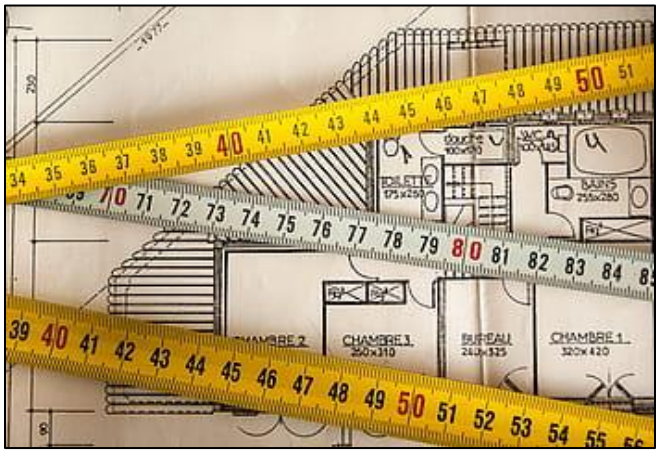
A = π (9 cm) (9 cm)

A = π 81 cm^2

A = 3.14 x 81 cm^2

A = 254.34 cm^2

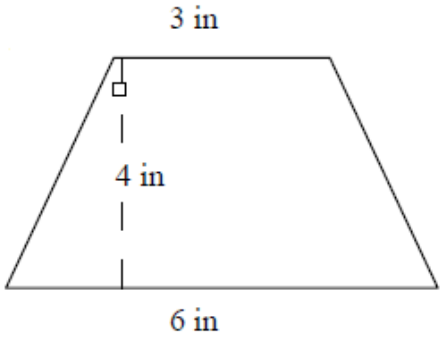




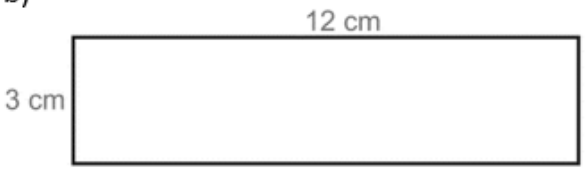
Activity 3: Calculating Area

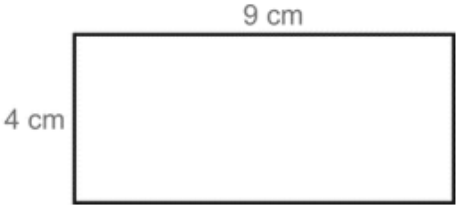
1. Using the formulas and information from the lesson, find the area of the following shapes. Please show your work. Remember all units of measurement will be squared in your answers.

a)

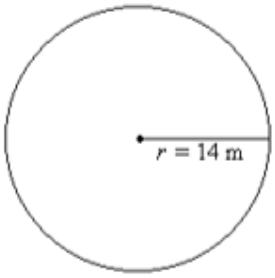


b)



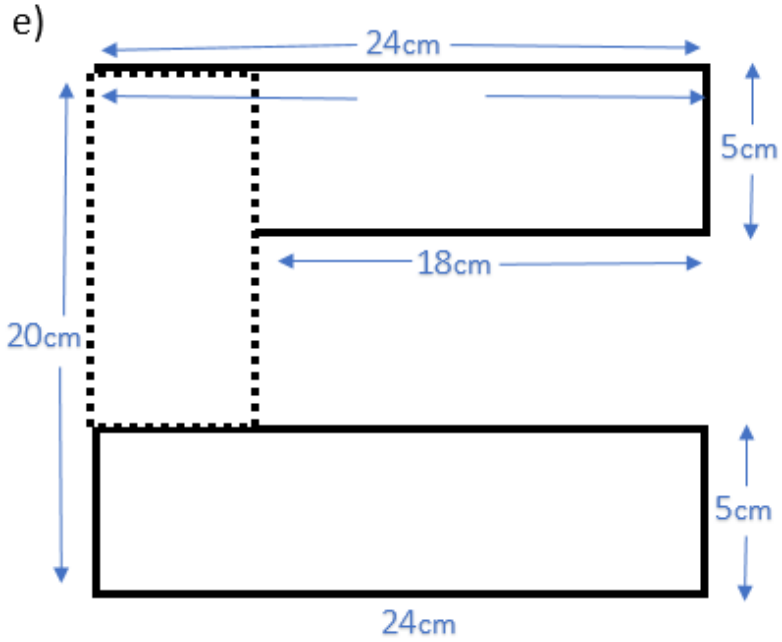


c)



d)

e)



Activity 4: Word Problems Using Area and Perimeter

1. Jason needs to put tape around the door before painting. The dimensions of the door are 86 inches wide and 97 inches high (length). How much tape will Jason need in inches and in feet?

_____

2. Jason is tiling 2 kitchen wall spaces. The first wall space that needs tiling is 180 cm long and 80 cm wide. The second one is 96 cm long and 80 cm wide. Calculate the area of the two spacing needing tiling to help Jason order the correct number of tiles. Convert your answer from cm into m using the proper units (m^2)in your answer.

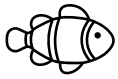
_____

_____

_____

Calculating Volume

The volume of an object is the amount of space inside that object. Every three-dimensional object occupies space. Finding the volume of an object helps us to calculate the amount needed to fill that object.



For example, the amount of water needed to fill a fish tank.

You can use volume formulas to calculate the volume of three-dimensional shapes. Volume is measured in cubic units.

Study the diagram and rewrite the formulas for the three-dimensional shapes shown in the chart on the lines on the next page:

Figure	Formula
Cube 	a^3
Rectangular prism 	$l \times w \times h$
Cylinder 	$\pi \times r^2 \times h$
Cone 	$\frac{1}{3} \times \pi \times r^2 \times h$
Sphere 	$\frac{4}{3} \times \pi \times r^3$

SplashLearn

https://www.splashlearn.com/math-vocabulary/geometry/volume

Cube: _____

Sphere: _____

Cone: _____

Cylinder: _____

Rectangular Prism: _____

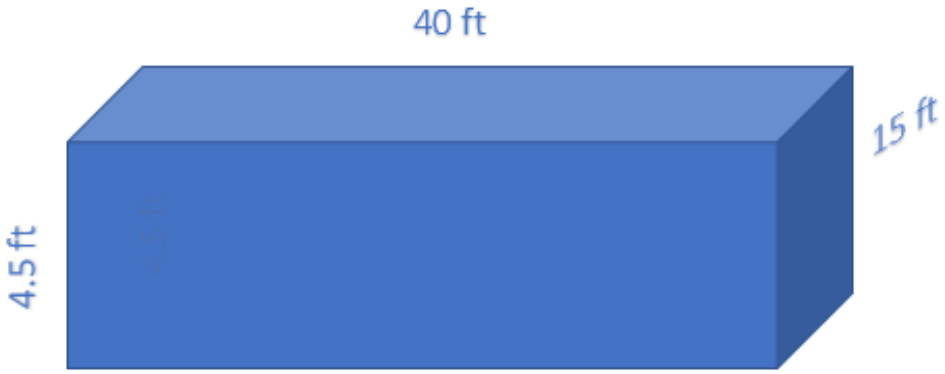
r = radius
h = height
π = pi (3.14)

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

Example of Calculating 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 x w x h = 2,700 ft^3

2,700 ft^3 x 7.5 = 20,250 gallons

The pool can hold 20,250 gallons of water.

Activity 4: Finding Volume

1. You are constructing a play area that will have a ball pit area for children to play in. The measurements are length 20 metres, width 10 metres and depth is 2 metres. You will need to calculate the volume of the ball pit (a rectangular prism), this will give you the inner space of the ball pit and then you will know how many boxes of balls to order to fill it.

Each pack of Jumbo Balls will fill approximate 6 cubic metres. How many packs will you need to fill the ball pit?

_____

_____

_____

2. Your supervisor has asked you to calculate the volume of an oil tank. The tank is 6 ft high, and the radius is 2 ft. Include the formula to calculate the volume of a cylinder and remember to use the correct units.

_____

_____

_____

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

_____

_____

_____

_____

Lesson 5: Working with Ratios

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, (3x4):(2x4), making it 12:8.

Activity 1: Ratio in the Trades

1. The length of a rectangular deck is 20 feet, and the width is 15 feet. What is ratio of length to width? _____

2. The Scissor Sensation Salon mixes 3 parts leave-in-conditioner to 1 part toner in their spray bottles. Both products are sold in one litre bottles. If the salon orders 12 bottles of leave-in-conditioner, how many bottles of toner should they need for their mixture?

_____

Congratulations! You have finished this course.

Answer Guide

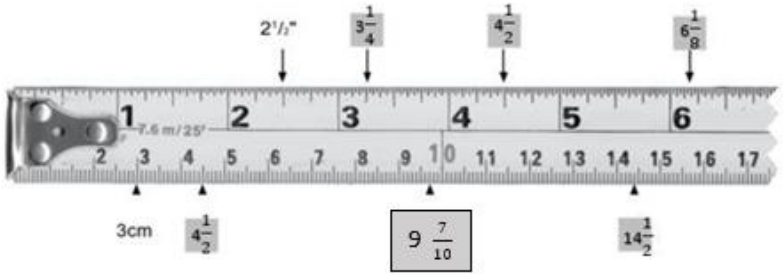
Lesson 1: Measurement and Calculations

Activity 1: Learning to Read a Tape Measure

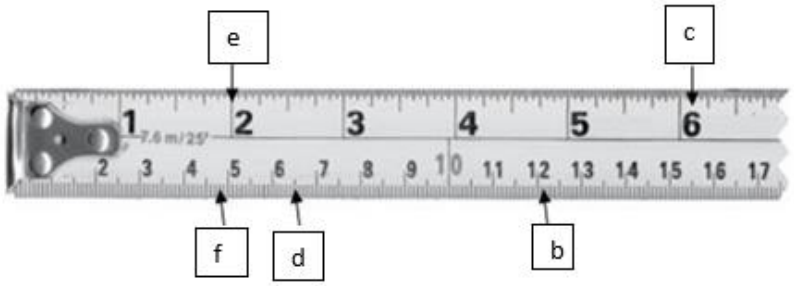
Learner should watch full video

Activity 2: Using a Tape Measure

1.



2.



3. Answers will vary.

Lesson 2: Fractions

Activity 1: Fractions in Daily Life

Answers will vary.

Activity 2: Practice Factoring

$\frac{2}{20}=\frac{1}{10}$ $\frac{8}{8}=1$

Activity 3: Changing Mixed Numbers into Improper Fractions

1. $\frac{9}{4}$ $\frac{34}{6}$ $\frac{29}{3}$

2. $3\frac{1}{2}$ $2\frac{1}{9}$ $3\frac{3}{10}$ $2\frac{5}{7}$

Activity 4: Multiply and Divide Fractions

$\frac{9}{55}$ $\frac{26}{27}$ $\frac{11}{26}$ $\frac{21}{8} = 2\frac{5}{8}$

Activity 5: Fraction Word Problems

1. She has $8\frac{1}{7}$ gallons left over

2. $\frac{3}{4} \div \frac{1}{16} = \frac{48}{4}$ = 12 pieces

3. $28 \div 3\frac{1}{2} = \frac{28}{1} \div \frac{7}{2} = \frac{56}{7} =$ 8 projects

Activity 6: Reducing Fractions to Simplest Form

1. *÷2,* $\frac{1}{4}$

2. a. $\frac{7}{21}=\frac{1}{3}$ b. $\frac{10}{40}=\frac{1}{4}$ c. $\frac{4}{12} = \frac{1}{3}$ d. $\frac{8}{18}=\frac{4}{9}$

Lesson 3: Calculators and Decimals

Practice: Find the equal decimal value

.875 .222 0.2 .27

Activity 1: Using Decimals

1. 4 inches = 0.333 ft
2. 3 ft, 11 inches = 3.917 ft
3. 4'10" = 4.833 ft
4. 24'1" = 24.0833 ft
5. 6" = 0.5 ft

Activity 2: Calculating Conversions

a) 5.28 b)30.28 c)12.8 d)229.6 e) 125.5 f)12.87

Lesson 4: Calculating Perimeter, Area, and Volume

Activity 1: Finding Perimeter

1. 47 ft
2. answers will vary depending on shape drawn by learner

3. 206 m of fencing is needed - they will need to buy 5 rolls

Activity 2: Finding Circumference

1. 138.16 cm

2. 31.4 cm

Activity 3: Calculating Area

a) $\frac{4}{2}$ (3 + 6) 2 x 9 = 18in^2

b) 3 cm x 12 cm = 36 cm^2 9 cm x 4 cm = 36 cm^2

c) 3.14 x (14 x 14) A = 615.44 m^2

d) 5 x 5 = 25 cm^2

e) (18 cm x 5 cm) + (15 cm x 6 cm) + (5cm x 24 cm) = 300 cm^2

Activity 4: Word Problems using Perimeter and Area

1. 366 inches of tape is needed (30.5 feet)

2. 14,400 + 7,680 = 22,080cm^2 220.8m^2

Activity 5: Finding Volume

1. 20m x 10m x 2m = 400m^3 Therefore you need to buy 67 packs.

2. V = 3.14 x 4 x 6 = 75.4 ft^3

3. Using the website Khan Academy

Lesson 5: Working with Ratios

Activity 1: Ratio in the Trades

1. The ratio of length to width is 20 to 15, 20:15 or 20/15

2. 3:1 (conditioner to toner) 12:4 she will need to buy 4 bottles of toner