Math Fundamentals Review

This worksheet will help you review some fundamental math concepts. It will cover:

Divisibility
Order of Operations
Greatest Common Factor & Least Common Multiple
Ratio & Proportion
Reducing Fractions
Converting Improper Fractions
Comparing Fractions
Multiplying & Dividing Fractions
Adding & Subtracting Fractions
The Metric System
Converting Units
Solving Equations with Algebra
Percentages

There are questions for all these topics, along with the answers, at the back. We also have individual worksheets for each of these areas at the Learning Centre for more practice.

DIVISIBILITY

When we say that a number is **divisible** by another number, we can divide it evenly with no remainder. 35 is divisible by 7 because 35 ÷ 7 = 5 exactly. 35 is not divisible by 2, because 35 ÷ 2 = 17 with a remainder of 1. For most small numbers, there is an easy test for divisibility. You may already know how to tell if a number is divisible by 2 (an **even** number). Here's a list of divisibility rules.

	RULE	**EXAMPLE**
2	The last digit is even (0, 2, 4, 6, 8).	74**6** is divisible by 2.
3	The sum of the digits is divisible by 3.	342 is divisible by 3, since 3 + 4 + 2 = 9. ✓
4	The last two digits are divisible by 4.	738,2**28** is divisible by 4.
5	The last digit is 5 or 0.	376**5** is divisible by 5.
6	The number is divisible by both 2 and 3.	43**8** is divisible by 6 since it's even, and 4 + 3 + 8 = 15. ✓
8	The last three digits are divisible by 8.	96,**048** is divisible by 8.
9	The sum of the digits is divisible by 9.	347,868 is divisible by 9 since 3 + 4 + 7 + 8 + 6 + 8 = 36; 3 + 6 = 9. ✓
10	The last digit is 0.	87,235,34**0** is divisible by 10.

The divisibility rules for 3, 6 and 9 can be applied as many times as needed to find out whether a large number is divisible by these factors.

Exercises on divisibility are on page 12.

ORDER OF OPERATIONS

When evaluating an expression, we must follow order of operations. Order of operations is also

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sometimes known as the BEDMAS rule. The order is:

B	**B**rackets first, then
E	**E**xponents, then
DM	**D**ivision and **M**ultiplication, then
AS	**A**ddition and **S**ubtraction.

We always do division and multiplication at the same time, from left to right, since they have equal priority. The same is true for addition and subtraction; neither one is more important, so they should be done from left to right.

Example: Evaluate: a) $(16 + 7) \times 3$ b) $16 + 7 \times 3$ c) $[(4 + 8) \div 2^2 + 7] \times 6 \div 5$

Solution:

a) Brackets first:
$\mathbf{(16 + 7)} \times 3$
$= 23 \times 3$
$= 69$

b) No B, no E, Multiplication first:
$16 + \mathbf{7 \times 3}$
$= 16 + 21$
$= 37$

c) Brackets first: $\mathbf{[(4 + 8) \div 2^2 + 7]} \times 6 \div 5$

In the brackets, Brackets first: $[\mathbf{(4 + 8)} \div 2^2 + 7] \times 6 \div 5$

Still in brackets, Exponents next: $= [12 \div \mathbf{2^2} + 7] \times 6 \div 5$

Division next: $= [\mathbf{12 \div 4} + 7] \times 6 \div 5$

Addition next: $= [\mathbf{3 + 7}] \times 6 \div 5$

No brackets left. Division and multiplication from left to right: $= \mathbf{10 \times 6 \div 5}$
$= 60 \div 5$
$= 12$

Notice that in (a) and (b) that the expressions looked the same, but the answers were not!

Exercises on order of operations are on page 12.

GREATEST COMMON FACTOR & LEAST COMMON MULTIPLE

A **factor** of a large number is any smaller number that divides the large number evenly. The factors of 12 are 1, 2, 3, 4, 6, and 12. These are the only numbers that divide 12 evenly. If we are looking at two numbers, and we are interested in the largest possible factor of both of the numbers, we call that the **greatest common factor**, or **GCF**, of those numbers. Finding the GCF will be a useful skill when we need to reduce a fraction to its lowest terms.

A **multiple** of a particular number is any answer that we can get by multiplying that number by another natural number. The multiples of 12 include 12, 24, 36, 48, 60, and so on. There are an infinite number of multiples of any number. If we are looking at two numbers, and we are interested in the smallest number that is a multiple of both of them, we call that the **least common multiple**, or **LCM**, of those numbers. Finding the LCM will be a useful skill when we need to add fractions.

In finding GCF and LCM, it is worth looking at the **prime factors** of a number. A **prime number** is a number that has no factors other than itself and 1. (1 is not considered prime.) 12 is not prime because it has more factors than just 12 and 1. 11 is prime because 1 and 11 are its only factors. The first few prime numbers are 2, 3, 5, 7, 11, 13, 17, …. Prime factors are useful because they break down numbers to factors that cannot be broken down any smaller.

Example: Find the GCF of 36 and 126.

Solution: First we want to find the prime factors of these two numbers. We can use the divisibility rules (p. 1) to find these. We only want to look for prime factors.

Is 36 divisible by 2? Yes, so we divide: 36 = 2 × 18. Is 18 divisible by 2? Yes, so now we have 36 = 2 × 2 × 9. Is 9 divisible by 2? No, so we move on to the next prime factor, 3. 9 is divisible by 3, so we have 36 = 2 × 2 × 3 × 3. The last factor is now prime, so we stop. We *do* want to know if a prime factor appears more than once in a prime factorization! If we do the same thing to 126, we get 126 = 2 × 3 × 3 × 7. Now we compare these factorizations. **For GCF we only want the factors that appear in both factorizations, as many times as they appear in both.** Both factorizations have one 2 and two 3's. 126 has a 7 as a factor, but 36 doesn't, so it's not a factor of our GCF. Although 36 has two 2's, 126 doesn't, so we can't have two 2's in the GCF. GCF = 2 × 3 × 3 = 18. 18 is the largest number that is a factor of 36 and a factor of 126.

Example: Find the LCM of 75 and 90.

Solution: Again we want to find the prime factors of these two numbers. We use the divisibility rules, and we find that 75 = 3 × 5 × 5, and 90 = 2 × 3 × 3 × 5.

Now we compare these factorizations. **For LCM we want all the factors that appear in either factorization, as many times as they appear in any one place.** This is quite different from GCF! For GCF we want the factors that are in common, and we will have a short list. For LCM we want every factor we see, and we will have a longer list.

Start with the list of factors for 75, and then look at each factor in 90. If there aren't enough factors, add them.

3 × 5 × 5	90 has a factor of 2. Our list doesn't have a 2, so put one in.
2 × 3 × 5 × 5	90 has two 3's. Our list only has one, so put one in.
2 × 3 × 3 × 5 × 5	90 has a factor of 5. Our list already has enough 5's. Do nothing.

The factors of the LCM are 2 × 3 × 3 × 5 × 5 = 450. 450 ÷ 75 = 6, and 450 ÷ 90 = 5, so 450 is a multiple of both 75 and 90. This is our answer.

Exercises on GCF and LCM are on page 12.

RATIO & PROPORTION

A **ratio** is a way of writing a relationship between the sizes of numbers. All of these expressions are ratios and they say the same thing:

2 : 3 2 to 3 $\frac{2}{3}$

If this ratio is the number of men in your class to the number of women, it means that for every 2 men in the class there are 3 women. This does not mean that there are 5 people in your class. There might be 20 men and 30 women, but the relationship is 2 to 3. **Order matters in a ratio.** The ratio 3 : 2 isn't the same.

A **proportion** is a comparison between two situations with the same ratio. If a worker gets paid $35 for every 5 hours, then doubling the number of hours also doubles the pay. We can write:

\$35 : 5 hours = \$70 : 10 hours $\frac{\$35}{\text{5 hours}} = \frac{\$70}{\text{10 hours}}$

We can use proportions to solve problems with missing numbers. If:

A : B = C : D then A × D = B × C

In the example above, 35 × 10 = 350 = 5 × 70. We can use this equation to solve problems.

Example: At a store, mozzarella cheese costs $2.96 for 2 kilograms. How much would 500 g of mozzarella cost?

Solution: This is a proportion problem. We need to set up two ratios, one for the situation we know all about, and one for the situation we want to know about, and then set those ratios equal to each other to make the proportion. Order in the ratio matters: it must be the same for each. We can write:

$$\$2.96 : 2\text{ kg} = x : 500\text{ g}$$

We also need to convert all units so they are the same. In this question we have kilograms and grams. We need to choose one and convert the other. (More about converting between metric units on page 7.)

$$\$2.96 : 2\text{ kg} = x : 0.5\text{ kg}$$

We multiply the outside values of the proportion and the inside values of the proportion to get an equation, which we can solve. (More about algebra on page 8.)

$$2.98 \times 0.5 = 2x$$
$$1.48 = 2x$$
$$1.48 \div 2 = 2x \div 2$$
$$0.74 = x$$

500 grams of mozzarella costs $0.74, or 74¢.

Exercises on ratio and proportion are on page 13.

REDUCING FRACTIONS

It is helpful to reduce a fraction to the smallest numbers possible. I can write the fraction $\frac{1}{2}$ many different ways — $\frac{2}{4}, \frac{3}{6}, \frac{10}{20}, \frac{500}{1000}, \ldots$ — but $\frac{1}{2}$ is the easiest to understand because the numbers are smaller. Also, it is easier to do math with smaller numbers. Writing a fraction with the smallest numbers is called **reducing** the fraction **to lowest terms**. We can do this by dividing the **numerator** (top part) and the **denominator** (bottom part) of the fraction by their GCF. If the GCF is 1, then the fraction is already in lowest terms. (More about greatest common factor on page 2.)

Example: Reduce $\frac{21}{56}$ to lowest terms.

Solution: We need to know the GCF of 21 and 56. First we find the prime factorizations of both these numbers, and find the factors in common. Then divide both numbers in the fraction by the GCF:

$$21 = 3 \times \mathbf{7}$$
$$56 = 2 \times 2 \times 2 \times \mathbf{7}$$
$$GCF = 7$$

$\frac{21 \div 7}{56 \div 7} = \frac{3}{8}$, so $\frac{21}{56}$ reduced to lowest terms is $\frac{3}{8}$.

Exercises on reducing fractions are on page 4.

CONVERTING IMPROPER FRACTIONS

A number like 1½ is called a **mixed number** because it is a mix of a fraction and a whole number. A fraction like $\frac{3}{2}$, with a numerator larger than the denominator, is called an **improper fraction**. All improper fractions have a value greater than 1. (A fraction with the denominator larger than the numerator is often called a **proper fraction**.) If we are doing arithmetic with fractions, it can be easier to use improper fractions, while mixed numbers are intuitively easier to understand. (How much is $\frac{812}{15}$? More than 50? Less than 50? It's hard to tell in this form, but if it's rewritten as a mixed number, it's easier.)

Example: Convert $\frac{73}{12}$ to a mixed number.

Solution: Fractions are just division problems. To convert to a mixed number, divide:

$73 \div 12 = 6$, with 1 remainder.

The quotient is the whole number part of the answer, and the remainder is the numerator of the fraction part. The denominator stays the same: $\frac{73}{12} = 6\frac{1}{12}$.

Example: Convert $7\frac{8}{9}$ to an improper fraction.

Solution: The denominator stays the same. To get the new numerator, multiply the denominator by the whole number part and add the old numerator:

$$7\frac{8}{9} = \frac{7 \times 9 + 8}{9} = \frac{71}{9}$$

Exercises on improper fractions are on page 13.

COMPARING FRACTIONS

One of the harder questions on the math assessments is determining which of two fractions is bigger. If either the denominators or numerators are the same, the comparison is easier:

If the *denominators* of two fractions are the same, the larger fraction has the *larger* numerator.

If the *numerators* of two fractions are the same, the larger fraction has the *smaller* denominator.

Example: Determine which of these is the largest fraction: $\frac{8}{13}, \frac{8}{15}, \frac{7}{15}$.

Solution: Start with the last two fractions. The fractions $8/15$ and $7/15$ have the same denominator. They mean 8 pieces and 7 pieces of a whole, in order, and the pieces are all the same size. There are more pieces in $8/15$ so it must be bigger. Now compare $8/15$ and $8/13$. They both mean 8 pieces of a whole, and the first pieces are the whole cut into 15 parts and the second pieces are the whole cut into 13 parts. Since the second one is cut into fewer pieces, those pieces must be larger. (Imagine a cake cut into 3 pieces and another cut into 30 pieces. Which pieces are bigger?) Since both fractions represent the same number of pieces, the one with bigger pieces is the bigger fraction. $8/13$ is the largest of the fractions.

If you cannot use these guidelines to answer the question, you may be able to eliminate some fractions from a list (just as $7/15$ was eliminated as a possibility in the example). After this, you can cross-multiply to find which one of two fractions is larger:

Multiply the numerator of each fraction by the denominator of the other one. The larger answer came from the numerator of the larger fraction.

Example: Determine which of these is the larger fraction: $\frac{7}{12}, \frac{3}{5}$.

Solution: The two numerators are 7 and 3. Multiply each numerator by the denominator from the other fraction.

Left: $7 \times 5 = 35$ Right: $3 \times 12 = 36$

Since 36 is larger, the fraction on the right is larger. $\frac{3}{5} > \frac{7}{12}$.

Exercises on comparing fractions are on page 13.

MULTIPLYING AND DIVIDING FRACTIONS

Multiplying fractions works the way we wish all operations with fractions did: you just multiply the numerators and multiply the denominators. We can cancel before we multiply.

Example: Multiply $\frac{3}{8} \times \frac{4}{5}$.

Solution: $\frac{3}{8} \times \frac{4}{5} = \frac{3 \times \cancel{4}}{{}_2\cancel{8} \times 5} = \frac{3}{2 \times 5} = \frac{3}{10}$

A whole number can be written as a fraction with a denominator of 1. When multiplying mixed numbers, convert to improper fractions first. (You can review converting from mixed numbers to improper fractions and back again on page 4.)

Example: Multiply: (a) $\frac{7}{10} \times 3$ (b) $2\frac{1}{3} \times 5\frac{1}{2}$.

Solution: (a) $\frac{7}{10} \times 3 = \frac{7}{10} \times \frac{3}{1} = \frac{7 \times 3}{10 \times 1} = \frac{21}{10}$; $21 \div 10 = 2\text{ R }1, \therefore \frac{21}{10} = 2\frac{1}{10}$

(b) $2\frac{1}{3} = \frac{2 \times 3 + 1}{3} = \frac{7}{3}$; $5\frac{1}{2} = \frac{5 \times 2 + 1}{2} = \frac{11}{2}$; $\frac{7}{3} \times \frac{11}{2} = \frac{7 \times 11}{3 \times 2} = \frac{77}{6}$

$77 \div 6 = 12\text{ R }5, \therefore \frac{77}{6} = 12\frac{5}{6}$

To do any division problem with fractions, we **invert and multiply**: write the second fraction upside-down and multiply the fractions instead.

Example: Divide: (a) $\frac{5}{9} \div \frac{7}{12}$ (b) $1\frac{1}{4} \div 3$.

Solution: (a) $\frac{5}{9} \div \frac{7}{12} = \frac{5}{9} \times \frac{12}{7} = \frac{5 \times \cancel{12}^{4}}{{}_3\cancel{9} \times 7} = \frac{5 \times 4}{3 \times 7} = \frac{20}{21}$

(b) $1\frac{1}{4} = \frac{1 \times 4 + 1}{4} = \frac{5}{4}$; $\frac{5}{4} \div 3 = \frac{5}{4} \div \frac{3}{1} = \frac{5}{4} \times \frac{1}{3} = \frac{5 \times 1}{4 \times 3} = \frac{5}{12}$

Reduce your final answer when possible. (You can review reducing fractions on page 4.)

Exercises on multiplying and dividing fractions are on page 14.

ADDING AND SUBTRACTING FRACTIONS

To add or subtract fractions you need a common denominator. The common denominator should be the LCM of the denominators of the fractions you're adding or subtracting. With mixed numbers, add fraction parts and whole number parts separately.

Example: Add (a) $\frac{3}{8}+\frac{4}{5}$ (b) $4\frac{5}{6}+2\frac{3}{4}$.

Solution: (a) The LCM of 8 and 5 is 40. (b) The LCM of 6 and 4 is 12.

$$\begin{aligned} \frac{3}{8} &= \frac{3\times 5}{8\times 5} = \frac{15}{40} \\ +\ \frac{4}{5} &= \frac{4\times 8}{5\times 8} = \frac{32}{40} \\ \hline & \frac{47}{40} = 1\frac{7}{40} \end{aligned}$$

$$\begin{aligned} 4\frac{5}{6} &= 4+\frac{5\times 2}{6\times 2} = \frac{10}{12} \\ +\ 2\frac{3}{4} &= 2+\frac{3\times 3}{4\times 3} = \frac{9}{12} \\ \hline & 6 + \frac{19}{12} = 1\frac{7}{12} \qquad 6 + 1\tfrac{7}{12} = 7\tfrac{7}{12} \end{aligned}$$

To subtract fractions, you may sometimes need to borrow. To borrow with fractions, we "break" a whole into fractions just like you might "break a dollar" into quarters or dimes.

Example: Subtract $3\frac{2}{9}-\frac{5}{6}$.

Solution: The LCM of 9 and 6 is 18.

$$\begin{aligned} 3\frac{2}{9} \quad & \frac{2\times 2}{9\times 2} = \frac{4}{18} \quad 2\frac{18+4}{18} = 2\frac{22}{18} \\ -\frac{5}{6} \quad & \frac{5\times 3}{6\times 3} = \frac{15}{18} \quad \frac{15}{18} = \frac{15}{18} \\ \hline & \qquad 2\frac{7}{18} \end{aligned}$$

Exercises on adding and subtracting fractions are on page 14.

THE METRIC SYSTEM

The metric system uses **base units** and **prefixes** to create new units for measurement. A base unit is the basic way to measure something. We use the **metre** to measure distance, the **gram** to measure mass (or weight) and the **litre** to measure volume (or capacity). We add prefixes to these to change their size to make the units more convenient to use.

Larger Units			Base Units	Smaller Units					
kilo- **k**					centi- **c**	milli- **m**			micro- **mc** or **μ**
1000			1		0.01	0.001			0.000001

These are the most common metric prefixes. In math and science the "micro" prefix is abbreviated by the Greek letter mu (pronounced "mew"), μ. In pharmacology, it is abbreviated "mc".

Each prefix indicates what factor the base unit has been multiplied by. If we multiply a gram by 1000, it becomes a **kilo**gram (kg). A "mL" is a litre (L) that has been multiplied by 0.001 to become much smaller; this unit is a **milli**litre, and so on.

Converting between units in the metric system means moving the decimal in the number to the left if the unit gets *bigger*, or to the right if the unit gets *smaller*.

Example: Convert (a) 15 km to m (b) 72.35 mcg to cg.

Solution: (a) Metres (m) are smaller than kilometres (km). Going from the box in the diagram for "kilo" to the box for the base unit means moving to the right three boxes, so the decimal moves three places to the right.

1 5.0 0 0.   15 km = 15 000 m

(b) Centigrams (cg) are larger than micrograms (mcg). Going from the “micro” box to the “centi” box means going 4 boxes to the left, so the decimal moves 4 places to the left.

0.0 0 7 2.3 5   72.35 mcg = 0.007 235 cg

Add zeroes as needed. **In the LPN program, you must put a zero in front of the decimal point.**

Exercises on the metric system are on page 14.

CONVERTING UNITS

To convert between units that are more complicated to work with than the metric system, we can use fractions called **conversion factors** to help us remember whether to multiply or divide to do a conversion.

Example: Convert 3½ fl.oz. (fluid ounces) to millilitres.

Solution: We multiply the measurement we’re converting by a fraction whose numerator and denominator are equal. We put the unit we don’t want anymore on the bottom so it will cancel, and we put the unit we do want on the top. The table on page 11 lets us find the conversion factor we need. Fluid ounces and millilitres are units of volume, so we look at the Volume table. The column with “1 fluid ounce” also has 30 mL, so 1 fl.oz. = 30 mL, and either of the two fractions at the right is a valid conversion factor. We want to use the one on the right because we need to cancel ounces.

$$\frac{1\text{ fl.oz.}}{30\text{ mL}} \qquad \frac{30\text{ mL}}{1\text{ fl.oz.}}$$

$$3\tfrac{1}{2}\text{ fl.oz.} \times \frac{30\text{ mL}}{1\text{ fl.oz.}} = \frac{3.5\times 30}{1}\text{ mL} = 105\text{ mL}$$

If instead we were asked to convert 80 mL to fluid ounces, we’d use the other fraction:

$$80\text{ mL} \times \frac{1\text{ fl.oz.}}{30\text{ mL}} = \frac{80}{30}\text{ fl.oz.} = 2.33\text{ fl.oz.}$$

More than one conversion factor can be used if we have more than one unit to convert, or if we don’t know a direct way to convert from one unit to another.

Example: A doctor prescribes 200 mL/hour of a particular medication. What is this amount expressed in fl.oz./day?

Solution: We set up two conversion fractions to cancel both units. We need to put two things that are equal into each conversion factor. 24 hours = 1 day, so:

$$200\,\frac{\cancel{\text{mL}}}{\cancel{\text{hour}}} \times \frac{1\text{ fl.oz.}}{30\,\cancel{\text{mL}}} \times \frac{24\,\cancel{\text{hours}}}{1\text{ day}} = \frac{200\times 1\times 24}{30\times 1}\,\frac{\text{fl.oz.}}{\text{day}} = 160\text{ fl.oz./day}$$

Some useful conversion rates are on page 11. A review of multiplying and dividing fractions is on page 6. Exercises on converting units are on page 14.

SOLVING EQUATIONS WITH ALGEBRA

Algebra is a powerful way to solve mathematical problems. For your assessment, you may be tested to see whether you can find out the unknown identity of a number from an equation. Your job is to change the equation so that it matches the original problem, and so that it has the unknown number by itself. In algebra, there are only two things you can do. You can:

… replace any part of an equation with something else that has the same value.

… perform operations (+, −, ×, ÷) on every term of both sides of the equation

The unknown number will be represented by a letter, usually x or N. In general, you'll want to follow order of operations <u>*backwards*</u> to get the unknown number by itself. This means you'll add or subtract before you multiply or divide, and you'll work on anything in brackets last. Do the opposite of the operation you see in the equation. (If a number is subtracted, add. If it is multiplied, divide.)

Simplify your equation whenever you can. (That's why we replace parts of the equation.)
Example 1: Solve: $3x - 8 = 22$

Solution: We need to get x by itself. We'll change the equation using these two rules.

	$3x - 8$	=	22
Add 8 to both sides:	$3x - 8 + 8$	=	$22 + 8$
Simplify:	$3x$	=	30
Divide both sides by 3:	$3x \div 3$	=	$30 \div 3$
Simplify:	x	=	10

Example 2: Solve: $7x - 5 = 4x + 7$

Solution: Now we have two x's. To solve this type of problem, we need to get all the parts of the equation with an x on one side, and all the parts without an x on the other side.

	$7x - 5$	=	$4x + 7$
Add 5 to both sides:	$7x - 5 + 5$	=	$4x + 7 + 5$
Simplify:	$7x$	=	$4x + 12$
Subtract 4x from both sides:	$7x - 4x$	=	$4x + 12 - 4x$
Simplify:	$3x$	=	12
Divide both sides by 3:	x	=	4

You can always check your answers to algebra problems by plugging your answer into the *original question* to see if it works.

Example 1:	$3x - 8$	=	$3(10) - 8$
		=	$30 - 8 = 22$ ✓

Help with order of operations is on page 1. Practice algebra problems are on page 15.

PERCENTAGES

Percentages are another way of writing a fraction, just as decimals are another way of expressing fractions. Converting between percentages and decimals is easy:

To convert a percentage to a decimal, remove the "%" symbol and shift the decimal point two spaces to the *left*.

To convert a decimal to a percentage, shift the decimal point two spaces to the *right* and add a "%" symbol.

Example: Write: (a) 27% as a decimal (b) 0.065 as a percentage.

Solution: (a) To convert to a decimal, shift the decimal point left two spaces: 27% = 0.27.

(b) To convert to a percentage, shift the decimal point right two spaces and add a %: 0.065 = 6.5%.

To convert a percentage to a fraction, remove the "%" symbol and write the number over 100. If that number is a decimal fraction, multiply the top and bottom by 10 until it is not. Reduce the fraction that results if necessary. For a fraction made from a percentage in this way, you only need the divisibility rules for 2 and 5.

Example: Write as fractions: (a) 36% (b) 91.7%.

Solution: (a) 36% = $\frac{36}{100}$. This can be reduced: $\frac{36 \div 4}{100 \div 4} = \frac{9}{25}$

(b) 91.7% = $\frac{91.7}{100}$. The fraction has a decimal, so we fix it. $\frac{91.7 \times 10}{100 \times 10} = \frac{917}{1000}$

To convert a fraction to a percentage, divide the fraction to create a decimal, and then convert the decimal.

Example: Write $\frac{5}{8}$ as a percentage.

Solution: "$\frac{5}{8}$" means 5 ÷ 8. 5 ÷ 8 = 0.625. Convert this to a percentage: 0.625 = 62.5%

You may also be asked to solve a percentage problem. You can use proportions to solve these. We set up the proportion by writing the percentage as a fraction over 100, and setting it equal to another fraction: the portion divided by the whole. There are three types:

Example 1: What is 58% of 96?
Solution: 58% = $\frac{58}{100}$. In this type of problem, the "whole" is 96 — we're taking a percentage of this number. We want to know the portion. Call it N:

$$\frac{58}{100} = \frac{N}{96}$$

Cross-multiply: $58 \times 96 = 100N$

$5568 = 100N$

Solve for N: $5568 \div 100 = 100N \div 100$

$55.68 = N$

So 58% of 96 is 55.68.

Example 2: What percentage of 64 is 48?

Solution: In this type of problem, the "whole" is 64 — we're taking a percentage of this number. The portion is 48. We don't know the percentage; call it N:

$$\frac{N}{100} = \frac{48}{64}$$

Cross-multiply: $64N = 48 \times 100$

$64N = 4800$

Solve for N: $64N \div 64 = 4800 \div 64$

$N = 75$

So 48 is 75% of 64.

Example 3: 30% of what number is 51?
Solution: 30% = $\frac{30}{100}$. In this type of problem, the "whole" is unknown — we're taking a percentage of "what number". The portion is 51. Call the whole N:

$$\frac{30}{100} = \frac{51}{N}$$

Cross-multiply: $30N = 51 \times 100$

$30N = 5100$

Solve for N: $30N \div 30 = 5100 \div 30$

$N = 170$

So 51 is 30% of 170.

Help with proportions is on page 3. Help with solving algebraic equations is on page 8. Exercises on percentages are on page 15.

USEFUL CONVERSION FACTORS

Each column in this table represents the same amount, expressed in different units. So in the first column of the distance chart below, 1 inch = 2.54 cm = 25.4 mm. Each row represents the same unit. Larger units are higher in the table. See the section on converting units (page 8) to see how to use the table.

Distance

				0.621 mi.	**1 mile**
			.0001 km	**1 kilometre**	1.609 km
		0.91 m	**1 metre**	1000 m	1609 m
1 inch	⅓ yd. **1 foot** 12 in.	**1 yard** 3 ft. 36 in.	1.094 yd. ~3.281 ft ~39.37 in	~1094 yd. ~3281 ft.	1760 yd. 5280 ft.
2.54 cm 25.4 mm	30.48 cm 304.8 mm	91.44 cm 914.4 mm	100 cm 1000 mm		

Volume

1 teaspoon	½ fl. oz. **1 tablespoon** 3 tsp.	**1 fluid ounce** 2 tbsp. 6 tsp.	½ pt. **1 cup** 8 fl. oz. 16 tbsp. 48 tsp.	½ qt. **1 pint** 2 c. 16 fl. oz. 32 tbsp	**1 quart** 2 pt. 4 c. 32 fl. oz.
5 cc 5 mL	15 cc 15 mL	~30 cc ~30 mL	~240 cc ~240 mL*	~475 mL	~950 mL

* In cooking, a cup is usually equated to 250 mL. 240 mL is a bit more accurate.

Weight

	1 dram	**1 ounce ap.** 8 dram	**1 lb. ap.*** 12 oz. ap. 96 dram	**1 pound** 16 ounces	**1 kg** 2.2 lb. 2.68 lb. ap. 32.2 oz. ap.
1 gram 1000 mg	3.9 g	31.1 g	373 g	454 g	1000 g

* The pound used to measure medications consists of 12 apothecary ounces. In medicine, it's called the apothecary pound. It is important to remember that there are two different ounces (plus fluid ounces) and two different pounds.

For pharmacology:
1 $^{mmol}/_{L}$ of glucose = 18 $^{mg}/_{dL}$ of glucose
1 $^{mmol}/_{L}$ of cholesterol = 39 $^{mg}/_{dL}$ of cholesterol (HDL and LDL both)
1 $^{mmol}/_{L}$ of triglycerides = 89 $^{mg}/_{dL}$ of triglycerides
88 $^{mcmol}/_{L}$ of creatinine = 1 $^{mg}/_{dL}$ of creatinine (careful! That's micromoles!)

EXERCISES

These exercises will help you practice the skills in this package. The Learning Centre also has individual worksheets on most of these subjects so you can get more detailed instructions and more practice. The worksheet name appears with the exercise that relates to it. To prepare for the assessments at VCC, these exercises should be done **without a calculator**.

DIVISIBILITY — Instructions on *page 1*

D 1. Determine whether the numbers are divisible by the factors shown.

a) Is 6484 divisible by:
i) 2? ii) 4? iii) 10?

b) Is 7845 divisible by:
i) 5? ii) 3? iii) 9?

c) Is 15,942 divisible by:
i) 3? ii) 6? iii) 4?

d) Is 74,056 divisible by:
i) 9? ii) 8? iii) 6?

e) Is 16,936,835,418 divisible by:
i) 2? ii) 4? iii) 10?

Answers are on page 15. More help is available in the worksheet **Divisibility Rules**.

ORDER OF OPERATIONS — Instructions on *page 1*

OO 1. Determine the values of these mathematical expressions.

a) $42 \div 7 \times 3$

b) $42 \div (7 \times 3)$

c) $7 \times 5 - 4 \times 8$

d) $12(5 + 7 - 9 + 3 \times 7 - 11) \div 4$

e) $3 \times (19 + 6) + 8(29 - 26) + (3^2 - 2^3)$

f) $12 \times 3 + 4 - (5 \times 6 + 7) + 8(9 + 10)$

g) $144 \div [3 + 5 \times 9 - (7 + 45 \div 9)]$

h) $[64{,}000 \div (193 + 307) - 3] \div [(6 + 5) \times 4 - 3^2 - 10]$

Answers are on page 15. More help is available in the worksheet **Order of Operations**.

GREATEST COMMON FACTOR & LEAST COMMON MULTIPLE — Instructions on *page 2*

GCF 1. Determine the greatest common factor of the sets of numbers given.

a) 12 and 18
b) 24 and 60
c) 42 and 49
d) 100 and 160
e) 15, 25, and 35
f) 45, 63 and 90
g) 30, 64 and 72
h) 8, 48 and 144
i) 16, 56 and 70

GCF 2. Determine the least common multiple of the sets of numbers given.

a) 3 and 5
b) 6 and 8
c) 10 and 15
d) 24 and 30
e) 2, 3, and 7
f) 6, 8 and 10
g) 8, 12 and 18
h) 9, 15 and 25
i) 15, 21 and 36

Answers are on page 16. More help is available in the worksheet **GCF & LCM**.

RATIO & PROPORTIONS

Instructions on ***page 3***

RP 1. Solve for x.

a) $\frac{x}{12} = \frac{25}{60}$
b) $\frac{35}{42} = \frac{10}{x}$
c) $\frac{98}{70} = \frac{x}{45}$
d) $\frac{1.5}{2} = \frac{27}{x}$
e) $\frac{2.3}{10} = \frac{x}{35}$
f) $\frac{1.4}{2.6} = \frac{0.91}{x}$
g) 2 : 3 = 50 : x
h) 1 : 7 = 3.2 : x
i) 3.2 : 5.6 = x : 6.3

RP 2. Solve the word problems by creating and solving proportions.

a) A mechanic estimates that it takes him about 45 minutes to do an oil change. If he has four oil changes to do to day, how long will they take to complete in minutes? In hours?
b) A packing plant weighs a sample of 5 containers of strawberries and gets a total weight of 1.4 kg. How much weight would a crate of 200 containers hold?
c) Tablets of a certain medication contain 250 mg of actual medicine. If a doctor prescribes 2250 mg of medicine each day, how many tablets must the patient take?
d) A solution has a concentration of 0.85 moles of salt for every 1 litre of fluid. A chemist measures out 0.050 L of solution. How many moles of salt are in the sample?

Answers are on page 16. More help is available in the worksheet **Ratio and Proportion**.

REDUCING FRACTIONS

Instructions on ***page 4***

RF 1. Simplify these fractions by reducing them to lowest terms.

a) $\frac{3}{6}$
b) $\frac{5}{20}$
c) $\frac{12}{30}$
d) $\frac{28}{36}$
e) $\frac{175}{325}$
f) $\frac{30}{90}$
g) $\frac{75}{180}$
h) $\frac{42}{126}$
i) $\frac{2400}{9600}$
j) $\frac{124}{412}$

Answers are on page 16. More help is available in the worksheet **Equivalent Fractions**.

CONVERTING IMPROPER FRACTIONS

Instructions on ***page 4***

IF 1. Convert to a mixed number. Reduce to lowest terms when possible.

a) $\frac{5}{3}$
b) $\frac{7}{4}$
c) $\frac{12}{5}$
d) $\frac{21}{4}$
e) $\frac{17}{2}$
f) $\frac{131}{10}$
g) $\frac{42}{12}$
h) $\frac{57}{6}$
i) $\frac{52}{39}$
j) $\frac{1071}{243}$

IF 2. Convert to an improper fraction. Reduce to lowest terms when possible.

a) $1\frac{1}{2}$
b) $1\frac{2}{7}$
c) $2\frac{3}{8}$
d) $3\frac{7}{10}$
e) $6\frac{2}{5}$
f) $7\frac{11}{16}$
g) $3\frac{6}{8}$
h) $5\frac{12}{15}$
i) $9\frac{18}{42}$
j) $12\frac{24}{96}$

Answers are on page 16. More help is available in the worksheet **Equivalent Fractions**.

COMPARING FRACTIONS

Instructions on ***page 5***

CF 1. In each group, determine which fraction is the *largest*.

a) $\frac{5}{6}, \frac{5}{9}$	c) $\frac{9}{16}, \frac{9}{13}$	e) $\frac{1}{2}, \frac{51}{100}$	g) $\frac{3}{13}, \frac{4}{21}, \frac{4}{13}$	i) $\frac{11}{17}, \frac{10}{19}, \frac{13}{17}, \frac{10}{18}$
b) $\frac{7}{10}, \frac{4}{10}$	d) $\frac{3}{4}, \frac{5}{6}$	f) $\frac{7}{15}, \frac{12}{19}$	h) $\frac{4}{9}, \frac{7}{14}, \frac{4}{7}$	j) $\frac{21}{10}, \frac{33}{15}, \frac{45}{21}$

Answers are on page 16.

MULTIPLYING AND DIVIDING FRACTIONS **Instructions on *page 6***

MD 1. Multiply. Reduce to lowest terms when possible. Express your answer as a mixed number when possible.

a) $\frac{1}{4} \times \frac{3}{5}$	c) $\frac{3}{10} \times \frac{5}{6}$	e) $\frac{7}{9} \times 3$	g) $\frac{9}{10} \times 4\frac{2}{3}$	i) $4\frac{1}{5} \times 2\frac{7}{12}$
b) $\frac{2}{7} \times \frac{3}{8}$	d) $\frac{3}{4} \times 5$	f) $3\frac{1}{3} \times \frac{5}{8}$	h) $2\frac{2}{7} \times 9$	j) $6\frac{3}{12} \times 8\frac{12}{18}$

MD 2. Divide. Reduce to lowest terms when possible. Express your answer as a mixed number when possible.

a) $\frac{5}{6} \div \frac{1}{2}$	c) $\frac{1}{7} \div \frac{5}{3}$	e) $7 \div \frac{3}{4}$	g) $2\frac{5}{6} \div 8$	i) $10\frac{2}{4} \div 5\frac{1}{3}$
b) $\frac{3}{8} \div \frac{5}{12}$	d) $\frac{6}{11} \div 4$	f) $1\frac{2}{3} \div \frac{7}{10}$	h) $3\frac{4}{5} \div 8\frac{1}{2}$	

Answers are on page 16. More help is available in the worksheet **Working With Fractions**.

ADDING AND SUBTRACTING FRACTIONS **Instructions on *page 6***

AS 1. Add. Reduce to lowest terms when possible. Express your answer as a mixed number when possible.

a) $\frac{2}{7} + \frac{4}{7}$	c) $\frac{7}{20} + \frac{3}{20}$	e) $\frac{7}{12} + \frac{7}{10}$	g) $\frac{7}{12} + \frac{9}{20} + \frac{13}{30}$	i) $4\frac{6}{7} + 3\frac{1}{10}$
b) $\frac{5}{13} + \frac{3}{13}$	d) $\frac{3}{5} + \frac{1}{4}$	f) $\frac{5}{6} + \frac{7}{8} + \frac{2}{5}$	h) $1\frac{3}{5} + 3\frac{2}{5}$	j) $12\frac{5}{8} + 26\frac{3}{4}$

AS 2. Subtract. Reduce to lowest terms when possible. Express your answer as a mixed number when possible.

a) $\frac{12}{13} - \frac{4}{13}$	c) $\frac{8}{15} - \frac{2}{15}$	e) $\frac{7}{8} - \frac{2}{5}$	g) $2\frac{7}{10} - \frac{5}{6}$	i) $4\frac{1}{3} - 1\frac{4}{5}$
b) $\frac{14}{17} - \frac{9}{17}$	d) $\frac{4}{5} - \frac{2}{3}$	f) $\frac{13}{6} - \frac{3}{4}$	h) $2\frac{3}{16} - \frac{17}{28}$	j) $21\frac{18}{24} - 8\frac{25}{30}$

Answers are on page 16. More help is available in the worksheet **Working With Fractions**.

THE METRIC SYSTEM **Instructions on *page 7***

M 1. Convert the following to the indicated unit. [*Hint: pay attention to the prefixes.*]

a) 1530 m to km	d) 0.004 kg to g	g) 142 700 W to kW
b) 125 cg to g	e) 0.000 034 g to µg (or mcg)	h) 0.035 2 A to mA
c) 2250 mL to L	f) 12 457 milliseconds to s	i) 0.033 72 C to µC

Answers are on page 16. More help is available in the worksheet **Metrics**.

CONVERTING UNITS **Instructions on *page 8***

CU 1. Convert the following measurements to the indicated unit. You may find the conversion factors on page 11 helpful.

a) 36 in. to yards	d) 12 fl. oz. to teaspoons	g) 18 lb. to ounces
b) 2 mi. to feet	e) 600 mL to cups	h) 78 kg to pounds

c) 55 in. to cm	f) 3½ quarts to millilitres	i) $5\frac{5}{12}$ lb. ap. to drams

Answers are on page 16. More help is available in the worksheet **Conversion Fractions**.

SOLVING EQUATIONS WITH ALGEBRA **Instructions on *page 8***

A 1. Solve for the variable in each equation.

a) $x + 2 = 7$	d) $2a + 4 = 12$	g) $N + 4 = 2N - 5$
b) $N - 4 = 11$	e) $3x + 1 = 28$	h) $2x + 29 = 3x + 14$
c) $4y = 24$	f) $5b - 12 = 28$	i) $3.5x - 2 = 1.7x + 4$

A 2. Write each question as an algebra problem and then solve it.

a) Amanda takes money out of an ATM and spends $17 at the bookstore. She has $23 left. How much money did she take out of the ATM?

b) A nurse visits all the patients on her floor. She spends an average of 7 minutes with each one, and in total her rounds take an hour and 24 minutes. How many patients are on this floor?

c) Marcus has $2.13 in change in his pocket. There are 3 pennies, 1 nickel and 3 dimes. How many quarters are there?

d) Steve, Brianna and Jonnelle each have the same number of crayons. If they each had 4 more crayons, the group would have a total of 36 crayons. How many do they each have?

Answers are on page 16. More help is available in the worksheet **Everything About Algebra**. More practice is available in the worksheets **Algebra Practice** and **One-Variable Problems**.

PERCENTAGES **Instructions on *page 9***

P 1. Convert to the indicated form of a fraction.

a) 0.23 as a percentage	e) 61% as a fraction	i) 150% as a decimal
b) 0.667 as a percentage	f) 22.8% as a fraction	j) 4.6 as a percentage
c) 44% as a decimal	g) ¾ as a percentage	k) 225% as a fraction
d) 12½% as a decimal	h) $^{13}/_{20}$ as a percentage	ℓ) $^{31}/_{5}$ as a percentage

P 2. Solve the percentage problems.

a) x = 40% of 35	e) 12 = p% of 48	i) 60 = 25% of x
b) x = 33⅓% of 87	f) 41 = p% of 210	j) 47 = 52% of x
c) What is 25% of 120?	g) 26 is what percent of 52?	k) 21 is 15% of what?
d) What is 37% of 24?	h) What percent of 36 is 4?	ℓ) 150% of what number is 63?

Answers are on page 16. More help is available in the worksheet **Working With Percents**.

SOLUTIONS

You can find full solutions and more help in the Learning Centre.

DIVISIBILITY — **Problems on *page 12***

D1. a) i) yes ii) yes iii) no. b) i) yes ii) yes iii) no. c) i) yes ii) yes iii) no. d) i) no ii) yes iii) no.
e) i) yes ii) no iii) no.

ORDER OF OPERATIONS — **Problems on *page 12***

OO1. a) 18 b) 2 c) 3 d) 39 e) 100 f) 155 g) 4 h) 5

GREATEST COMMON FACTOR & LEAST COMMON MULTIPLE — **Problems on *page 12***

GCF1. a) 6 b) 12 c) 7 d) 20 e) 5 f) 9 g) 2 h) 8 i) 2

GCF2. a) 15 b) 24 c) 30 d) 120 e) 42 f) 120 g) 72 h) 225 i) 1260

RATIO & PROPORTIONS — **Problems on *page 13***

RP1. a) 5 b) 12 c) 63 d) 36 e) 8.05 f) 1.69 g) 75 h) 22.4 i) 3.6

RP2. a) 1 : 45 = 4 : x, <u>180 min., 3 h</u> b) 5 : 1.4 = 200 : x, <u>56</u> c) 1 : 250 = x : 2250, <u>9</u> d) 0.85 : 1 = x : 0.050, <u>0.0425</u>

REDUCING FRACTIONS — **Problems on *page 13***

RF1. a) $\frac{1}{2}$ b) $\frac{1}{4}$ c) $\frac{2}{5}$ d) $\frac{7}{9}$ e) $\frac{7}{13}$ f) $\frac{1}{3}$ g) $\frac{5}{12}$ h) $\frac{1}{3}$ i) $\frac{1}{4}$ j) $\frac{31}{103}$

CONVERTING IMPROPER FRACTIONS — **Problems on *page 13***

RP1. a) $1\frac{2}{3}$ b) $1\frac{3}{4}$ c) $2\frac{2}{5}$ d) $5\frac{1}{4}$ e) $8\frac{1}{2}$ f) $13\frac{1}{10}$ g) $3\frac{1}{2}$ h) $9\frac{3}{6} = 9\frac{1}{2}$ i) $1\frac{13}{39} = 1\frac{1}{3}$ j) $4\frac{99}{243} = 4\frac{11}{27}$

RP2. a) $\frac{3}{2}$ b) $\frac{9}{7}$ c) $\frac{19}{8}$ d) $\frac{37}{10}$ e) $\frac{32}{5}$ f) $\frac{123}{16}$ g) $3\frac{3}{4} = \frac{15}{4}$ h) $5\frac{4}{5} = \frac{29}{5}$ i) $9\frac{3}{7} = \frac{66}{7}$ j) $12\frac{1}{4} = \frac{49}{4}$

COMPARING FRACTIONS — **Problems on *page 13***

CF1. a) $\frac{5}{6}$ b) $\frac{7}{10}$ c) $\frac{9}{13}$ d) $\frac{5}{6}$ e) $\frac{51}{100}$ f) $\frac{12}{19}$ g) $\frac{4}{13}$ h) $\frac{4}{7}$ i) $\frac{13}{17}$ j) $\frac{33}{15}$

MULTIPLYING AND DIVIDING FRACTIONS — **Problems on *page 14***

MD1. a) $\frac{3}{20}$ b) $\frac{6}{56} = \frac{3}{28}$ c) $\frac{15}{60} = \frac{1}{4}$ d) $\frac{15}{4} = 3\frac{3}{4}$ e) $\frac{21}{9} = 2\frac{1}{3}$ f) $\frac{10}{3} \times \frac{5}{8} = \frac{50}{24} = 2\frac{1}{12}$ g) $\frac{9}{10} \times \frac{14}{3} = \frac{126}{30} = 4\frac{1}{5}$
h) $\frac{16}{7} \times \frac{9}{1} = \frac{144}{7} = 20\frac{4}{7}$ i) $\frac{21}{5} \times \frac{31}{12} = \frac{651}{60} = 10\frac{17}{20}$ j) $6\frac{1}{4} \times 8\frac{2}{3} = \frac{25}{4} \times \frac{26}{3} = \frac{650}{12} = 54\frac{1}{6}$

MD2. a) $\frac{10}{6} = \frac{5}{3} = 1\frac{2}{3}$ b) $\frac{36}{40} = \frac{9}{10}$ c) $\frac{3}{35}$ d) $\frac{6}{44} = \frac{3}{22}$ e) $\frac{28}{3} = 9\frac{1}{3}$ f) $\frac{5}{3} \div \frac{7}{10} = \frac{50}{21} = 2\frac{8}{21}$ g) $\frac{17}{6} \div \frac{8}{1} = \frac{17}{48}$
h) $\frac{19}{5} \div \frac{17}{2} = \frac{38}{85}$ i) $\frac{21}{2} \div \frac{16}{3} = \frac{63}{32} = 1\frac{31}{32}$

ADDING AND SUBTRACTING FRACTIONS — **Problems on *page 14***

AS1. a) $\frac{6}{7}$ b) $\frac{8}{13}$ c) $\frac{10}{20} = \frac{1}{2}$ d) $\frac{12}{20} + \frac{5}{20} = \frac{17}{20}$ e) $\frac{35}{60} + \frac{42}{60} = \frac{77}{60} = 1\frac{17}{60}$ f) $\frac{100}{120} + \frac{105}{120} + \frac{48}{120} = \frac{253}{120} = 2\frac{13}{120}$
g) $\frac{35}{60} + \frac{27}{60} + \frac{26}{60} = \frac{88}{60} = 1\frac{7}{15}$ h) 5 i) $4\frac{60}{70} + 3\frac{7}{70} = 7\frac{67}{70}$ j) $12\frac{5}{8} + 26\frac{6}{8} = 38 + \frac{11}{8} = 38 + 1\frac{3}{8} = 39\frac{3}{8}$

AS2. a) $\frac{8}{13}$ b) $\frac{5}{17}$ c) $\frac{6}{15} = \frac{2}{5}$ d) $\frac{12}{15} - \frac{10}{15} = \frac{2}{15}$ e) $\frac{35}{40} - \frac{16}{40} = \frac{19}{40}$ f) $\frac{26}{12} - \frac{9}{12} = \frac{17}{12} = 1\frac{5}{12}$
g) $2\frac{21}{30} - \frac{25}{30} = 1\frac{51}{30} - \frac{25}{30} = 1\frac{26}{30} = 1\frac{13}{15}$ h) $2\frac{21}{112} - \frac{68}{112} = 1\frac{133}{112} - \frac{68}{112} = 1\frac{65}{112}$
i) $4\frac{5}{15} - 1\frac{12}{15} = 3\frac{20}{15} - 1\frac{12}{15} = 2\frac{8}{15}$ j) $21\frac{3}{4} - 8\frac{5}{6} = 21\frac{9}{12} - 8\frac{10}{12} = 20\frac{21}{12} - 8\frac{10}{12} = 12\frac{11}{12}$

THE METRIC SYSTEM — **Problems on *page 14***

M1. a) 1.53 km b) 1.25 g c) 2.25 L d) 4 g e) 34 µg f) 12.457 s g) 142.7 kW h) 35.2 mA i) 33 720 µC

CONVERTING UNITS — **Problems on *page 14***

CU1. a) 1 yd. b) 10 560 ft. c) 139.7 cm d) 72 tsp. e) 2.5 c. f) 3325 mL g) 288 oz. h) 171.6 lb. i) 520 dram

SOLVING EQUATIONS WITH ALGEBRA — **Problems on *page 15***

A1. a) 5 b) 15 c) 6 d) 4 e) 9 f) 8 g) 9 h) 15 i) 3.333…

A2. a) $x - 17 = 23$; $x = 40$ b) $7x = 60 + 24 = 84$; $x = 12$ c) $213 = 25x + 3 + 5 + 30$; $x = 7$ d) $3(x + 4) = 36$; $x = 8$

PERCENTAGES — **Problems on *page 15***

P1. a) 23% b) 66.7% c) 0.44 d) 0.125 e) $\frac{61}{100}$ f) $\frac{22.8}{100} = \frac{228}{1000} = \frac{57}{250}$ g) 75% h) 65% i) 1.5 j) 460%
k) $\frac{9}{4}$ or $2\frac{1}{4}$ ℓ) 620%

P2. a) 14 b) 29 c) 30 d) 8.88 e) 25% f) 19.52…% g) 50% h) 11.11…% i) 240 j) 9