NUMBERS AND CALCULATION WITH NUMBERS

Number Formats and Conventions

Worksheet 1: Number Formats and Conventions

Sometimes one can get confused with the use of a comma and the point. In South Africa the decimal comma is used to separate the whole number from the fraction and spaces to separate thousands. e.g. 3 000 000,453

Note however that some calculators use a comma to separate the thousands and the point to separate the fractions, e.g. 3,000,000.453 while others use spaces e.g. 3 000 000.453; it can also be represented as 3'000'000,453

To indicate an amount of money, separate the Rands from the cents with a comma and use spaces to indicate thousands e.g. R123 345,45

Look at any digit with a decimal fraction:

T	H	T	O	,	t	h	t
3	2	5	4	,	6	7	9

$3 \times 1\,000 = 3\,000$

$2 \times 100 = 200$

$5 \times 10 = 50$

$4 \times 1 = 4$

$6 \times \frac{1}{10} = 0{,}6$

$7 \times \frac{1}{100} = 0{,}07$

$9 \times \frac{1}{1\,000} = 0{,}009$

So we say:

3 thousand

2 hundred

54 (fifty four)

Comma six seven nine

(a) Break this number down as shown above and write it in word format:

237 785,067

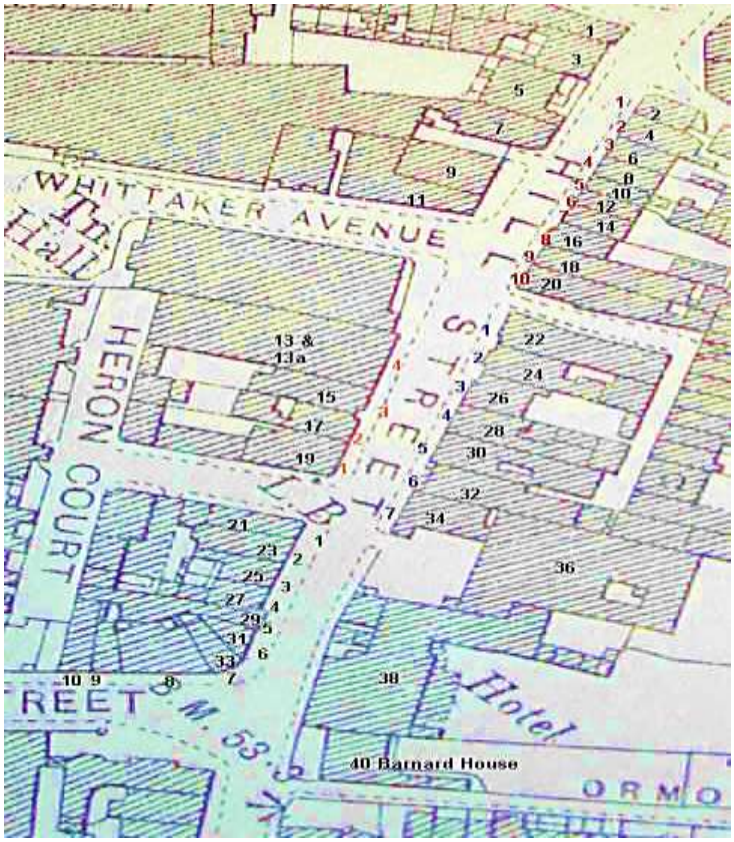
_____

_____

_____

_____

(b) Study this street map and answer the following questions:



i. "If you come down Hill Street, "John explained, (he approaches from the north side) our house is on the corner of Whittaker Avenue and Hill Street."

At what number in Hill Street does John live?

ii. If John had given directions from 33 Hill Street at the Southern end of the map, how many houses did he pass on the left hand side to find his house? (Give the street numbers.)

iii. If you stand in front of the hotel, what is the number of the house on the right hand side of the hotel?

iv. Give two possible numbers for the house across the street from house number 15.

_____

_____

_____

_____

_____

Worksheet 2: Large Numbers

(a) Study this diagram and write the following numbers in words:

Trillion	**Billion** (Milliard)	**Million**	**Thousands**	**One**
HT TT T	**HB TB B**	**HM TM M**	**HT TT T**	**H T O**

i. $100\ 500\ 700\ 300 =$ _____

_____

ii. $900\ 800\ 700\ 100\ 400 =$ _____

_____

(b) Multiplication by $10, 100$ and $1\ 000$: (Make use of your calculator)

i. $280\ 000\ 890 \times 10 =$ _____

ii. $209\ 789{,}8 \times 10 =$ _____

iii. $205\ 589{,}08 \times 100 =$ _____

iv. $3\ 785\ 890{,}5008 \times 1\ 000 =$ _____

(c) Divide the following by $10, 100$ or 1000: (use your calculator if you are unsure.)

i. $170\ 345\ 786 \div 10 =$ _____

ii. $1\ 123\ 546{,}7 \div 100 =$ _____

iii. $34{,}5008 \div 1\ 000 =$ _____

(d) Exercises in context:

i. You pay R$12, 80$ to pass through a toll gate. You pass that gate every workday of the year. What is the amount of money that you pay to use the road per annum?
(5 days per week, 52 weeks per annum)

_____

ii. You pay 45 cents per carry bag each time you go shopping. If you buy 5 bags per working day to carry your groceries, calculate the amount of money you spend on bags per month. On average there are $20{,}5$ working days per month.

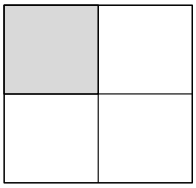
_____

iii. Google the approximate distance from Oliver Tambo airport to Atlanta airport. Give your answer in kilometres.

Worksheet 3: Fractions

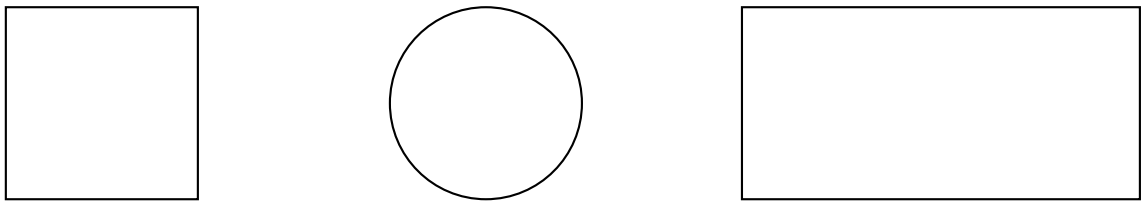
Definition: Fractions are parts of a whole. The top number tells you how many parts you have, compared to the bottom number which says how many equal parts there are in total.

Example:
$\frac{1}{4}$ means one part out four parts

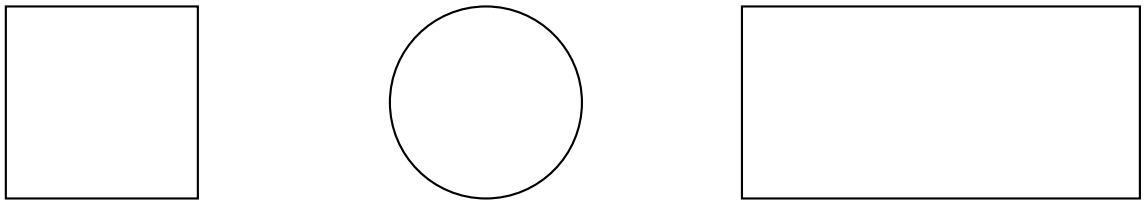


(a) Colour the next shapes to represent the fractions:

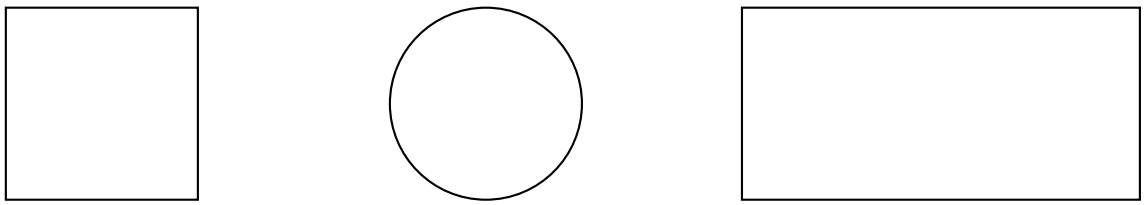
$\frac{1}{2}$



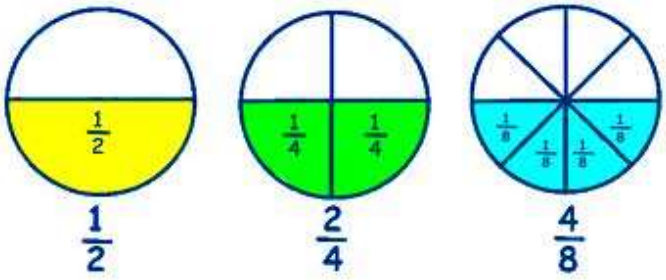
$\frac{3}{4}$



$\frac{7}{8}$



(b) Study this representation of equivalent fractions

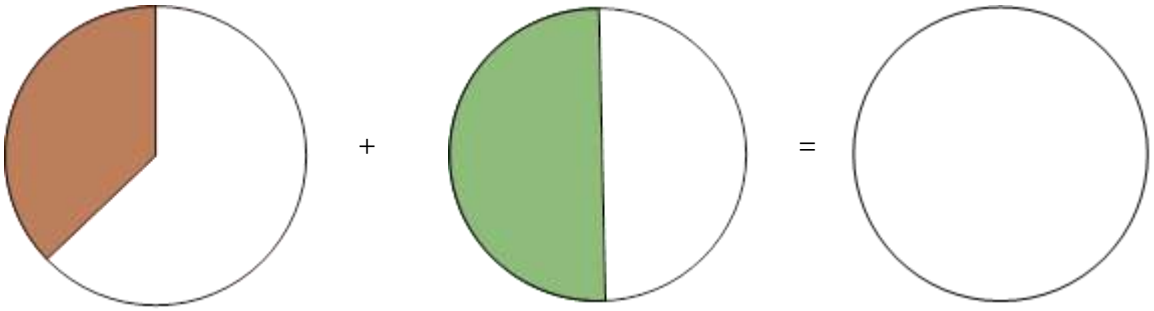


Draw illustrations and write down equivalent fractions for the following: $\frac{1}{4}$ = ...

(c) Adding the following fractions with unequal denominators:

Assume that the figure is a pizza. The coloured part is the part that has been eaten. Colour the

last pizza to represent the total part that has been eaten.

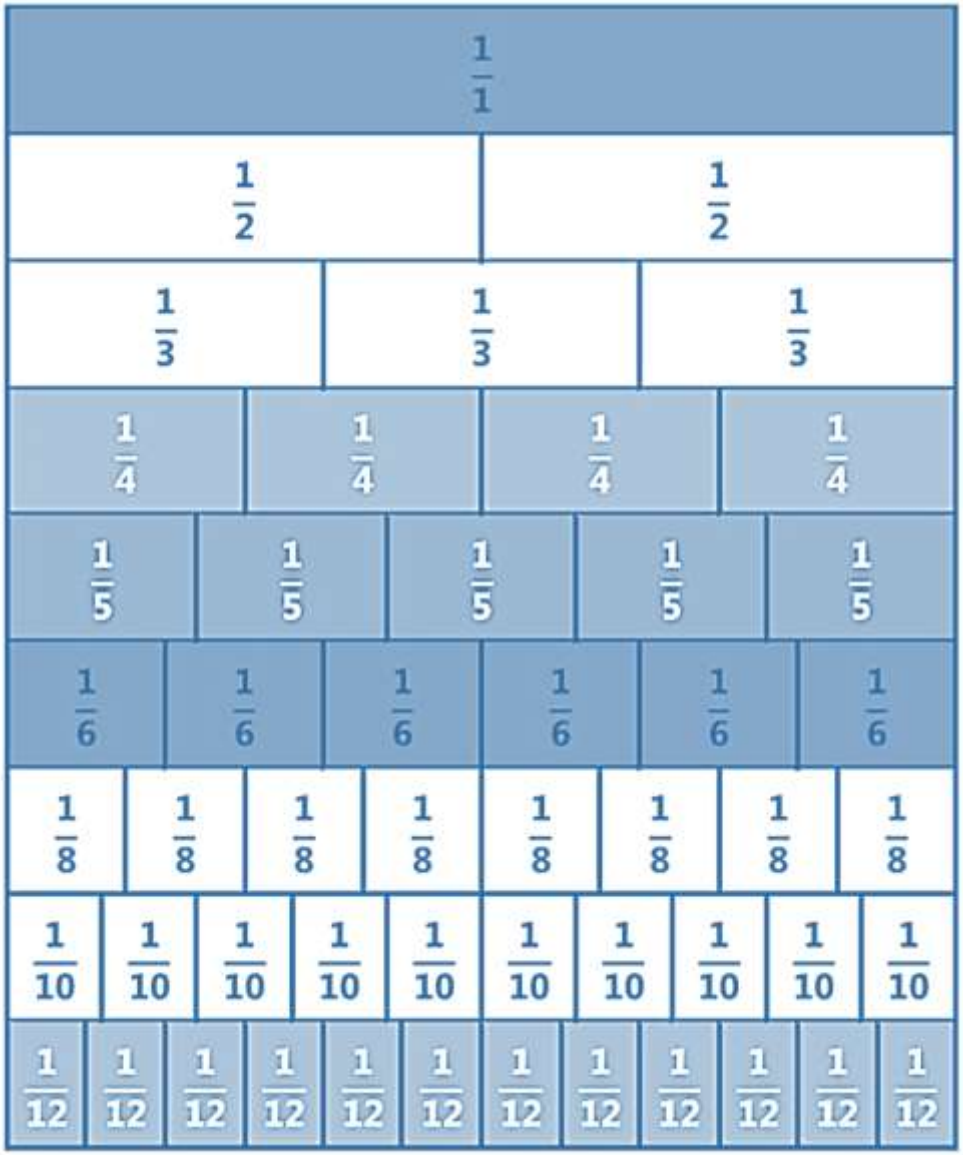


$\frac{1}{3}$ + $\frac{1}{2}$ = _____

Divide the circles in equal pieces, so that both fractions can be shown. How many equal pieces are there now? Show your calculations.

_____

(d) Study this fraction wall and answer the questions:



i. $\frac{1}{2} + \frac{2}{8} =$ _____

ii. $\frac{1}{8} + \frac{2}{8} =$ _____

iii. $\frac{8}{8} + \frac{5}{5} =$ _____

iv. $\frac{8}{12} + \frac{1}{6} =$ _____

v. $\frac{2}{3} + \frac{1}{6} =$ _____

(e) Mixed numbers: (Are made up of a whole number and a fraction)

For example: $2\frac{1}{5}$ means $2+\frac{1}{5}$ which is the same as $\frac{11}{5}$ (inproper fraction)

	Mixed number	Improper fraction
(i)	$2\frac{1}{3}$	→
(ii)	$2\frac{1}{2}$	→
(iii)	$1\frac{3}{5}$	→
(iv)	$5\frac{3}{4}$	→
(v)	$2\frac{3}{4}$	→
(vi)	$2\frac{3}{5}$	→
(vii)	$4\frac{5}{6}$	→
(viii)	$2\frac{3}{7}$	→
(ix)	←	$\frac{16}{5}$
(x)	←	$\frac{189}{17}$
(xi)	←	$\frac{10}{3}$
(xii)	←	$\frac{23}{4}$
(xiii)	←	$\frac{231}{7}$
(xiv)	←	$\frac{23}{14}$
(xv)	←	$\frac{13}{2}$

(f) Take note that $2\frac{3}{4}$ differs from $2\left(\frac{3}{4}\right)$. Explain what the difference is:

i. $2\frac{3}{4}$ = _____

ii. $2\left(\frac{3}{4}\right)$ = _____

(g) Complete the following table:

Fractions, Decimals and Percentages				
Fraction		Equivalent fractions	Decimal	Percentage
(i)	$\frac{1}{2}$	$\frac{2}{4}$; ; ; ; ; ;	0,5	50%
(ii)	$\frac{1}{3}$	$\frac{2}{6}$; ; ; ; ; ;		
(iii)	$\frac{2}{3}$	$\frac{4}{6}$; ; ; ; ; ;		
(iv)	$\frac{3}{4}$	$\frac{6}{8}$; ; ; ; ; ;		
(v)	$\frac{1}{5}$	$\frac{2}{10}$; ; ; ; ; ;		
(vi)	$\frac{1}{6}$	$\frac{2}{12}$; ; ; ; ; ;		
(vii)	$\frac{1}{7}$	$\frac{2}{14}$; ; ; ; ; ;		

(h) How to multiply and divide with fractions

Multiplication: $\frac{3}{4} \times \frac{8}{9} = \frac{\cancel{3}^{1}}{\cancel{4}_{1}} \times \frac{\cancel{8}^{2}}{\cancel{9}_{3}}$ (Cancel where possible) $= \frac{2}{3}$

Division: $\frac{2}{7} \div \frac{8}{21} = \frac{2}{7} \times \frac{21}{8}$

$= \frac{3}{4}$ (Division sign turns into multiplication sign and fractionswops)

Try the following without your calculator:

(i)	$\frac{3}{4} \div \frac{3}{8}$	
(ii)	$\frac{3}{9} \times \frac{3}{27}$	
(iii)	$\frac{1}{2} \times \frac{2}{3}$	
(iv)	$\frac{1}{2} \div \frac{3}{8}$	
(v)	$\frac{9}{24} \times \frac{12}{3}$	

(i) Do the following without your calculator:

(i)	$\frac{1}{3} + \frac{5}{9}$ = _____ = _____ = _____	(ii)	$\frac{3}{4} \div \frac{3}{8}$ = _____ = _____ = _____
(iii)	$\frac{3}{9} + \frac{27}{81}$ = _____ = _____ = _____	(iv)	$\frac{3}{9} \times \frac{27}{81}$ = _____ = _____ = _____
(v)	$\frac{1}{2} + \frac{2}{3}$ = _____ = _____ = _____	(vi)	$\frac{3}{9} - \frac{27}{81}$ = _____ = _____ = _____
(vii)	$\frac{1}{2} - \frac{2}{8}$ = _____ = _____ = _____	(viii)	$\frac{1}{2} \div \frac{2}{8} \times \frac{3}{6}$ = _____ = _____ = _____

(ix)	$\frac{2}{9} + \frac{1}{24} \times \frac{12}{3}$ = _____ = _____ = _____	(x)	$\frac{1}{2} \div \frac{1}{6} \times 2$ = _____ = _____ = _____

(j) Study the following diagram:

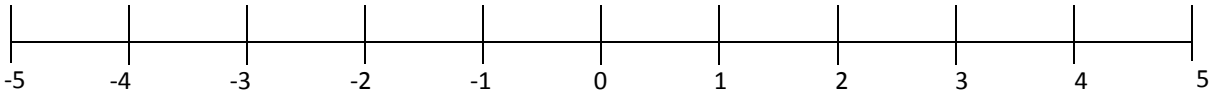
Th **Thousands** **7**	**H** **Hundreds** **5**	**T** **Tens** **3**	**U** **Units** **2**	**Comma** **,**	**Tenths** $\frac{1}{10}$	**Hundredths** $\frac{4}{100}$	**Thousandths** $\frac{5}{1000}$
7	**5**	**3**	**2**	**,**	**1**	**4**	**5**

Complete the table:

	FRACTION	DECIMAL FRACTION
(i)	$\frac{1}{5}$ →	
(ii)	$\frac{13}{20} \times \frac{5}{5} = \frac{65}{100}$ →	
(iii)	$2\frac{3}{10}$ →	
(iv)	$2\frac{1}{2}$ →	
(v)	$\frac{13}{25}$ →	
(vi)	$\frac{7}{8}$ →	
(vii)		0,26
(viii)		0,875
(ix)		3,132
(x)		2,03
(xi)		0,1
(xii)		2,5

Worksheet 4: Positive and Negative Numbers

(a) Make use of a number line to do the following without your calculator:



i. $-4 - 2 =$ _____

ii. $-4 + 4 =$ _____

iii. $-5 - 1 =$ _____

iv. $-4 - 1 =$ _____

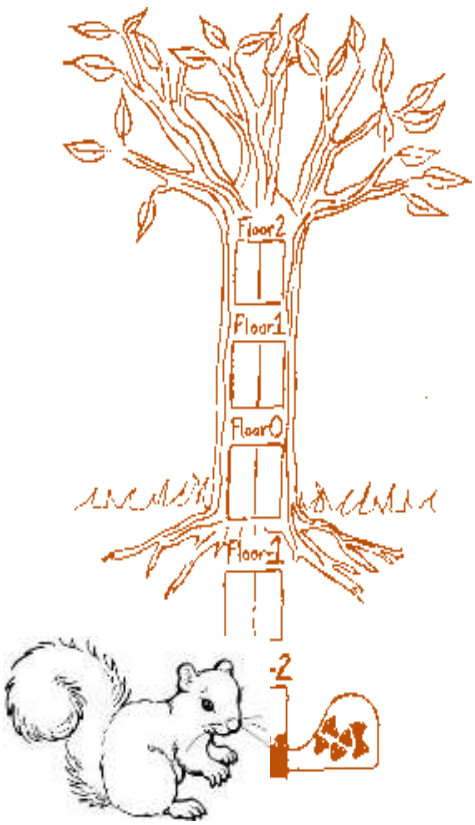
v. $2 - 3 =$ _____

vi. $-4 + 2 =$ _____

vii. The current temperature is 7°C. It drops with 8°C. What is the temperature now?

_____

viii. Study the picture and answer the following questions:



How many floors is the squirrel from the branches?
Write the expression down:

_____

Which floor is exactly in the middle?
Write the expression down:

_____

How many floors are under ground level? Many ground squirrels hibernate during cold winters, sleeping in a nest until warm weather arrives.

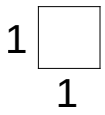
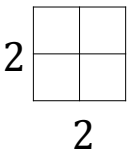
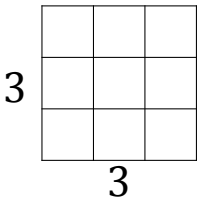
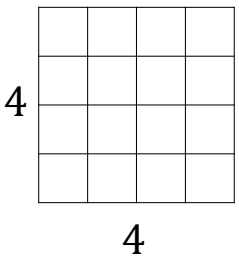
_____

Read a few interesting facts on squirrels:

There are over 200 different species of squirrels. They cannot really fly, but can glide up to 150 feet = 46 m using a membrane of skin). Squirrels range in size from 5 to 36 inches (13 - 92 cm) long (including a long tail).

Worksheet 5: Square Numbers & Roots, Cube numbers & Roots

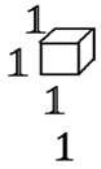
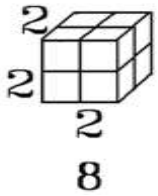
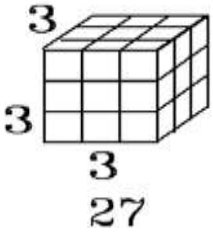
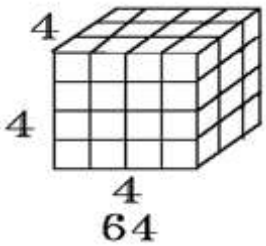
(a) Complete the following table: This is 2D and this is how one calculates area.

Perfect Square Chart			
Dimensions	Model	Square	Square Root
1×1		$1 \times 1 = 1^2 = 1$	$\sqrt{1} = 1$
Number of squares:	1		
2×2			
Number of squares:			
3×3			
Number of squares:			
4×4			
Number of squares:			

_____

_____

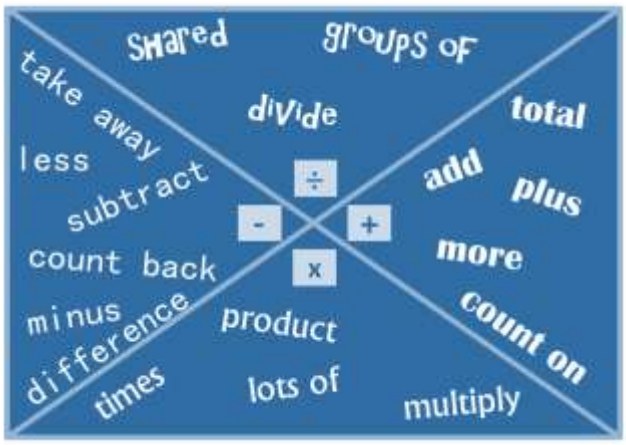
(b) Complete the following table. This is 3D and this is how one calculates VOLUME.

Perfect Cube Chart			
Dimensions	Model	Cube	Cube Root
$1 \times 1 \times 1$		$1 \times 1 \times 1 = 1^3 = 1$	$\sqrt[3]{1} = 1$
Number of cubes:	1		
$2 \times 2 \times 2$			
Number of cubes:			
$3 \times 3 \times 3$			
Number of cubes:			
$4 \times 4 \times 4$			
Number of cubes:			

(c) Calculate the following by means of you calculator:

(i)	$\sqrt{9}$ =	(ii)	$\sqrt{25} \div \sqrt{36}$ =
(iii)	$\sqrt{9 + 16}$ =	(iv)	$\left(\sqrt{2}\right)^2$ =
(v)	$\sqrt{2\left(\frac{1}{2}\right)}$ =	(vi)	$\sqrt{2\frac{1}{2}} =$
(vii)	$\sqrt{144}$ =	(viii)	$\sqrt{32 - 4} =$
(ix)	$\sqrt{\frac{16}{4}} =$	(x)	$\sqrt{\frac{25}{\sqrt{16}}} =$
(xi)	$2^3 =$	(xii)	$3^2 =$
(xiii)	$\sqrt{25} =$	(xiv)	$\sqrt{9} + \sqrt{16} =$
(xv)	$(0{,}1)^3 =$	(xvi)	$\sqrt[3]{27} =$
(xvii)	What is the length of the side of a square if the area of the square is equal to 81 m^2 ?	(xviii)	What is the length of the side of a square if the area of the square is equal to 16 cm^2 ?
(xix)	What is the length of the side of a cube if the volume of the cube is equal to 81 m^3 ?	(xx)	What is the length of the side of a cube if the volume of the cube is equal to 64 m^3 ?
(xxi)	What is the area of a square if the side length is 3 cm?	(xxii)	What is the area of a square if the side length is 2 m?
(xxiii)	What is the volume of a cube if the side lengths are 1 cm each?	(xxiv)	What is the volume of a cube if the side lengths are 4 m each?

Worksheet 6: Mathematical Language



This is to change WORDS into SIGNS! Choose a sign to match the sentence

	Sentence	Number sentence
(a)	What is the difference between 4 and -5?	
(b)	What is the product of 2 and 3?	
(c)	The tiled area is 6 m^2. The area of one tile is 1 m^2. How many tiles are there?	
(d)	Subtract 4 from 3.	
(e)	Multiply 3 by 4.	
(f)	Two times three.	
(g)	6 divided by 3.	
(h)	The sum of 2; 5; 8 and 17.	
(i)	9 cookies shared by three boys.	
(j)	You score 10 times less on your Math test. Your previous mark was 80%. What is your current mark?	
(k)	You decide to study 10 times more for the next test. You studied 30 minutes the previous time. How many minutes are you going to study now? How many hours is that?	
(l)	Your dad increases your pocket money by 10 times. You received R30. How much money will you have now?	

Operations using numbers and calculator Skills

Worksheet 7: Order of Operations using BODMAS rule:

BRACKETS

SQUARE NUMBERS AND ROOTS

OF

DIVISION AND **M**ULTIPLICATION

ADD AND **S**UBTRACT

Study this example:

Expression	Which operation?	The form with the operation done
$900 \div 20 \text{ of } (2+3) \times 6 \text{ of } 3$	Brackets	$900 \div 20 \text{ of } 5 \times 6 \text{ of } 3$
$900 \div 20 \text{ of } 5 \times 6 \text{ of } 3$	of	$900 \div 100 \times 6 \text{ of } 3$
$900 \div 100 \times 6 \text{ of } 3$	of	$900 \div 100 \times 18$
$900 \div 100 \times 18$	$\div$	900×18
900×18	$\times$	**162**

Determine the following: (You may use your calculator, but show your steps.)

(a) $3 \times 7 - 11 \times 6 + 1$

= _____

= _____

= _____

= _____

(b) $58 \div 2 + 2 \times 4 - \frac{2}{3} \text{ of } 30$

= _____

= _____

= _____

= _____

(c) $2 \times (2+3) - 6 \div 2$

= _____

= _____

= _____

(d) $\sqrt{160-16} - 32 \div 8$

= _____

= _____

= _____

(e) $6 \times 8 \div 2 + 3$

=

=

=

=

(f) $983{,}5 - 100 - 10$

=

=

=

=

(g) $250 - 25 \times 4 + 100$

=

=

=

(h) $\frac{3}{5}$ of 205

=

=

=

(i) $280 + 24{,}8 \times 20 \div 2$

=

=

=

(j) $\frac{2}{3}$ of $120\ \text{km} + 7\ \text{km}$

=

=

=

(k) $\frac{2}{5}\left(1\frac{4}{9}\right)$

=

=

=

=

(l) $17 + 3 \times 2 - 1$

=

=

=

=

(m) $1 \div 1 \times 1 - 1 + 1$

=

=

=

=

(n) $\text{R}450 - \text{R}32{,}50 \times 10$

=

=

=

=

Worksheet 8: Estimation

(a) Study the picture below. How would you estimate how many beads are in the jar?

_____

_____

_____

_____

_____

_____

(b) You can do this as a class competition. (See whose estimated answers are the closest.)

Situation	Estimation	Real value
What is the diameter of a R5 coin?		
What is the perimeter of a R10?		
What is today's temperature?		
What is the circumference of your fist?		
What is the length of you hand span?		
What is the area of your classroom?		
What is the volume of your classroom?		