



# **SUPPORTING YOUR CHILD WITH NUMERACY**



**How to help your child with Numeracy  
for parents, carers and guardians**

## **Craigmount High School**

“Numeracy is a skill for life, learning and work.”

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## Numeracy: Estimating

It is useful to develop a sense of size about things in the world around us.

- estimating height and length in cm, m, km, mm  
e.g. length of pencil = 10 cm  
width of desk = m
- small weights, small areas, small volumes  
e.g. bag of sugar = 1 kg
- areas in square metres, lengths in mm and m  
e.g. area of a blackboard = 4 m<sup>2</sup>  
diameter of 1p = 15 mm

Using knowledge of rounding can be used to estimate the answer to a problem.

### Examples:

If the digit following the degree of accuracy is 5 or more then we round up.

Round	74	→	70 (to the nearest 10)
	386	→	400 (to the nearest 100)
	347.5	→	348 (to nearest whole number)
	7.51	→	7.5 (to 1 decimal places)
	8.96	→	9.0 (to 1 d.p.)
	3.14159	→	3.142 (to 3 d.p)
	3.14159	→	3.14 (to 3 significant figures)

Sometimes it may be necessary to round up/down depending on the context.



## Numeracy: Addition

### Mental Methods

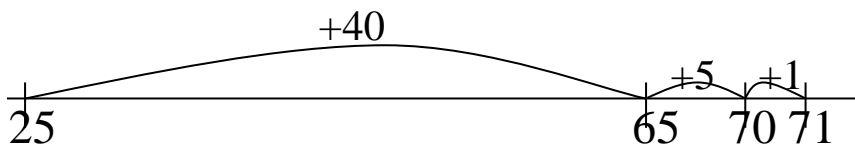
**Example:** Work out  $25 + 46$

*Method 1:* Split the number.

Add the tens, then add the units, then add them together

$$20 + 40 = 60, \quad 5 + 6 = 11, \quad 60 + 11 = 71$$

*Method 2:* Jump on from one number (showing working on the empty number line).



### Written Method

To complete a written addition make sure the numbers are lined up in the appropriate columns.

**Example:** Work out  $345 + 279$

Step 1

$$\begin{array}{r} 345 \\ + 279 \\ \hline 4 \\ \hline 1 \end{array}$$

Step 2

$$\begin{array}{r} 345 \\ + 279 \\ \hline 24 \\ \hline 11 \end{array}$$

Step 3

$$\begin{array}{r} 345 \\ + 279 \\ \hline 624 \\ \hline 11 \end{array}$$

It is often helpful to estimate the answer before performing the calculation.

4.

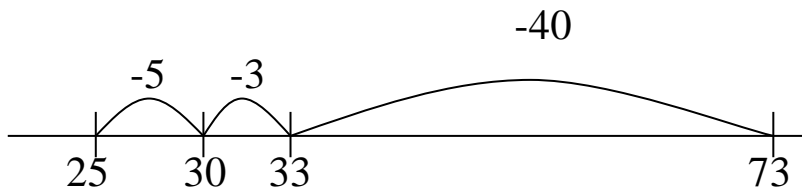


## Numeracy: Subtraction

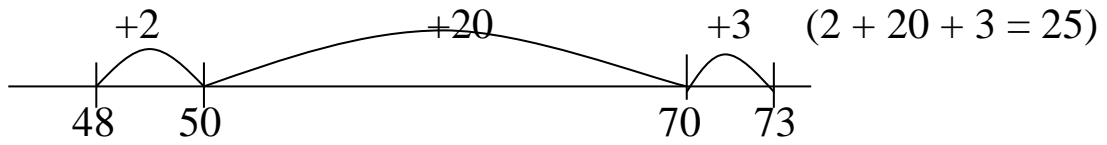
Subtraction can be completed mentally.

**Example:** Work out  $73 - 48$

*Method 1:* Jump back 48 from 73 (showing working on the empty number line).



*Method 2:* Count on from 48 to 73 to find the difference.



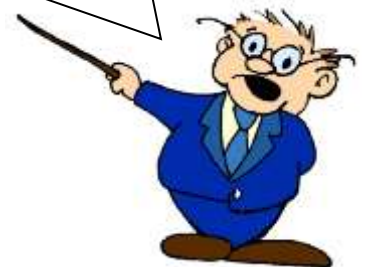
### Written Method

To complete a written subtraction make sure the numbers are lined up in the appropriate columns.

**Example:** Work out  $873 - 295$

Step 1	Step 2	Step 3
$\begin{array}{r} 61 \\ 873 \\ -295 \\ \hline 8 \end{array}$	$\begin{array}{r} 7161 \\ \cancel{8}73 \\ -295 \\ \hline 78 \end{array}$	$\begin{array}{r} 7161 \\ \cancel{8}73 \\ -295 \\ \hline 578 \end{array}$

It is often helpful to estimate the answer before performing the calculation.



# Numeracy: Multiplication

It is essential for many topics to have a good understanding of multiplication table (times tables) facts.

## Mental Methods

**Example:** Work out  $39 \times 6$

*Method 1:* Split the number being multiplied, then add together

$$30 \times 6 = 180, \quad 9 \times 6 = 54, \quad 180 + 54 = 234$$

*Method 2:* Round the number being multiplied and subtract the extra amount.

$$40 \times 6 = 240, \quad 40 \text{ is } 1 \text{ too many} \quad 240 - 6 = 234$$

so subtract  $1 \times 6$

## Multiples of 10 and 100

To multiply by 10 move every digit one place to the left.

To multiply by 100 move every digit two places to the left.

Th	H	T	U	
	2	3		
	↙	↘		
	2	3	0	x 10

Th	H	T	U		
		2	3		
		↙	↘		
	2	3	0	0	x 100

Th	H	T	U	•	t	h	
		2	3	•	4	6	
		↙	↘				
	2	3	4	•	6		x 10

Th	H	T	U	•	t	h		
			2	3	•	4	6	
			↙	↘				
	2	3	4	6	•	0	x 100	

## Examples:

	$24 \times 30$
Multiply by 3	$24 \times 3 = 72$
Multiply by 10	$72 \times 10 = 720$

	$5 \cdot 6 \times 400$
Multiply by 4	$5 \cdot 6 \times 4 = 22 \cdot 4$
Multiply by 100	$22 \cdot 4 \times 100 = 2240$

## Numeracy: Multiplication

### Multiplication by 2 digits

**Example:** Work out  $34 \times 26$

Step 1

Do  $34 \times 6$  first

$$\begin{array}{r} 34 \\ \times 26 \\ \hline 204 \quad 34 \times 6 \\ \hline \end{array}$$

Step 2

Do  $34 \times 20$   
Insert a zero

$$\begin{array}{r} 34 \\ \times 26 \\ \hline 204 \quad 34 \times 6 \\ \underline{680} \quad 34 \times 20 \\ \hline \end{array}$$

Step 3

Now add together the two parts

$$\begin{array}{r} 34 \\ \times 26 \\ \hline 204 \quad 34 \times 6 \\ \underline{680} \quad 34 \times 20 \\ \hline 884 \end{array}$$

### Multiplication of 2 decimals

To multiply two decimals change both the decimals to whole numbers by multiply by 10 or 100. Carry out the multiplication as above. Change the answer back by dividing by 10 or 100 as necessary.

**Example:** Work out  $3.4 \times 0.26$

Change to  $34 \times 26$

Work out  $34 \times 26$  as above

Change back to  $3.4 \times 0.26$

$$3.4 \times 10 = 34, 0.26 \times 100 = 26$$

$$34 \times 26 = 884$$

$$884 \div 10 \div 100 = 0.884$$

## Numeracy: Division

By recalling times tables facts division can be carried out accurately.

*Method 1:* No remainders

**Example:** Work out  $174 \div 3$

$$\begin{array}{r} 58 \\ 3 \overline{) 174} \end{array}$$

*Method 2:* Remainder

Carry on the calculation by inserting zeros until there is no remainder.

**Example:** Work out  $27.5 \div 4$

$$\begin{array}{r} 6.875 \\ 4 \overline{) 27.50} \end{array}$$



## Numeracy: Negative Numbers

Negative numbers or *integers* are used in many real life situations.

The temperature is  $-4^{\circ}\text{C}$  (negative 4 degrees Celsius)

### Addition/Subtraction

When adding on a positive number go upwards

When adding on a negative number go downwards

When subtracting a positive number do downwards

When subtracting a negative number do upwards

### Examples

$$3 + 5 = 8$$

$$3 + (-5) = -2$$

$$4 - 7 = -3$$

$$4 - (-7) = 11$$

### Multiplication/Division

(+ve positive number, -ve negative number)

Multiplying a +ve by a +ve the answer will be +ve

Multiplying a -ve by a +ve the answer will be -ve

Multiplying a +ve by a -ve the answer will be -ve

Multiplying a -ve by a -ve the answer will be +ve

$$3 \times 5 = 15$$

$$(-3) \times 5 = -15$$

$$3 \times (-5) = -15$$

$$(-3) \times (-5) = 15$$

Dividing a +ve by a +ve the answer will be +ve

Dividing a -ve by a +ve the answer will be -ve

Dividing a +ve by a -ve the answer will be -ve

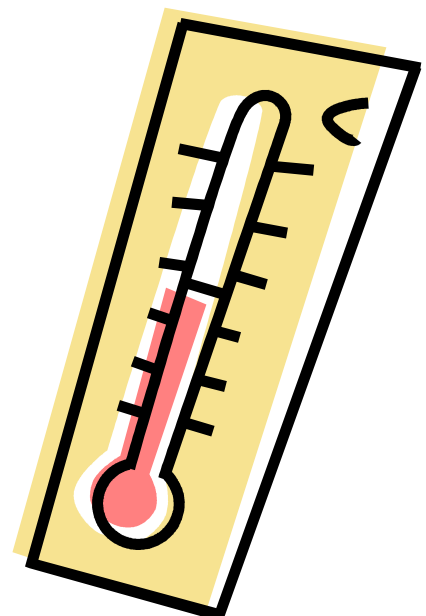
Dividing a -ve by a -ve the answer will be +ve

$$24 \div 6 = 4$$

$$(-24) \div 6 = -4$$

$$24 \div (-6) = -4$$

$$(-24) \div (-6) = 4$$



## Numeracy: BODMAS

The order in which calculations are carried out is important. If we have more than one operation we should use the following order.

**B** racket

**O** peration (ie squaring, taking square root of)

**D** ivision

**M** ultiplication

**A** ddition

**S** ubtraction

**Examples:**

$$\begin{aligned} & 30 - 4 \times 2 \\ & = 30 - 8 \quad \mathbf{M}ultiplier \\ & = 22 \quad \mathbf{S}ubtract \end{aligned}$$

$$\begin{aligned} & (9 + 3) \div 6 \\ & = 12 \div 6 \quad \mathbf{B}racket \\ & = 2 \quad \mathbf{D}ivision \end{aligned}$$

$$\begin{aligned} & 3 \times 4^2 \\ & = 3 \times 16 \quad \mathbf{O}peration \\ & = 48 \quad \mathbf{M}ultiply \end{aligned}$$

$$\begin{aligned} & (3 \times 4)^2 \\ & = 12^2 \quad \mathbf{B}racket \\ & = 144 \quad \mathbf{O}peration \end{aligned}$$

$$\begin{aligned} & (7 \times 6) - \sqrt{25} \\ & = 42 - \sqrt{25} \quad \mathbf{B}racket \\ & = 42 - 5 \quad \mathbf{O}peration \\ & = 37 \quad \mathbf{S}ubtraction \end{aligned}$$

Most Scientific calculators use BODMAS.



## Numeracy: Fractions

### Simple Fractions

To work out simple fractions of 1 or 2 digit numbers divide by the denominator (the number on the bottom)

#### Examples:

$$\frac{1}{3} \text{ of } 12 = 12 \div 3 = 4 ; \quad \frac{1}{5} \text{ of } 70 = 70 \div 5 = 14$$

To work out more challenging fractions divide by the denominator (the number on the bottom) and multiply by the numerator (the number on the top)

#### Examples:

$$\frac{3}{4} \text{ of } 24 = 24 \div 4 \times 3 = 18$$

### Equivalent Fractions

To work out equivalent fractions multiply the top and the bottom by the same number. Equivalent fractions can also be **simplified** by dividing both the top and bottom of the fraction by the same number.

$$\begin{array}{ccc} & \times 6 & \\ \frac{3}{4} = \frac{18}{24} & & \frac{35}{40} = \frac{7}{8} \\ & \times 6 & \div 5 \end{array}$$

### Improper Fractions and Mixed Numbers

An improper fraction is one where the number on the top is larger than the number on the bottom. We can express improper fractions as a mixed number (a whole number and a fraction) by simplifying.

$$\frac{23}{4} = 5 \frac{3}{4} \quad 23 \div 4 = 5 \text{ remainder } 3$$

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# Numeracy: Fractions

## Addition and Subtraction

Fractions can only be added or subtracted if they have the same denominator.

### Examples:

$$\begin{aligned} & \frac{1}{2} + \frac{1}{3} \\ = & \frac{3}{6} + \frac{2}{6} \\ = & \frac{5}{6} \end{aligned}$$

$$\begin{aligned} & \frac{5}{4} - \frac{1}{3} \\ = & \frac{15}{12} - \frac{4}{12} \\ = & \frac{11}{12} \end{aligned}$$

## Multiplication

To multiply fractions multiply the numerators, then multiply the denominators.

### Examples:

$$\begin{aligned} & \frac{4}{7} \times \frac{2}{3} \\ = & \frac{4 \times 2}{7 \times 3} \\ = & \frac{8}{21} \end{aligned}$$

$$\begin{aligned} & \frac{3}{7} \times \frac{2}{3} \\ = & \frac{6}{21} \\ = & \frac{2}{7} \end{aligned}$$

## Division

To divide fractions flip the second fraction and change the sum to multiply. Please note  $a/b$  means  $\frac{a}{b}$ .

### Example:

$$\begin{aligned} & \frac{5}{7} \div \frac{2}{3} \\ = & \frac{5}{7} \times \frac{3}{2} \\ = & \frac{15}{14} = 1 \frac{1}{14} \end{aligned}$$

Remember to simplify your answer where possible.



## Numeracy: Percentages

Percentage means *parts of one hundred*.

Percentages can be expressed as a decimal or a fraction. Here are some common simple percentages.

Percentage	Decimal	Fraction
100%	1	$\frac{1}{1}$
50%	0.5	$\frac{1}{2}$
10%	0.1	$\frac{1}{10}$
5%	0.05	$\frac{1}{20}$
20%	0.2	$\frac{1}{5}$
25%	0.25	$\frac{1}{4}$
75%	0.75	$\frac{3}{4}$
$33\frac{1}{3}\%$	0.333...	$\frac{1}{3}$
$66\frac{2}{3}\%$	0.666...	$\frac{2}{3}$

**Example:** Work out 25% of 84

*Method 1:* Express as a fraction

$$25\% \text{ of } 84 = \frac{1}{4} \text{ of } 84 = 21$$

*Method 2:* Express as a decimal

$$25\% \text{ of } 84 = 0.25 \times 84 = 21$$

*Method 3:* Using a calculator

$$25\% \text{ of } 84 = 84 \div 100 \times 25 = 21$$



## Numeracy: Percentages

We can use knowledge of more common percentages to help calculate others.

### Examples:

Calculate 70% of £90

Work out 10%      10% of £90 = £9  
Multiply by 7      70% of £90 = £9 x 7 = £63

Calculate 15% of £67

Work out 10%      10% of £67 =  $67 \div 10 = 6.70$   
Work out 5%      5% of £67 =  $6.70 \div 2 = 3.35$   
So                      15% of £67 = £10.05

Calculate 8% of £34

Work out 1%      1% of £34 =  $34 \div 100 = 0.34$   
Multiply by 8      8% of £34 =  $0.34 \times 8 = £2.72$

### Fractions → Percentages

**Example:** John scored 18 marks out of 40 in a test. Write this as a percentage.

$$\frac{18}{40} = 18 \div 40 = 0.45 = 45\%$$

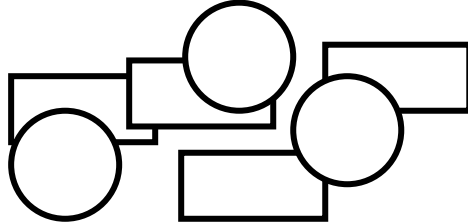
We do not use the % button on the calculator because of inconsistencies between models.



# Numeracy: Ratio

When two quantities are compared it is useful to write as a ratio.

**Example:**



There are 4 circles and 3 rectangles.

The ratio of circles:rectangles is

4:3 (we say as 4 to 3)

The order of the ratio is important.



Ratios can be simplified like fractions.

**Example:** Simplify 12:20

*Method:* Divide each side by 4

12:20

3:5

Ratio can be used to solve problems.

**Example:** To make purple paint the ratio of blue paint to red paint is 2:3. If you have 8 litres of blue paint how much red paint do you need?

	blue : red	
Multiply by 4	2 : 3	Multiply by 4
	8 : 12	

**Example:** Andrew and Beth share £35 in the ratio 3:4. How much do they each get?

Number of parts =	3 + 4	= 7	
1 part	= £35 ÷ 7	= £5	
3 parts	= £5 x 3	= £15	Andrew gets £15
4 parts	= £5 x 4	= £20	Beth gets £20

## Numeracy: Proportion

Two quantities are said to be in direct proportion if they both go up at the same rate.

**Example:**

If 5 bananas cost 80 pence, then what do 3 bananas cost ?

*Method:*

5 bananas cost 80 p

1 banana costs  $80 \div 5 = 16\text{p}$

3 bananas costs  $16 \times 3 = 48$  pence

Two quantities are said to be in inverse proportion if one quantity goes up as the other goes down.

**Example:**

Five men take 6 days to build a wall. How long would 3 men take?

*Method:*

5 men take 6 days

1 man takes  $6 \times 5 = 30$  days

3 men take  $30 \div 3 = 10$  days

If rounding is required only round at the last stage.





## Numeracy: Time

It is helpful to recall time facts.

1 minute = 60 seconds  
1 hour = 60 minutes  
1 day = 24 hours  
1 year = 52 weeks  
= 365 days (or 366 in a leap year)

Time can be written in 12 hour and 24 hour clock

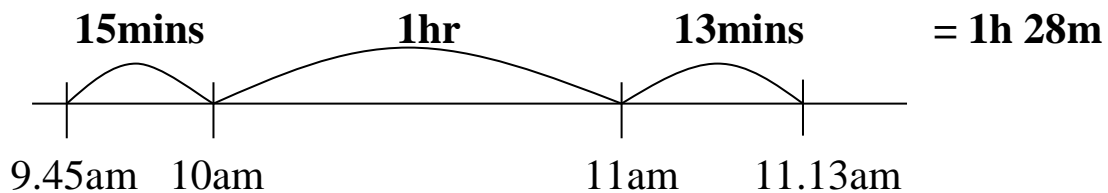
**Examples:**

12 hour clock		24 hour clock
11:27 pm	=	2327
9:35 am	=	0935
12:56 am	=	0056
12:56 pm	=	1256

We can calculate time differences.

**Example:** How long it is between 9:45am and 11:13am.

*Method:* Count on from 9.45am until 11.13am (shown on empty number line).



Minutes can be changed in hours to aid solving problems.

**Example:** Change 27 minutes in hours.

*Method:*  $27 \text{ min} = 27 \div 60 = 0.45 \text{ hour}$   
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## Numeracy: Measurement

Pupils should be able to solve practical problems using knowledge of measurements.

It is helpful to know some conversions between common units.

### Length

$$10 \text{ mm} = 1 \text{ cm}$$

$$100 \text{ cm} = 1 \text{ m}$$

$$1000 \text{ m} = 1 \text{ km}$$

### Weight

$$1 \text{ kg} = 1000 \text{ g}$$

$$1 \text{ tonne} = 1000 \text{ kg}$$

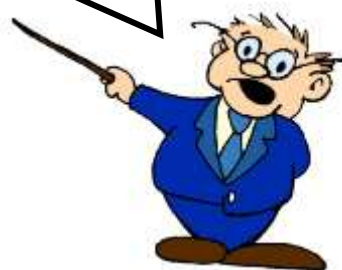
### Volume

$$1000 \text{ ml} = 1 \text{ litre}$$

$$1 \text{ cm}^3 = 1 \text{ ml}$$

When answering questions in context remember pupils should always include appropriate units.

Discuss units when cooking, looking at maps, measuring furniture.



## Numeracy: Data Analysis

Information can be collated, organised and communicated in appropriate ways.

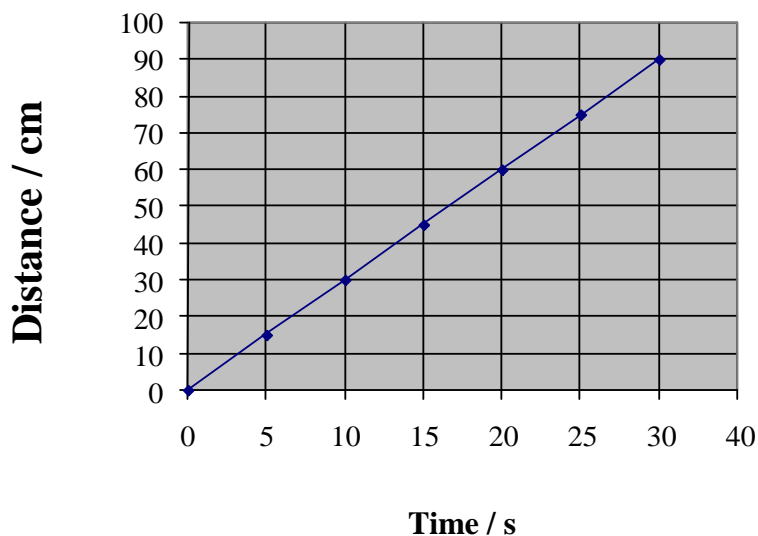
### Line Graphs

*Method:* Choose an appropriate scale for the axes to fit the paper  
If necessary, make use of a jagged line to show that the lower part of a graph has been missed out.  
Label the axes .  
Give the graph a title.  
Number the lines **not** the spaces.  
Plot the points neatly.  
Join up the points with a straight line or a smooth curve as appropriate.

**Example:** The distance a gas travels over time has been recorded in the table below.

<b>Time (s)</b>	0	5	10	15	20	25	30
<b>Distance (cm)</b>	0	15	30	45	60	75	90

**Distance travelled by a gas over time**



# Numeracy: Data Analysis

## Bar Charts

*Method:* Give the graph a title.

Label the axes.

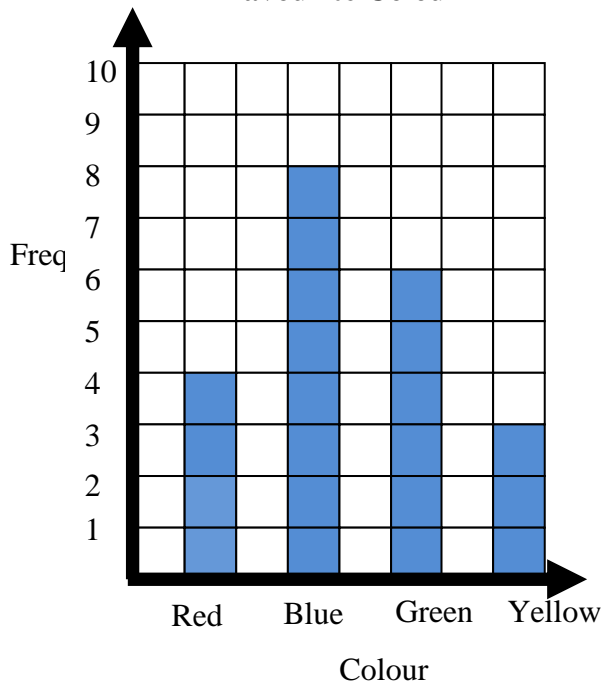
Label the bars in the centre of the bar (each bar has an equal width).

Label the frequency (up the side) on the lines not on the spaces.

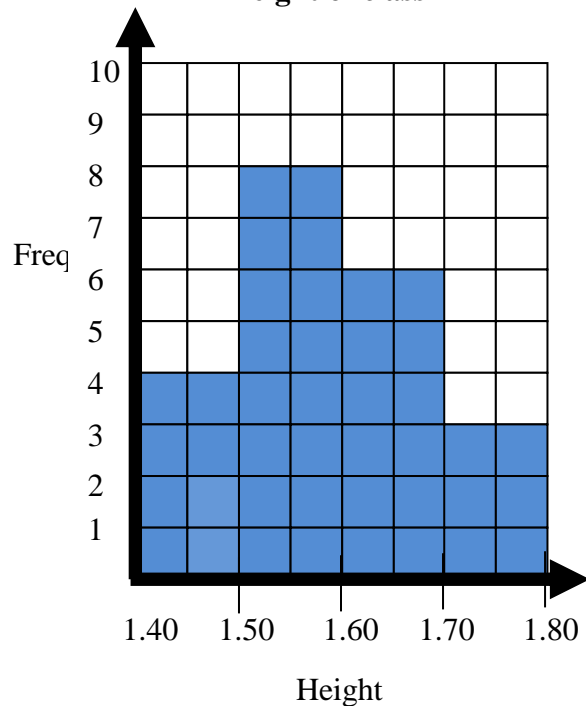
Bars are only joined together when grouped numbers.

## Examples:

**Favourite Colour**



**Height of class**



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## Numeracy: Data Analysis

### PIE CHARTS

*Method:* Label all the slices  
Give the pie chart a title  
Encourage slices to be drawn in a clockwise direction

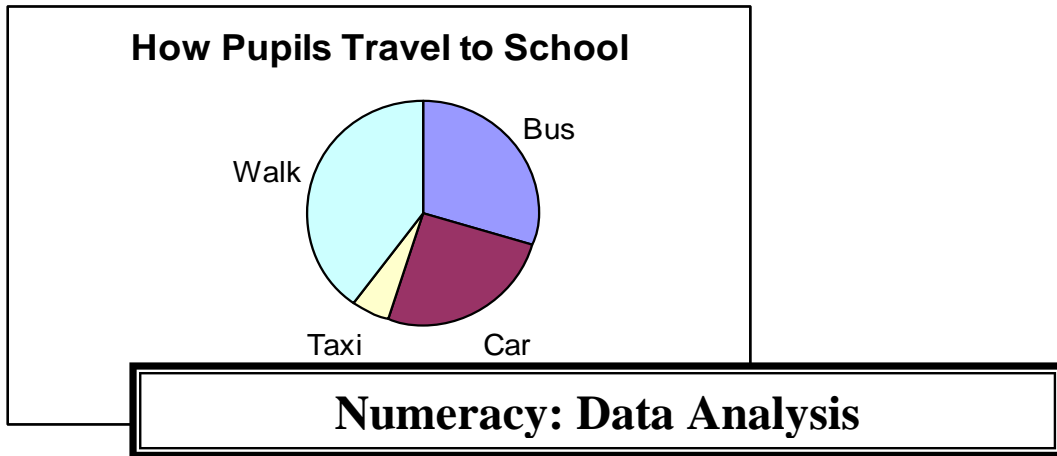
**Examples:** A class were asked how they got to school.

Pie chart worked out using percentage

Transport	Percentage	Angle
Bus	30%	30% of 360 = 108°
Car	25%	25% of 360 = 90°
Taxi	5%	5% of 360 = 18°
Walk	40%	40% of 360 = 144°

Pie chart worked out using frequencies.

Transport	Frequency	Angle
Bus	6	$\frac{6}{20}$ of 360 = 108°
Car	5	$\frac{5}{20}$ of 360 = 90°
Taxi	1	$\frac{1}{20}$ of 360 = 18°
Walk	8	$\frac{8}{20}$ of 360 = 144°
<b>Total</b>	20	360°



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To analyse data it is often useful to work out the average.

There are three different types of average,

- Mean - this is found by adding up all the values and dividing by the number of values.
- Median - this is the middle value of an ordered set of data. If there are two numbers in the middle it is between these two numbers.
- Mode - this is the most common value in a data set.

The range is the highest value – lowest value of the data set.

**Example:** Work out the mean, median, mode and range for this set of data.

3    5    6    7    4    11    7    8    4    7

$$\text{Mean} = \frac{3 + 5 + 6 + 7 + 4 + 11 + 7 + 8 + 4 + 7}{10} = \frac{62}{10} = 6.2$$

Ordered data    3    4    4    5    6    7    7    7    8    11

↑

Median = 6.5

Mode = 7    (most common number in the data set)

Range = highest value – lowest value

$$\begin{aligned} &= 11 - 3 \\ &= 8 \end{aligned}$$

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## Numeracy: Probability

By understanding probability pupils can determine how many times they expect an event to occur and use this information to make predictions.

Probability is written as a fraction.

Probability of an event =  $\frac{\text{number of favourable events}}{\text{Number of possible events}}$

**Example:** A bag contains 3 red balls and 4 blue balls. What is the probability that a ball chosen at random is 3?

*Method:* How many red balls?  
How many balls altogether?

$$P(\text{red}) = \frac{3}{7}$$

**Example:** A team has won 5 games, drawn 3 games and lost 4 games. If they played 48 games in a season how many games would they expect to win?

$$P(\text{win}) = \frac{5}{12}$$

$$\text{Expect} = \frac{5}{12} \times 48 = 20 \text{ games}$$

23.

## Numeracy: Vocabulary

Often words mean the same.

### **Addition**

add  
sum of  
total  
plus  
more than  
altogether

### **Subtraction**

subtract  
minus  
take away  
find the difference  
less than  
remove

### **Multiplication**

multiply  
times  
product  
lots of  
sets of

### **Division**

divide  
share  
quotient  
split between  
groups of

### **Equals**

will be  
total  
same as  
makes



**We hope that you find this booklet useful  
supporting your child with numeracy.**

MG 10