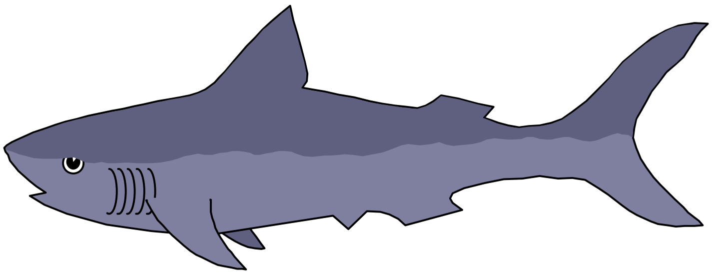
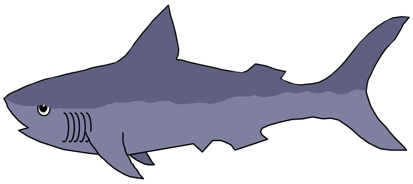
Support Sheets for Level 3 Application of Number

Notes

N2.2
N3.2 Scales and Proportions





Large Scale:-
Objects look large on map or diagram.

Small Scale:-
Objects look small on map or diagram.

A scale of, for example,
1 to 25 or
1 : 25
means that 1cm on the diagram represents 25cm in real life.
Note, units MUST be consistent unless stated otherwise.

To convert from actual size to scale size,
Divide by (in this case) 25.

To convert from scale size to actual size,
Multiply by (in this case) 25.

Support Sheets for Level 3 Application of Number

Notes

N2.2
N3.2 Ratio

A ratio of 1:2 means that two objects or amounts are related by one of the objects being twice the size of the other.
Money, for example can be shared out in a ratio.

£30 shared out in a ratio of 3:2

Add the numbers in the ratio together
3 + 2 = 5

Divide the quantity or amount of money by that figure,
£30 / 5 = £6

This corresponds to how much 1 share is worth. To work out how much 3 shares amounts to, multiply this figure by 3.
Similarly for 2 shares, multiply that figure by 2.

The figures in the final ratio, when added together MUST be the same as the original amount.
ie £18 + £12 = £30

So,
£6 x 3 = £18
£6 x 2 = £12

Therefore, £30 shared into the ratio 3:2 = £18 : £12

Support Sheets for Level 3 Application of Number

Notes

N2.2
N3.2 Standard Form

Standard Form is a method of representing either very large or very small numbers.
The numbers appear in the form

$a \times 10^n$

where,
a is any number between 1.0 and 9.999 and
n is any whole number, either positive or negative.

If n is positive, it makes the number larger and moves the decimal point n places to the right.

So,
4.26×10^4 means,
42600
(there must be 4 numbers after the first!)

If n is negative, it makes the number smaller and moves the decimal point n places to the left.

So,
4.26×10^{-4} means,
0.000426

1000 (1 thousand) can be represented in standard form as 1×10^3

1000000 (1 million) can be represented in standard form as 1×10^6

N2.2
N3.2 Rearranging Formulae

A formula is a rule that can be used to work out an unknown value.

An example of a formula is,
A = l x w where,
A is the area of a rectangle,
l is the length of the longest side and
w is the width.

So, if the length and width of the rectangle are known, the area can be calculated by multiplying them together.

For example, if *l = 6cm* and *w = 4cm*
since *A = l x w*
$A = 6 \times 4\ cm^2$
$A = 24cm^2$

Also, if the area and the length are known the width can be calculated by rearranging the formula and making the width the subject of the formula, that is make *w* the letter on its own on one side of the formula.

By treating the = sign as the pivot of a balance, the formula can be rearranged and still remain balanced as long as what is done to one side of the formula, is also done to the other.

For example,
if *a = b,* then if 4 is added to *a*, in order to keep the equation balanced, 4 must also be added to *b.* So,
a + 4 = b + 4.
Also,
if *5c = 10d,*
then if BOTH sides of the formula are divided by for instance 5, then
c = 2d, because $\frac{5}{5} = 1$ and $\frac{10}{5} = 2$

So, to go back to the area problem where the area and length are known, the formula can be rearranged by dividing both sides of the equation by the length, *l.*

$$\frac{A}{l} = w$$

And

$$\frac{24}{6} = 4cm$$

These rules apply to all equations and formulae, no matter how complicated.

The formula to calculate the final velocity, *v,* from the initial velocity, *u,* the time that it accelerates, *t,* and the acceleration, *a,* is:-

$v = u + at$

This formula can be rearranged to work out the time that it has been accelerating from the other values.

Subtract *u* from both sides.

$v – u = at$

Divide both sides by *a*

$(v – u) / a = t.$

Support Sheets for Level 3 Application of Number

Notes

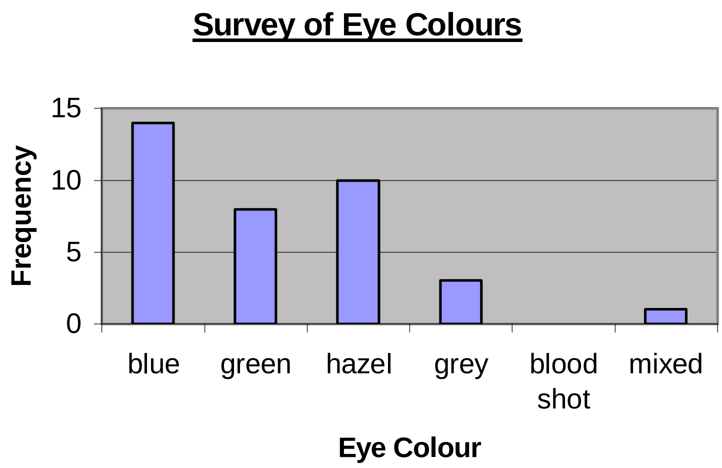
N2.2
N3.3 Interpreting Results and Presenting Information

Charts and diagrams should ALWAYS have a title.

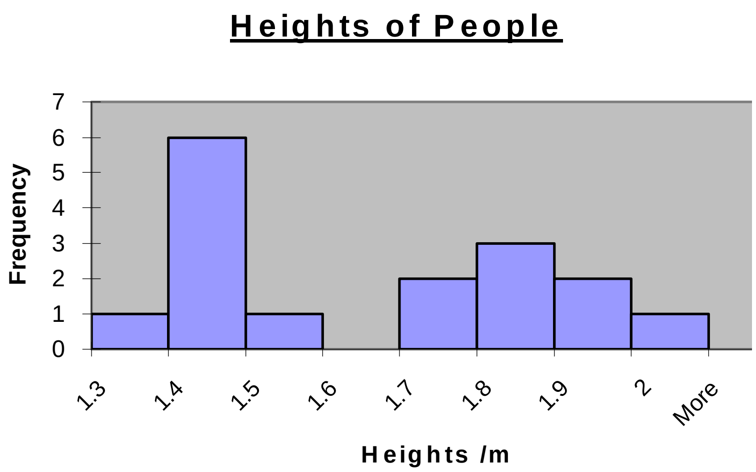
The axes of bar charts, histograms and scatter graphs should be labelled correctly and clearly.

Pie charts and pictograms should always have a key.

Bar Charts



Bar charts are usually presented with vertical bars. They can also be shown with horizontal bars.
The height of each bar corresponds to the frequency.
Gaps are left between the bars when the data being represented is discrete. That is to say that the data being represented by each bar is completely separate from the bar next to it, blue does not run into green or vice versa.
If the data is continuous, for instance heights of people, the bars should touch.



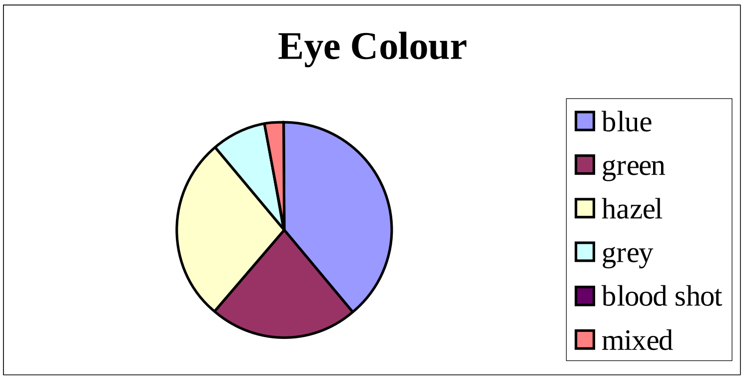
Support Sheets for Level 3 Application of Number

Notes

N2.2
N3.3 Pie Charts

The frequency of each category is represented as a fraction of the total amount, where the whole pie represents all of the data.

Two dimensional charts are generally much easier to read and understand than three dimensional charts.



The above chart clearly shows that blue eyes are the most common colour of the survey.

It is not, however particularly easy to work out the actual number of people from the survey who had blue eyes.

To construct a pie chart requires several simple steps.

- Add all the frequencies together.
- Divide 360 by this number.
- Multiply each of the frequencies by this figure to work out the angles to be drawn.
- As a check, add all of the angles together. They should add up to 360.

The angles must always add up to 360°.

Eye Colour	Frequency	360/36	F x Angle	Angle
Blue	14	10	14 x 10	140
Green	8	10	8 x 10	80
Hazel	10	10	10 x 10	100
Grey	3	10	3 x 10	30
Bloodshot	0	10	0 x 10	0
Mixed	1	10	1 x 10	10

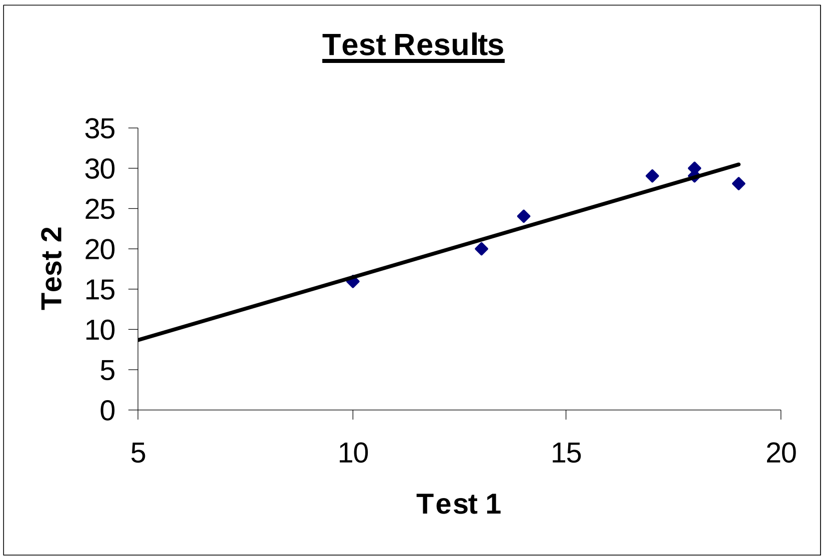
It is often helpful to work out the angles using a table.

Total 36 Total 360

N2.2
N3.3 Graphs

A scatter graph shows two distinct values plotted on the same chart. For instance the marks obtained in two different tests by a class could be plotted on one diagram. The purpose of this is that the resultant graph will show whether there is a relationship between the mark for the first test and the mark of the second test.

	Test 1	Test 2
Student 1	14	24
Student 2	19	28
Student 3	18	29
Student 4	13	20
Student 5	10	16
Student 6	17	29
Student 7	18	30



Positive Correlation:-
Line of best fit goes from bottom left to top right.

As one value increases, so does the other.

If a straight line were to be drawn through as many of the points as possible, that is a line of best fit, this particular scatter graph shows that there is a relationship between the two test results.

There is positive correlation. If a high mark was achieved in the first test, then a high mark was usually scored in the second test.

Negative correlation:-
Line of best fit goes from top left to bottom right.

As one value increases, the other one decreases.