Trinity High School

Curriculum for Excellence

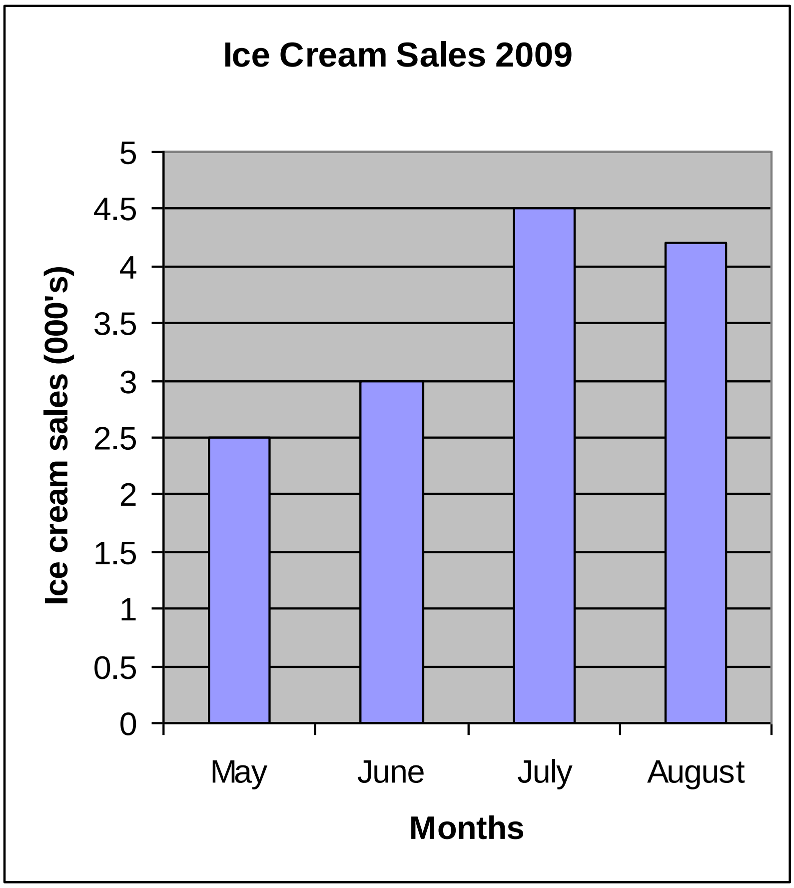
Whole School Numeracy Policy

Level 3

MNU 3-20a

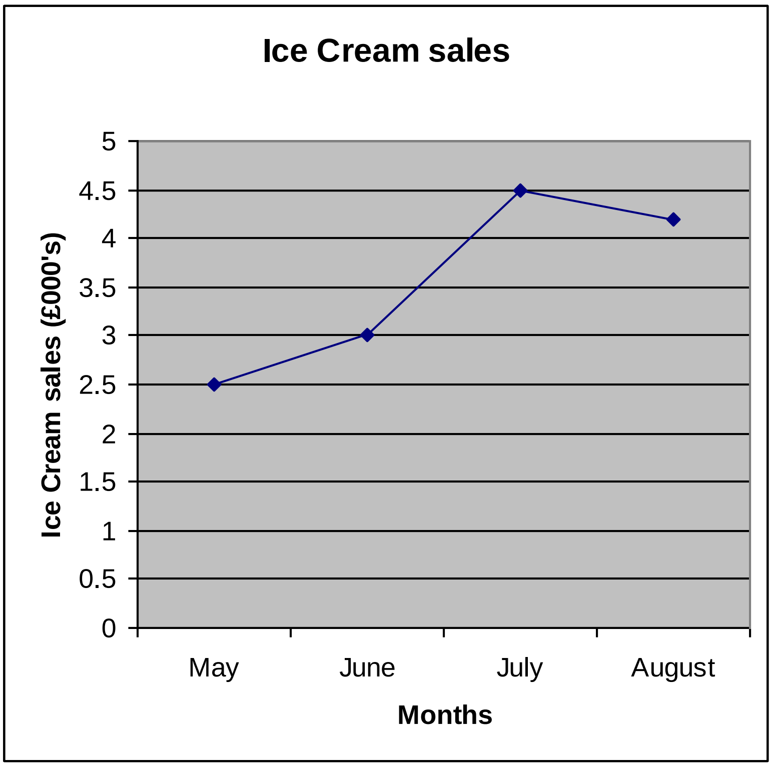
I can work collaboratively, making use of technology, to source information presented in a range of ways…………

MNU 3-20a – Bar graphs

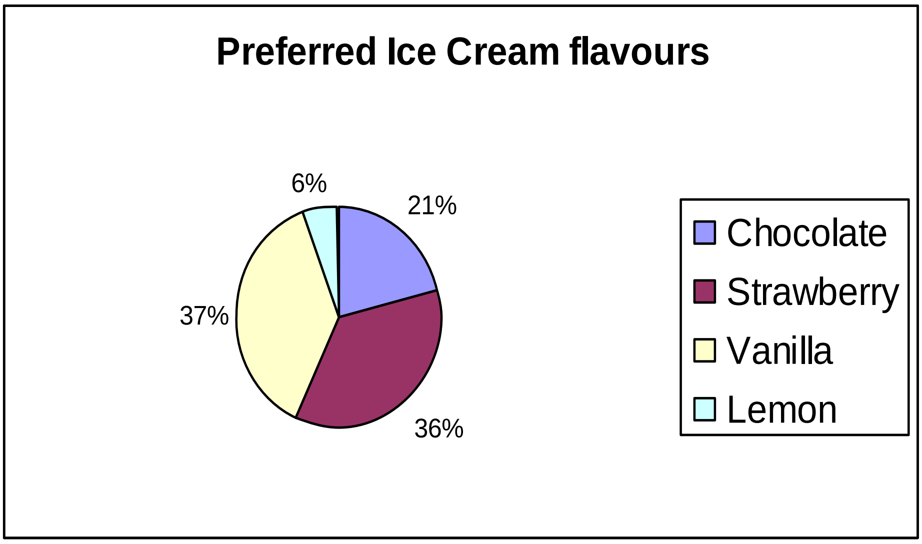


Months	Sales (£000's)
May	2.5
June	3
July	4.5
August	4.2

MNU 3-20a – Line Graphs



MNU 3-20a - Pie Charts



- Interpretation of pie charts may be used in several subject areas e.g Geography, History and Maths

Notes – parental help

- Use a pencil and a ruler
- Label axes accordingly, including units
- Give graph a title
- Always put spaces between bars (only on bar graphs)
- Use an appropriate scale – equal intervals
- Numbers always marked on the lines

Uses and contexts

- Statistical information permeates through many subjects within the school.
- Pupils may be asked to interpret bar graphs and line graphs in many different areas of the curriculum eg Science, Maths, History, Geography

MNU 3-07a

I can solve problems by carrying out calculations with a wide range of fractions, decimals and percentages, using my answers to make comparisons and informed choices for real life situations…………

3-07 (a) – Percentages/Fractions

What is a fraction?

A fraction contains a numerator (top line) and a denominator (bottom line). It is a way of representing a split or a share of a quantity.

Fraction of a quantity

To calculate $\frac{3}{4}$ of something we would $\div 4$ and then $\times 3$

eg $\quad {}^{3}\!/_{4}$ of 32 Kg

= 32 $\div 4 \times 3$ (÷ denominator, × numerator)

= 24 Kg

Percentages to Fractions – Conversion table

Percentage	Fraction
25%	$\frac{1}{4}$
50%	$\frac{1}{2}$
75%	$\frac{3}{4}$

Percentage	Fraction
20%	$\frac{1}{5}$
40%	$\frac{2}{5}$
60%	$\frac{3}{5}$
80%	$\frac{4}{5}$

Percentage	Fraction
30%	$\frac{3}{10}$
70%	$\frac{7}{10}$
90%	$\frac{9}{10}$

Percentage	Fraction
$33\frac{1}{3}\%$	$\frac{1}{3}$
$66\frac{2}{3}\%$	$\frac{2}{3}$

Percentage	Fraction
10%	$\frac{1}{10}$
1%	$\frac{1}{100}$

% Of An Amount (Non-Calculator)

e.g.

66 $\frac{2}{3}$ % of 24
= $\frac{2}{3}$ of 24 (Change % into fraction)
= 24 ÷ 3 x 2 (Divide by denominator, multiply by numerator)
= 16

If asked for 15% (or similar) without a calculator, use the following methodology;

e.g.

15% of £220

10% of £220

= £22 (emphasise ÷ 10)

5% = 22 ÷ 2

= £11
=> 15% = £33 (22 + 11)

% Of An Amount (Calculator)

- 32% of £400
- $\frac{32}{100}$ of £400
- = 400 ÷ 100 × 32
  (Building on previous knowledge)
- = £128

This particular technique may be used across the curriculum for pupils to convert any test marks to percentages.

Converting to a %age (calculator)

eg Charlie made a £12 profit from a bicycle that cost him £50. Express this **profit** as a percentage of the **cost** of the bicycle.

- $\frac{12}{50} \times 100\%$
- $= 24\%$

Notes – parental help

- Pupils should be encouraged to LEARN the basic percentage to fraction conversions
- Remember that Percentages are always ‘out of 100’
- Encourage pupils to show steps in working rather than jumping straight to answers

Uses and Contexts

- Percentages are everywhere in life. Pupils should be able to interpret what a Percentage actually means.
- Various contexts can be used across the curriculum as well as throughout our day to day life

MNU 3-08a

I can show how quantities that are related can be increased or decreased proportionally and apply this to solve problems in everyday contexts

3-08(a) Ratio and Proportion

Ratios can be used in Technical and Geography to convert scales. Home Economics may also use ratios to calculate the amount of ingredients required in a recipe.

When working with ratios (eg 1:3) conversion is performed in one of two ways.

Converting measurements into real life

Using the scale 1 cm: 4 m, how high is a tree that is represented by 3.9 cm in my Scale drawing??

1 cm: 4 m
3.9 cm: 3.9×4 = 15.6 metres.

Convert to real life by **MULTIPLYING BY THE SCALE**

Scaling Down

If trying to calculate how to convert a measurement to help us with a scale drawing, we should divide by the scale.

Convert to scale drawing measurements by **DIVIDING BY THE SCALE**

e.g.
A ship sails 300 miles. Using the scale 1 cm: 20 miles, calculate what size of line we would have to draw on our scale drawing.

300 ÷ 20 = 15 cm.

These calculations demonstrate how to convert using scales.

Ratio and Proportion can be used to perform calculations in many subject areas.

e.g. Carpet World are selling carpets at £24 for 4 m^2.

If I decide to buy the same carpet, calculate how much it would cost for 13 m^2.

There are several valid techniques for solving this problem. However, it is easiest to calculate the cost of 1 m^2 and then multiply to find the desired amount.

4 m^2 → £24

1 m^2 → 24 ÷ 4 = £6/m^2

13 m^2 → 6 × 13 = £78.

Always find **UNIT** cost first

ie cost of 1.

Quantities of ingredients can be calculated in a similar manner.

MNU 3-01a

I can round a number using an appropriate degree of accuracy, having taken into account the context of the problem

Rule is fairly simple for rounding. 5 or above means ROUND UP, below 5 means ROUND DOWN.

Technique:

Which digit is important when rounding?

The important digit is the one that sits immediately to the **right** of your desired accuracy.

Remember PLACE VALUE.

Hundreds	**Tens**	**Units ■**	**Tenths**	**Hundredths**

round to the nearest ten, look at the UNITS

round to the nearest HUNDREDTH, look at the THOUSANDTHS. etc

Round 473 to the nearest TEN – look at the units (the 3)

Less than 5 $\Rightarrow$ 473 = 470 (nearest ten)

Round 9.98 to 1 decimal place.

Answer: Look at 2nd number after decimal point,

10.0 – question specifically asks for 1 dp.

Contextual problems – a twist!

There are questions where rounding requires a common sense approach.

eg A tin of paint covers 10 m^2 of wall. In my living room the walls cover an area of 94 m^2. How many tins of paint will be needed to completely cover this area?

$94 \div 10 = 9.4$ tins.

Following rules of rounding that should be 9 tins

Given the context of the question, 10 tins of paint will be needed

If important digit is 5 or greater, **ROUND UP**, below 5, **ROUND DOWN**

MNU 3-03a,
MNU 3-03b

I can use a variety of methods to solve number problems AND recall number facts quickly and use them accurately when making calculations

One of the basic numerical methods is being able to multiply whole numbers (and decimals) by 10, 100 etc.

e.g 1) $45 \times 1\underline{00} = 45\underline{00}$

2) $658 \times 1\underline{0000} = 658\underline{0000}$

To multiply a whole number by 10, 100 etc, simply **ADD** the corresponding number of zeros on to the number

As you would expect, division is the reverse process. ie **remove** zeros in accordance with what you are dividing by.

e.g 3) 450~~00~~ ÷ 1$\underline{00}$ = 450

Decimal Multiplication/Division

Multiplying/Dividing A Decimal By 10, 100, 1000(or a multiple of)

Ex.1	2.75 x 10 = 27.5	Explanation should take place on how the digits will move ONE place to the LEFT which builds on previous work done with whole numbers.
	3.89 x 10 = 38.9	However, as with whole numbers, a quicker alternative can be shown by moving the decimal point ONE place to the RIGHT.

As before, rules to multiply/divide depend on multiple of 10.

X 10	Move decimal point **ONE** place to the **RIGHT**
X 100	Move decimal point **TWO** places to the **RIGHT**
X 1000	Move decimal point **THREE** places to the **RIGHT**
÷ 10	Move decimal point **ONE** place to the **LEFT**
÷ 100	Move decimal point **TWO** places to the **LEFT**
÷ 1000	Move decimal point **THREE** places to the **LEFT**

Additional examples:

x 30 Multiply by 3 then multiply by 10 (or reverse)

x 600 Multiply by 6 then multiply by 100 (or reverse)

÷ 8000 Divide by 8 then divide by 1000 (or reverse)

If pupils struggle to remember LEFT or RIGHT it could be helpful to emphasise if the number should be getting bigger or smaller before they start the calculation.

Subtraction

Subtraction is carried out using the 'decomposition' method – best illustrated via a few examples!

4 ^{5}~~6~~ ^{14}~~5~~^{1}2
-1 3 9 8
3 2 5 4

This method allows us to 'borrow' from the column directly to the left – if possible.

However, with the following example, we have to go two columns left to find something we can 'borrow' from.

~~1~~ ^{9}~~^{1}~~~~0~~ ^{1}~~0~~
- 6 7
3 3

These types of examples require MUCH care!

MNU 3-04a

I can use my understanding of numbers less than zero to solve simple problems in context

3-04 (a) - Negative Numbers

Negative Numbers can be used in several contexts.

History: Use of AD/BC

Accounts: negative money represents 'account in overdraft'

Science: Temperature

The actual calculation side of Negative Numbers is relatively straight forward.

(+) (-) means **SUBTRACT**.

(-) (-) means **ADD**.

Add means increase in value, Subtract means decrease.

e.g

1) $4 + (-5)$

$= 4 - 5$

$= -1$

2) $-3 - (-7)$

$= -3 + 7$

$= 4$

3) -6×5

$= -30$

4) $-42 \div (-6)$

$= 7$

When Multiplying and Dividing:
(-) × (+) = (-)
(-) ÷ (-) = (+)

MNU 3-11a

I can solve practical problems by applying my knowledge of measure, choosing the appropriate units and degree of accuracy for the task and using a formula to calculate area and volume.

3-11 (a) Conversion and Formulae

The tables, at the back of the document, can be used to convert between units of measure, volume and weight.

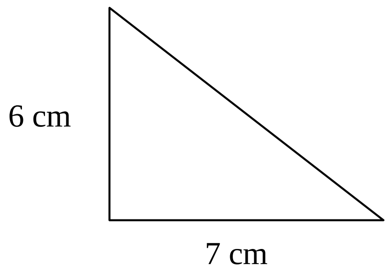
e.g. Change 5350m into km.

5350 ÷ 1000* = 5.35km * 1km = 1000m

There are many different formulas for Area. The basic procedure, for **all formulas**, should remain the same.

- Write down formula
- Substitute numbers into formula
- Calculate answer

e.g. Calculate the area of the triangle



Area $= \frac{1}{2} \times base \times height$

$= \frac{1}{2} \times 7 \times 6$

$= 21cm^2$

MNU 3-22a

I can find the probability of a simple event happening and explain why the consequences of the event, as well as its probability, should be considered when making choices.

3-22(a) Probability

Probability would always be expressed as a **fraction, ratio or decimal.**

Probability would always be measured on a scale of 0 to 1, where 0 is impossible and 1 is certain.

$$\textbf{Probability} = \frac{\textbf{Number of positive outcomes}}{\textbf{Total number of outcomes}}$$

e.g Nine wooden balls, numbered 1 to 9, are placed in a bag. What is the probability that I pick out a ball which is greater than 7?

Prob(> 7) = $\frac{2}{9}$

Note: Only 2 positive outcomes (8 or 9) and 9 total outcomes.

MNU 3-10a

Using simple time periods, I can work out how long a journey will take, the speed travelled at or the distance covered, using my knowledge of the link between time, distance and speed.

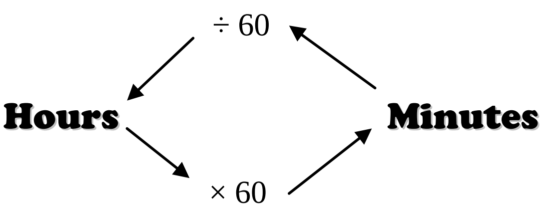
3-10(a) Time, Distance, Speed

The following conversion is vitally important when calculating using the time, distance speed triangle.

Time must always be converted to a decimal.

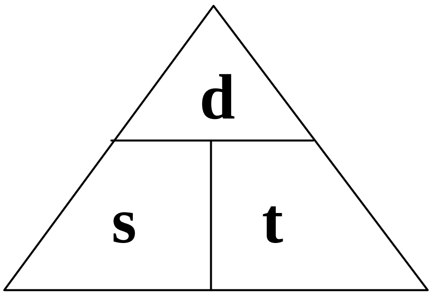
e.g 3 hours and 15 minutes = 3.25 hrs

To convert minutes, 15 ÷ 60 = 0.25 hrs => 3.25 hrs



Always remember to **convert time to a decimal** when calculating using time, distance, speed.

When calculating, using s/d/t, remember this triangle to help with the formulas.



Formulas:

$speed = \frac{distance}{time}$, $time = \frac{distance}{speed}$, $distance = speed \times time$

e.g.
Calculate the distance from Glasgow to Carlisle if I travelled at an average speed of 60mph for 1 hour 45 minutes.

Simply cover up the quantity you require and the formula is constructed with the other two letters.

Time = 1.75 hours

D = s × t

= 60 × 1.75

= 105 miles

NB Remember to convert time into decimals.

MNU 3-09a, b

When considering how to spend money, I can source, compare and contrast different contracts and services…….
I can budget effectively, making use of technology to manage money and plan for future expenses.

3-09(a), (b) Money

Many aspects of money require a little knowledge coupled with common sense.

Knowledge of the phrases and putting them into the real life practice is what is required for later life.

Most calculations involving money revolve around a sound knowledge of arithmetic skills – see 3.01(a), 3.03(a), (b).

Additional techniques:

1) Averages/Mean:

Calculate the average of 4, 9, 13, 12, 7

Average = $\frac{4+9+13+12+7}{5} = \frac{45}{5} = 9$

To calculate average:

- Add together all the digits
- Divide total by number of data.

2) BODMAS

Each of the letters of BODMAS stands for a particular Mathematical operation.

B – Brackets

O – Others (e.g. powers, square roots, of)

D – Division

M – Multiplication

A – Addition

S – Subtraction

e.g.
1)

$$\begin{aligned}&5+3\times 7\\&=5+21\\&=26\end{aligned}$$

2)

$$\begin{aligned}&(4+7)\div 2\\&=11\div 2\\&=5.5\end{aligned}$$