Kettlethorpe
HIGH SCHOOL

Numeracy Policy

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Contents

Purpose 3
Aims: 3
Teachers of Mathematics should: 4
Teachers of Subjects Other than Mathematics should: 5
Mental Arithmetic Techniques 6
Written Calculations 6
Disciplinary Language 7
Specific Cross Curricular Mathematical Links: 8

Numeracy at Kettlethorpe High School

Purpose:

To develop pupils' ability to reason mathematically and solve problems.

To provide a foundation for understanding a mathematical world.

Aims:

- To develop mathematics as an essential tool of communication, using representations to describe, illustrate, interpret, predict, reason and prove.
- To build on knowledge and skills gained in KS2.
- Reflect on gaps in numeracy skills early in KS3; take a systematic and personalised approach to addressing this.
- To ensure that pupils are motivated and stimulated so that they enjoy the subject.
- To develop independence and create ambitious, curious learners who take responsibility for their own destiny, through the use of Sparx maths
- To ensure that pupils have a wide range of skills in their mathematical tool kit, which they are confident to apply when solving problems in mathematics and other curriculum areas such as geography, science, technology and engineering.
- To empower pupils to understand their financial situation and plan for their own healthy economic futures.
- To ensure that pupils gain the most appropriate mathematical qualification from which they can progress on their chosen pathway. This qualification might be functional skills, GCSE maths and further maths for some.
- To ensure that our most able pupils are well-equipped and inspired to study maths at a higher level and are supported by the stretch of the further maths course content. We are committed to growing mathematicians of the future who choose to pursue careers and studies in maths, science, technology and engineering.

Teachers of Mathematics should:

- Provide support and advice to other departments with the use of the methods and calculations outlined in the mathematics schemes of learning, so that a consistent approach is used in all subjects.
- Through liaison with other teachers, attempt to ensure that pupils have appropriate numeracy skills by the time they are needed for work in other subject areas.
- Seek opportunities to use topics and examination questions from other subjects in mathematics lessons.
- Provide some starter resources on key topics used across other subjects for example standard form, density and percentage change in science and geography. Examples below.

Numeracy ACROSS THE CURRICULUM

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A value is in standard form when it is written as a number between 1 and 10 multiplied by a power of 10.

Circle the numbers which are in standard form

3.52×10^{5}

0.4×10^{5}

46×10^{-2}

0.6×10^{0}

1.00004×10^{-6}

Standard Form	Ordinary Form
4×10^{3}	
	46000000
5.6×10^{5}	
	13200
4.56×10^{-4}	
	0.000000922
8.45×10^{0}	

Numeracy ACROSS THE CURRICULUM

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Complete the table.

Material	Density	Mass	Volume
Silver		420 g	40 cm^3
Nickel	8.9 g/cm^3		150 cm^3
Iron	7.8 g/cm^3	2340g	
Marshmallow		211 g	422 cm^3
Soda	1.05 g/cm^3		1000 cm^3
Beech wood	0.8 kg/m^3	4.32 kg	
Bronze		4.35 kg	0.5 m^3
Glass	2.5 g/cm^3		212 cm^3

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

Teachers of Subjects Other than Mathematics should:

- Ensure that they are familiar with correct mathematical language, notation, conventions and techniques, relating to their own subject, and encourage pupils to use these correctly.

- Provide information for mathematics teachers on the stage at which specific numeracy skills will be required for particular groups.

- Provide resources for mathematics teachers to enable them to use examples of applications of numeracy relating to other subjects in mathematics lessons. Examples below.

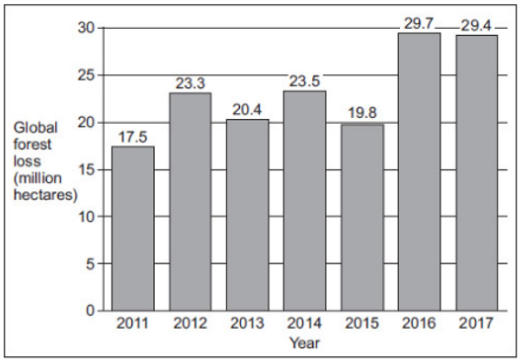
The table shows some information about 9 people.

Name	Gender	Age (years)	Weight (kg)	Eye colour
Toby	Male	25	62	Blue
Charles	Male	36	71	Green
Sarah	Female	49	60	Brown
Ali	Male	27	78	Brown
Jenny	Female	53	59	Brown
Kirsty	Female	15	65	Blue
Howard	Male	31	80	Blue
Megan	Female	18	73	Brown
Kim	Female	22	75	Green

Find the mean age of these 9 people.

..... years
(2)

Study the graph below showing global forest loss from 2011 to 2017.

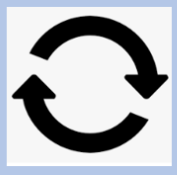


(a) Using the graph above, calculate the mean global forest loss from 2011 to 2017.

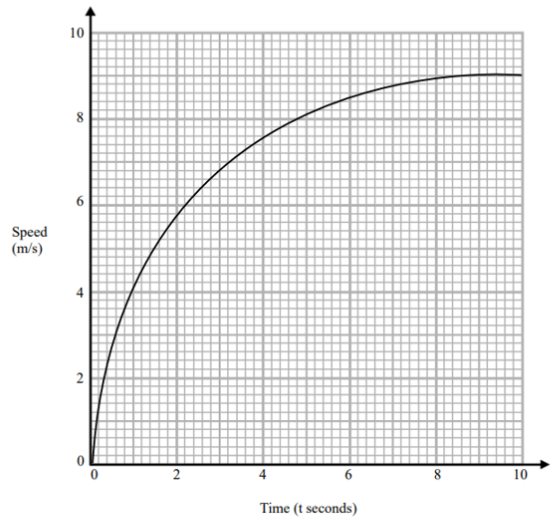
Give your answer to **one** decimal place.

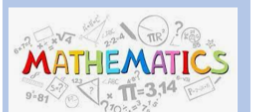
_____ million hectares

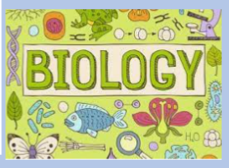
(1)



Here is a speed-time graph.





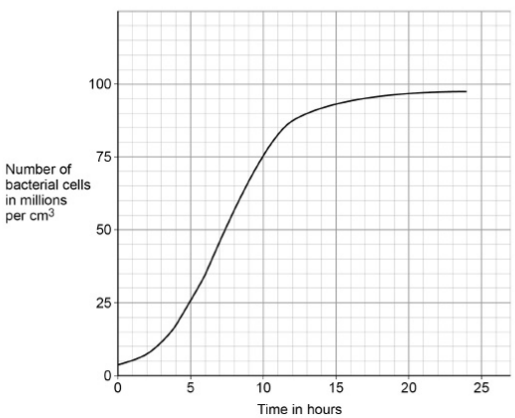


(a) Work out an estimate for the acceleration when t = 2.

..... ms^{-2}
(2)

Figure 1 shows the growth of a culture of the bacteria in a solution of nutrients at 25 °C

Figure 1



The rate of reproduction of the bacteria is fastest at 7 hours.

How many times faster is the rate of reproduction at 7 hours than the rate at 12 hours?

_____

_____

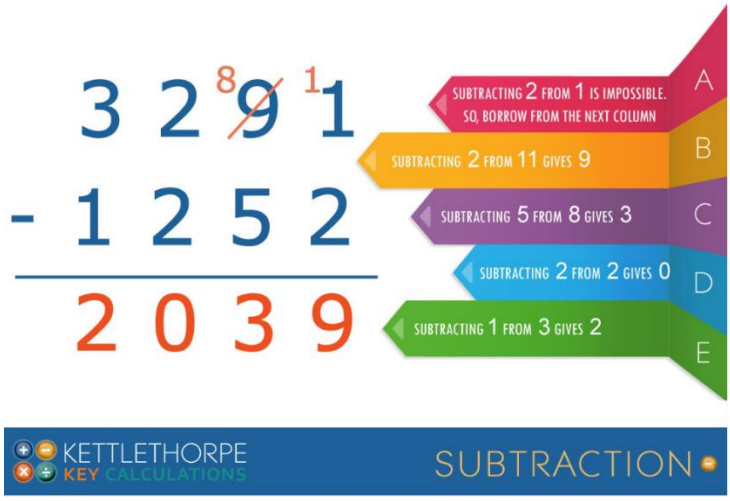
_____

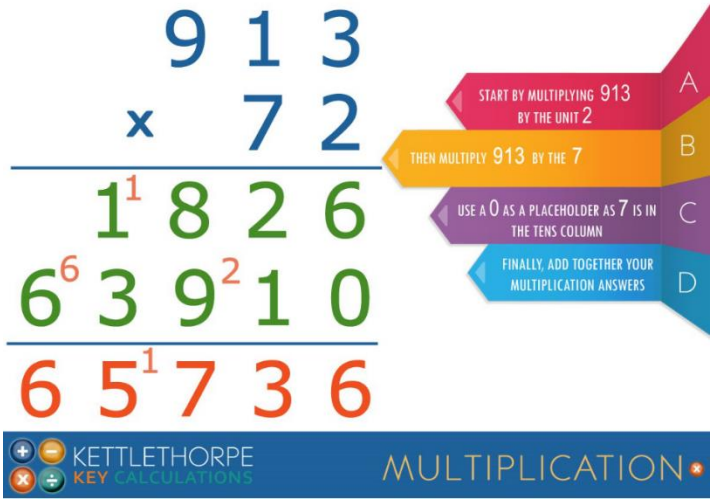
Mental Arithmetic Techniques

Opportunities for pupils to develop mental strategies for calculations should be given and pupils should be encouraged to estimate answers to calculations before they start so that they can check whether their answers are reasonable, including when using a calculator.

Written Calculations

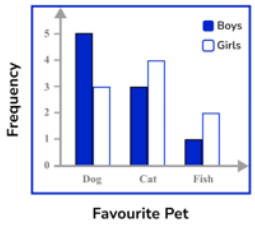
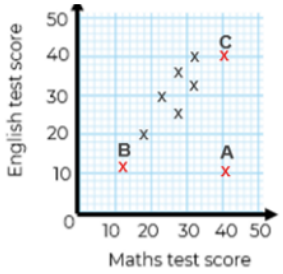
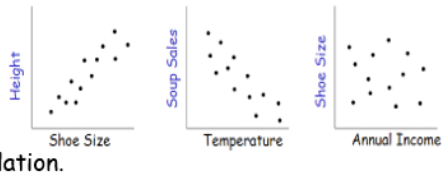
The Edexcel exam board accept a variety of methods for calculations, but we strive to ensure consistency as far as is possible. Kettlethorpe High School has standard methods for the 4 rules of number. The posters below are displayed in all mathematics classrooms to reinforce this for pupils. Only in exceptional circumstances would teachers differentiate to make the calculations more accessible, possibly by the use of a grid for multiplication.



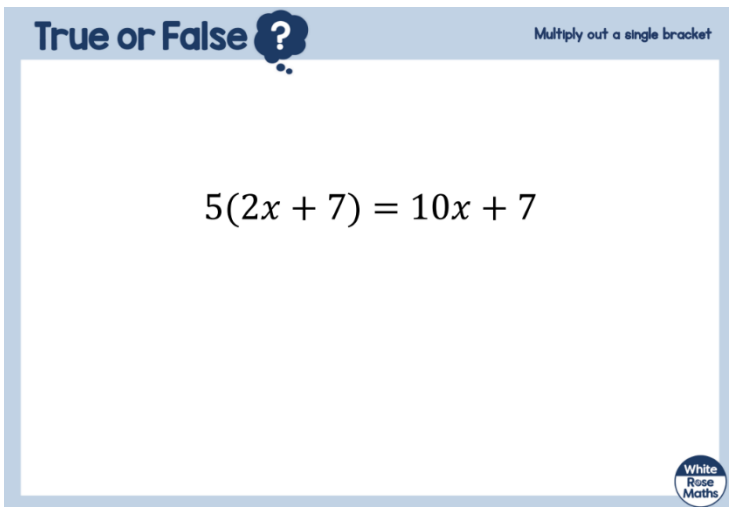


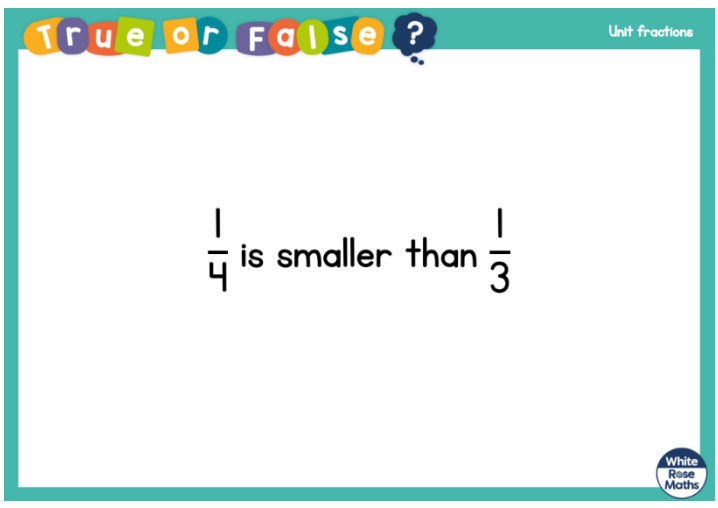
Disciplinary Language

- Mathematics teachers all display key vocabulary on their whiteboards.
- They describe their learning intentions and steps to success which enable pupils to talk confidently and reason about their mathematics.
- All units of work have a word bank of key vocabulary at the beginning, which pupils complete definitions for and examples where appropriate. These are completed for SEND pupils in advance to prevent copying from the board. See example below.

Displaying Data	Definition	An illustration
Two-way table	A way of classifying data in two ways.	
Compound bar chart	Contains two sets of data.	
Outlier	A piece of data which is outside the pattern of the rest of the observations.	
Correlation	Describes the Relationship between two variables. It can be positive, negative or no correlation.	

- True or false tasks are provided in the schemes of learning to ensure that opportunities for reasoning are given.





Specific Cross Curricular Mathematical Links:

Science

The science and maths teams will collaborate to ensure that consistency of method and delivery across key topics such as calculating means and percentages, substituting values into formulae, rearranging formulae and finding gradients of curves and straight lines in order to interpret rates of change.

Art and Technology

In art pupils will consider proportions, symmetry, rotations, enlargements and study Escher and his tessellations as part of a project.

Computing

Pupils will use maths in a variety of ways including flowcharts, programming, working with averages, binary, hexadecimal and use of databases .

Geography

Pupils have opportunities to collect, represent and interpret data. Pupils use 6 figure compass bearings, map scales, ratio and have to calculate percentage change.

History

Historical data can be analysed and presented in graphical form. The history team

PE

Athletic activities require measurement of height, distance, time and speed. They can calculate averages and use graphs with

Music

Pupils use their knowledge of fractions when studying rhythm and time signatures.

When composing they would consider the relationship between mathematics and the musical scale.

English

Teachers will use mathematical diagrams to represent contexts, eg. Venn diagrams to compare and contrast human characteristics. They might plot tension in storylines on a time series graph and discuss increasing and decreasing trends.

MFL

Aspects of maths such as counting, calculations, money, telling the time and the date are reinforced in MFL.