THE DUSTON SCHOOL
Knowledge itself is power
TDS 4-19

Year 9 Foundation Maths

Knowledge Organiser

Term 3

Name:	Class:

Keyword	Definition
Simplify	To make simpler or easier to understand by reducing the size of numbers or the number of terms.
Like terms	Terms which have the exact same letters in an expression.
Expression	One or more terms combined by addition or subtraction.
Function	A special relationship where each input has one output.
Numerator	The top number in a fraction.
Denominator	The bottom number in a fraction.
Improper Fraction	A fraction where the numerator is not smaller than the denominator.
Mixed Number	A combination of a whole number and a fraction.
Product	The result of multiplication.
Percent	Out of 100
Simplify	To make simpler or easier to understand by reducing the size of numbers or the number of terms.
Reciprocal	The result of dividing 1 by the number.

Homework 1 due:	
Homework 2 due:	
Homework 3 due:	

RESPECT

In Mathematics, a classroom environment should always be respectful. Students can show respect through:

- **Supporting each other with their learning.** Pupils should recognise that every individual has their own strengths and weaknesses and, as a class, we should 'up-lift' students.
- **Students should not be felt to be rushed by others in the classroom**. Respect that all students have different experiences and therefore will access the knowledge at different rates.
- **Being Polite.** As no different to the rest of school. Students should embrace diversity and treat all others with tolerance and decency.

ASPIRATION

- **Building logical processes.** Understanding that learning mathematical concepts improves our logical reasoning which improves other aspects of our lives: language, culture, games etc. the essence of mathematics is in respect of ideas, structures and relationships by logical reasoning.
- **Every day needs.** Understanding that being numerate, along with literate, is a strong indicator of long-term success and students' ability to climb the tree of knowledge.

RESILIENCE

- **I don't know it… yet.** Understanding that maths can be abstract and that, as with anything new, it will take time to learn. With time, you will succeed.
- **Mathematical concept won't always come easily.** Understanding that getting things wrong is a frustrating and not pleasant feeling but, to succeed, it is a passage we need to go through.
- **Practice makes permanent.** Mathematics is a logical subject such that, rehearsal and repetition of method is the key to being successful and committing the knowledge to long-term memory. This process takes time and will come with failures along the way which we must persevere through.

Term 3 Overview

Big Questions for the term

Simplifying and substitution

- What do we already know about algebra?
- What does it mean to simplify an expression?
- How do we form an expression?
- What is a function machine?
- What does it mean to expand a bracket?
- What does it mean to factorise?
- How do we expand double brackets?

Constructions

- How can we construct triangles?
- How can we bisect a line?
- How can we bisect an angle?
- How can we bisect a line from different points?
- How can we construct different angles?
- How can we map 3D shapes?
- What is a locus of points?

Knowledge Retrieval Questions – From Year 7

Unit 5 – Simplifying and substitution

#	Question	Answer
1	In algebra, what does "collecting like terms" mean?	Adding or subtracting terms with the exact same letters
2	In algebra, what is substitution?	Replacing something in an expression with something else which is equal to it
3	The symbol for which operation is not written in algebra?	Multiplication
4	How is division represented algebraically?	As a fraction
5	How do you write expressions from sentences?	Replace unknown numbers with letters, everything else should be a number or an operation.

Knowledge Retrieval Questions – From Year 8

Unit 5 – Simplifying and substitution

#	Question	Answer
1	How do you expand single brackets?	Multiply the term outside the brackets by each of the terms inside
2	How do you expand double brackets?	Multiply each of the terms in the first bracket by each of the terms in the second bracket.
3	What is the first step in factorising into single brackets?	Find the highest common factor of the terms.
4	When are brackets used in an expression?	When the order of operations is different to BIDMAS order.

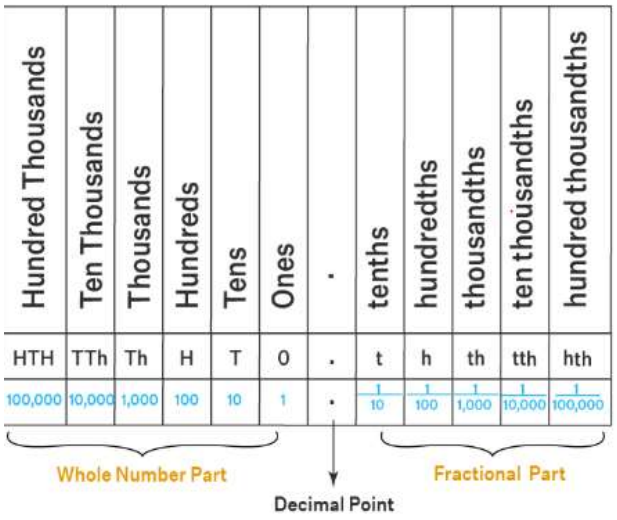
Knowledge Retrieval Questions – For Year 9

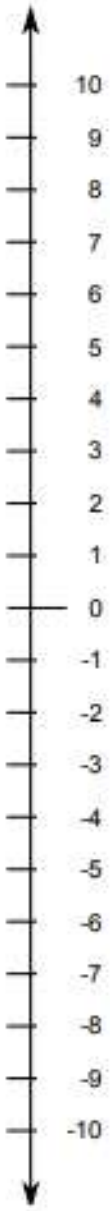
Unit 6 – Constructions

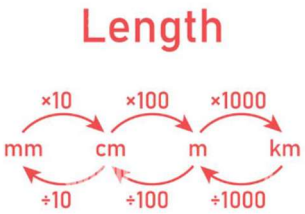
#	Question	Answer
1	What does it mean to "construct" in maths?	To draw accurately, using a combination of pencil, ruler, protractor and a pair of compasses.
2	How do you construct a triangle, given one side length and two angles?	Use a ruler to draw the side, measure the angles on either end, draw the lines so they connect.
3	How do you construct a triangle, given two side lengths and the angle between?	Use a ruler to draw one side, measure the angle, use a ruler to draw the second side, join the ends up.
4	How do you construct a triangle, given three side lengths?	Use a ruler to draw one side, use a pair of compasses to draw arcs on either end with radii equal to the two remaining sides, the point they intersect is the third vertex.
5	How do you construct a perpendicular bisector?	Set your compass to more than half way, draw two arcs from each end of the line, connect the two points where the arcs meet
6	How do you construct an angle bisector?	Put your compass on the vertex and make a mark on each line, draw an arc with your compass on each mark, connect the point where the arcs meet with the vertex.

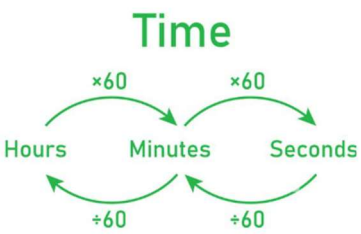
Multiplication Chart

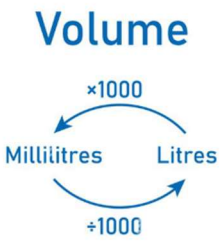
X	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

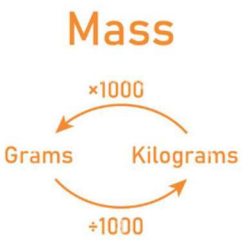












Remote-Learning

If you are absent from school, lesson work can be found on your year group Teams channel: files -> class materials -> maths

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This website is useful to students as it contains videos to support students understanding and also extra questions to extend and support students.

Please see your class teacher for any login issues

vle.mathswatch.co.uk

Username: firstnamesurname@dustonschool

Password: berrywood

Term 3 - Homework 1

#	Type	Question	Answer
1	Knowledge	How do you multiply numbers in standard form?	Multiply the numbers, add the indices, adjust if necessary
	Application 1	Calculate, giving your answer in standard form, $(3 \times 10^0) \times (1 \times 10^5)$	
	Application 2	Calculate, giving your answer in standard form, $(2 \times 10^9) \times (1 \times 10^2)$	
2	Knowledge	What does HCF stand for?	Highest Common Factor
	Application 1	What is the HCF of 60 and 12?	
	Application 2	What is the HCF of 10x and 3x?	
3	Knowledge	What is direct proportion?	Describes quantities which have a constant ratio
	Application 1	x and y are in direct proportion. When x = 9 y = 18. What would y be if x = 12?	
	Application 2	x and y are in direct proportion. When x = 7 y = 14. What would y be if x = 11?	
4	Knowledge	How do you share in a ratio if you are given one of the final amounts?	Scale up from the ratio to the amount you know and apply to the other
	Application 1	Carly and Dan share money in the ratio 5:2. Dan gets £12, how much does Carly get?	
	Application 2	Carly and Dan share money in the ratio 5:4. Dan gets £8, how much does Carly get?	

5	Knowledge	How do you decrease an amount by a percentage?	Calculate the percentage of the amount, then subtract it from the original amount
	Application 1	Decrease 120 by 10%	
	Application 2	Decrease 120 by 5%	

6	Knowledge	How do you increase an amount by a percentage?	Calculate the percentage of the amount, then add it on to the original amount
	Application 1	Increase 60 by 5%	
	Application 2	Increase 90 by 20%	

7	Knowledge	How do you increase an amount by 40% without a calculator?	Find 10% by dividing by 10, multiply that by 4, then add the result onto the original amount.
	Application 1	Increase 200 by 40%	
	Application 2	Increase 240 by 40%	

8	Knowledge	How do you find 30% of an amount without a calculator?	Find 10% by dividing the amount by 10, then multiply by 3.
	Application 1	Find 30% of 30	
	Application 2	Find 30% of 40	

10	Knowledge	How do you work out percentage change?	(Change ÷ Original) × 100 (%)
	Application 1	Over a year, your bank account goes from £10500 to £8500, calculate the percentage change.	$\frac{\quad}{\quad} \times 100 =$
	Application 2	Over a year, your bank account goes from £8400 to £10200, calculate the percentage change.	$\frac{\quad}{\quad} \times 100 =$

11	Knowledge	How do you work out the value after adding simple interest?	amount + % of amount × number of years
	Application 1	Calculate the balance if an account with £6700 got 5% simple interest for 5 years.	Value of 5% → Value of interest after 5 years → Value in the account after 5 years
	Application 2	Calculate the balance if an account with £4000 got 6% simple interest for 5 years.	Value of 6% → Value of interest after 5 years → Value in the account after 5 years →

12	Knowledge	What is a multiple?	A number in another numbers times table
	Application 1	What is the 4^{th} multiple of 5?	
	Application 2	What is the 6^{th} multiple of 7?	

13	Knowledge	What is a scale factor?	The ratio between corresponding measurements of similar shapes
	Application 1	Corresponding sides on two similar shapes are 9cm and 18cm. What is the scale factor?	
	Application 2	Corresponding sides on two similar shapes are 6cm and 24cm. What is the scale factor?	

14	Knowledge	What is the unitary method?	A method where the first step is making the ratio 1: n or n:1
	Application 1	10 pens cost 40p. Work out the cost of 7 pens.	
	Application 2	8 pens cost 16p. Work out the cost of 5 pens.	

Term 3 - Homework 2

#	Type	Question	Answer
1	Knowledge	How do you increase an amount by 40% without a calculator?	Find 10% by dividing by 10, multiply that by 4, then add the result onto the original amount.
	Application 1	Increase 200 by 40%	
	Application 2	Increase 160 by 40%	
2	Knowledge	What is direct proportion?	Describes quantities which have a constant ratio
	Application 1	x and y are in direct proportion. When x = 5 y = 20. What would y be if x = 15?	
	Application 2	x and y are in direct proportion. When x = 10 y = 30. What would y be if x = 13?	
3	Knowledge	With a calculator, how do you increase an amount by a percentage?	Add the percentage to 100%, then multiply by the amount
	Application 1	Increase 75 by 30%	
	Application 2	Increase 59 by 25%	
4	Knowledge	How do you increase an amount by a percentage?	Calculate the percentage of the amount, then add it on to the original amount
	Application 1	Increase 80 by 30%	
	Application 2	Increase 60 by 35%	

5	Knowledge	What is the unitary method?	A method where the first step is making the ratio 1: n or n:1
	Application 1	10 pens cost 40p. Work out the cost of 20 pens.	
	Application 2	8 pens cost 16p. Work out the cost of 16 pens.	

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6	Knowledge	What is a scale factor?	The ratio between corresponding measurements of similar shapes
	Application 1	Corresponding sides on two similar shapes are 10cm and 25cm. What is the scale factor?	
	Application 2	Corresponding sides on two similar shapes are 9cm and 36cm. What is the scale factor?	

7	Knowledge	How do you convert a mixed number to an improper fraction?	Multiply the whole number by the denominator and add it to the numerator
	Application 1	Convert $7\frac{3}{7}$ into an improper fraction.	
	Application 2	Convert $3\frac{4}{5}$ into an improper fraction.	

8	Knowledge	How do you share in a ratio if you are given one of the final amounts?	Scale up from the ratio to the amount you know and apply to the other
	Application 1	Carly and Dan share money in the ratio 9:1. Dan gets £8, how much does Carly get?	
	Application 2	Carly and Dan share money in the ratio 2:1. Dan gets £20, how much does Carly get?	

9	Knowledge	How do you work out percentage change?	(Change ÷ Original) × 100 (%)
	Application 1	Over a year, your bank account goes from £6300 to £10200, calculate the percentage change.	$\frac{\quad}{\quad} \times 100 =$
	Application 2	Over a year, your bank account goes from £5600 to £10200, calculate the percentage change.	$\frac{\quad}{\quad} \times 100 =$

10	Knowledge	With a calculator, how do you decrease an amount by a percentage?	Subtract the percentage from 100%, then multiply by the amount
	Application 1	Decrease 92 by 10%	
	Application 2	Decrease 73 by 1%	

11	Knowledge	How do you find an equivalent fraction?	Multiply or divide the numerator and denominator by the same number.
	Application 1	State a fraction which is equivalent to $\frac{5}{11}$	
	Application 2	State a fraction which is equivalent to $\frac{2}{7}$	

12	Knowledge	What is the answer to any number raised to the power zero?	1
	Application 1	Evaluate 13^0	
	Application 2	Evaluate 11^0	

13	Knowledge	What sign would the answer to a negative number divided by a positive number have?	Negative
	Application 1	Calculate -36 divided by 4	
	Application 2	Calculate -25 divided by 5	

14	Knowledge	How do you find 30% of an amount without a calculator?	Find 10% by dividing the amount by 10, then multiply by 3.
	Application 1	Find 30% of 90	
	Application 2	Find 30% of 40	

Term 3 - Homework 3

#	Type	Question	Answer
1	Knowledge	How do you work out percentage change?	(Change ÷ Original) × 100 (%)
	Application 1	Over a year, your bank account goes from £7700 to £10200, calculate the percentage change.	$\frac{\quad}{\quad} \times 100 =$
	Application 2	Over a year, your bank account goes from £8400 to £6800, calculate the percentage change.	$\frac{\quad}{\quad} \times 100 =$
2	Knowledge	How do you share in a ratio if you are given one of the final amounts?	Scale up from the ratio to the amount you know and apply to the other
	Application 1	Carly and Dan share money in the ratio 10:3. Dan gets £9, how much does Carly get?	
	Application 2	Carly and Dan share money in the ratio 8:1. Dan gets £7, how much does Carly get?	
3	Knowledge	What is a scale factor?	The ratio between corresponding measurements of similar shapes
	Application 1	Corresponding sides on two similar shapes are 6cm and 12cm. What is the scale factor?	
	Application 2	Corresponding sides on two similar shapes are 8cm and 20cm. What is the scale factor?	
4	Knowledge	How do you increase an amount by 40% without a calculator?	Find 10% by dividing by 10, multiply that by 4, then add the result onto the original amount.
	Application 1	Increase 200 by 40%	
	Application 2	Increase 160 by 40%	

5	Knowledge	How do you decrease an amount by a percentage?	Calculate the percentage of the amount, then subtract it from the original amount
	Application 1	Decrease 50 by 5%	
	Application 2	Decrease 120 by 10%	

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6	Knowledge	How do you share in a ratio if you are given the difference?	Work out the difference in the ratio and scale up to the difference you want
	Application 1	Anna and Ben share money in the ratio 7:3. Anna gets £20 more than Ben, how much does Anna get?	
	Application 2	Anna and Ben share money in the ratio 9:4. Anna gets £35 more than Ben, how much does Anna get?	

7	Knowledge	What sign would the answer to a negative number divided by a positive number have?	Negative
	Application 1	Calculate -80 divided by 4	
	Application 2	Calculate -100 divided by 5	

8	Knowledge	What is a cube number?	The product of 3 equal numbers.
	Application 1	What is 1 cubed?	
	Application 2	What is 2 cubed?	

9	Knowledge	With a calculator, how do you increase an amount by a percentage?	Add the percentage to 100%, then multiply by the amount
	Application 1	Increase 62 by 40%	
	Application 2	Increase 93 by 10%	

10	Knowledge	What is the definition of a square number?	The product of a number and itself
	Application 1	What is the 6th square number?	
	Application 2	What is the 10th square number?	

11	Knowledge	How do you work out the value after adding simple interest?	amount + % of amount × number of years
	Application 1	Calculate the balance if an account with £5800 got 3% simple interest for 3 years.	Value of 3% → Value of interest after 3 years → Value in the account after 3 years
	Application 2	Calculate the balance if an account with £8000 got 2% simple interest for 4 years.	Value of 2% → Value of interest after 4 years → Value in the account after 4 years →

12	Knowledge	How do you determine the index when converting small numbers into standard form?	It is the number of digits before the first non-zero digit
	Application 1	What is the index when the number 0.000 889 is written in standard form?	
	Application 2	What is the index when the number 0.000 000 9 is written in standard form?	

13	Knowledge	How do you find 30% of an amount without a calculator?	Find 10% by dividing the amount by 10, then multiply by 3.
	Application 1	Find 30% of 90	
	Application 2	Find 30% of 50	

14	Knowledge	How do you write a ratio into the form n:1?	Divide both numbers in the ratio by the second number in the ratio.
	Application 1	Write the ratio 10:2 into the form n:1	
	Application 2	Write the ratio 1:10 into the form n:1	

Careers in Maths

Carpenter

Carpenters construct and repair wooden structures, fittings, and furniture.

You'll work as an employee or a self-employed contractor for large and small construction companies. You may work on a construction site, a client's premises, or in your own workshop.

Depending on where you work, your day-to-day tasks may include:

- discussing plans and following instructions
- cutting and shaping timber for floorboards, doors, skirting boards and window frames
- making and fitting wooden structures like staircases, door frames, roof timbers and partition walls
- making and assembling fitted and free-standing furniture
- installing kitchens, cupboards and shelving
- building temporary wooden supports to hold setting concrete in place (shuttering)
- making and fitting interiors in shops, bars, restaurants, offices and public buildings
- constructing stage sets for theatre, film and TV productions

Working Hours and Environment

You'll usually work 39 to 45 hours a week, Monday to Friday. You may need to work some weekends or evenings to meet construction deadlines.

This is a physically active job. You could work outdoors in all weathers, up ladders and on scaffolding or roofs.

Entry Requirements

Employers usually look for some on-site experience and qualifications. You could start as a joiner's 'mate' or labourer to get site experience. Once working, your employer may offer you training on the job.

You could take a college course in carpentry and joinery to gain some of the knowledge and practical skills needed to improve your chances of finding work in the industry.

Skills Required:

You'll need:

- to be able to follow technical drawings and plans
- maths skills to calculate quantities and angles
- the ability to pay close attention to detail and make accurate measurements

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