THE DUSTON TDS 4-19 SCHOOL
Knowledge itself is power

Year 8 Maths
Knowledge Organiser
Term 6

Name:	Class:

Keyword	Definition
Median	The middle number in an ordered list.
Range	The difference between the smallest and largest values in a data set.
Mean	The sum of all the data divided by how many data there are.
Mode	The most common piece of data.
Frequency	How often something happens
Hypotenuse	The side opposite the right angle in a right-angled triangle
Theorem	A result which has been proven to be true
Pythagoras	In a right-angled triangle, the square of the long side is equal to the sum of the squares of the other two sides
Square	To square a number, you multiply it by itself
Root	A square root of a number is a value that, when multiplied by itself, gives 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 6 Overview

Big Questions for the term

Data

- How does finding an average help us to interpret and compare data?
- What is a pie chart and how does it link to fractions and proportion?
- What are the benefits of using a stem and leaf diagram to display data?
- What is the best way to find an average when dealing with a lot of data?
- How can a scatter graph be used to predict?

Pythagoras

- What is the name of the longest side of a triangle?
- How do we use the hypotenuse to calculate the shorter sides?
- How can we solve 2D shape problems using Pythagoras' Theorem?
- How can we use diagrams to solve problems involving right-angled triangles?
- Which other topics in Maths use Pythagoras' Theorem?

Knowledge Retrieval Questions – For Year 8

Unit 8 – Data

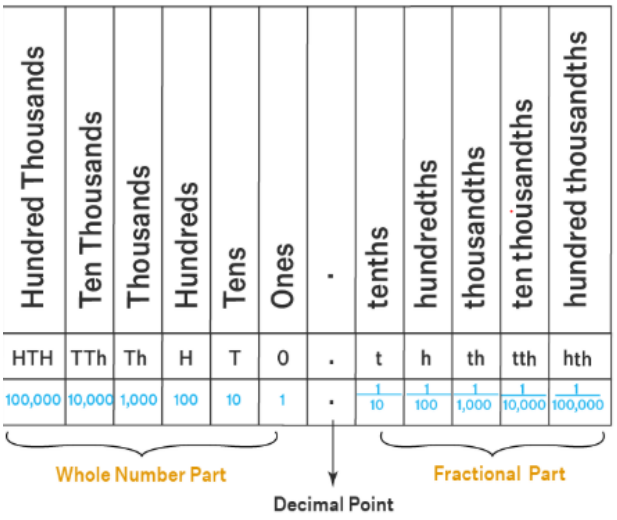
#	Question	Answer
1	How do you find the mode from a frequency table?	Identify the most frequent one.
2	How do you find the median from a frequency table?	Find the total frequency, add one and halve it. Identify which class contains that piece of data.
3	How do you find the mean from a frequency table?	Multiply Across, Add Down, Divide Totals.
4	How do you find the mean from a grouped frequency table?	Find Midpoints, Multiply Across, Add Down, Divide Totals.
5	How do you find interquartile range?	Upper Quartile - Lower Quartile
6	How do you find the lower quartile?	Add one to the number of values, divide by 4. Find the value in this position.
7	How do you find the upper quartile?	Add one to the number of values, multiply by 3, divide by 4. Find the value in this position.
8	What statistics are on a box plot?	Lowest Value, Lower Quartile, Median, Upper Quartile, Highest Value.

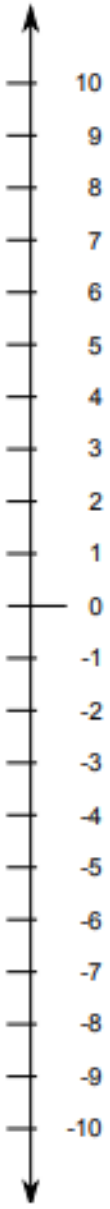
Unit 9 – Pythagoras

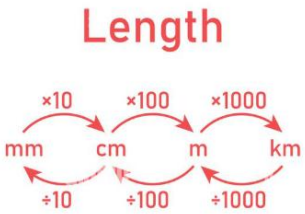
#	Question	Answer
1	How do you work out the hypotenuse if you know the other two edge lengths?	Square them both, add them, then square root.
2	How do you work out one of the shorter edges given the hypotenuse and the other edge length?	Square them both, subtract them, then square root.
3	How do you calculate the distance between two pairs of coordinates?	Square the differences in x and in y, add them, then square root.

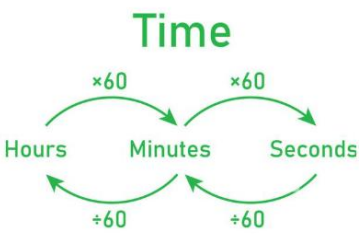
Multiplication Chart

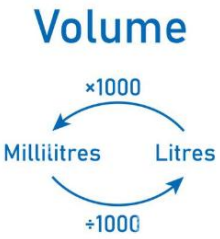
X	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	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

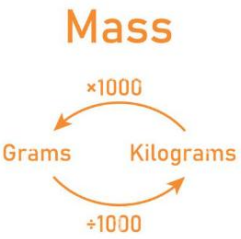












Remote-Learning

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.

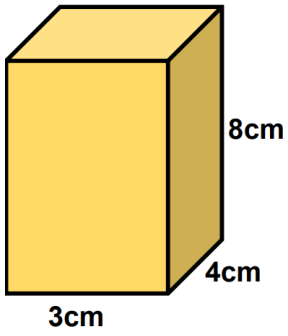
Please see your class teacher for any login issues

vle.mathswatch.co.uk

Username: firstnamesurname@dustonschool

Password: berrywood

Term 6 - Homework 1

<table>
<tr><th>#</th><th>Type</th><th>Question</th><th>Answer</th></tr>
<tr><td rowspan="2">1</td><td>Knowledge</td><td>How do you work out the surface area of a shape?</td><td>Work out the area of each face and add them together.</td></tr>
<tr><td>Application 1</td><td>Work out the surface area
 
</td><td>
<table>
<tr><td>Face</td><td>Area (cm^2)</td></tr>
<tr><td>Front</td><td></td></tr>
<tr><td>Back</td><td></td></tr>
<tr><td>Top</td><td></td></tr>
<tr><td>Bottom</td><td></td></tr>
<tr><td>Side 1</td><td></td></tr>
<tr><td>Side 2</td><td></td></tr>
<tr><td>Total</td><td></td></tr>
</table>
</td></tr>
<tr><td rowspan="3">2</td><td>Knowledge</td><td>What is the formula for the volume of a prism?</td><td>Volume = Cross-sectional Area × Length</td></tr>
<tr><td>Application 1</td><td>Work out the volume of a cuboid with dimensions 3m, 7m and 4m</td><td></td></tr>
<tr><td>Application 2</td><td>Work out the volume of a cuboid with dimensions 2cm, 3cm and 4cm</td><td></td></tr>
<tr><td rowspan="3">3</td><td>Knowledge</td><td>How do you find the midpoint given two points?</td><td>The midpoint will have coordinates halfway between the x and y coordinates of the two given points.</td></tr>
<tr><td>Application 1</td><td>Two points on a line segment are (3, 4), and (7, 6). What is the midpoint of the line segment?</td><td></td></tr>
<tr><td>Application 2</td><td>Two points on a line segment are (4, 3), and (8, 6). What is the midpoint of the line segment?</td><td></td></tr>
<tr><td rowspan="3">4</td><td>Knowledge</td><td>How do you know, given the equations of two lines, if they are parallel?</td><td>They have the same gradient.</td></tr>
<tr><td>Application 1</td><td>Are the following lines parallel?
A: $y = 2x + 4$ and B: $y = -2x - 4$</td><td></td></tr>
<tr><td>Application 2</td><td>Are the following lines parallel?
A: $y = 3x + 2$ and B: $y = 3x - 4$</td><td></td></tr>
</table>

#	Type	Question	Answer
6	Knowledge	What is the difference between a face, an edge, and a vertex?	A face is a flat surface on a 3D shape, an edge is where two faces meet, a vertex is where edges meet.
	Application 1	How many faces, edges and vertices does a cuboid have?	
	Application 2	How many faces, edges and vertices does a cube have?	
7	Knowledge	How do you work out the equation of a horizontal or vertical line?	Identify the number where the line goes through the axis, a. If horizontal: y = a. If vertical: x = a.
	Application 1	What is the equation of a horizontal line going through 6 on the axis?	
	Application 2	What is the equation of a vertical line going through - 5 on the axis?	
8	Knowledge	What is the relationship between radius and diameter?	Diameter = 2 × radius
	Application 1	What is the radius of a circle if the diameter is 14m?	
	Application 2	What is the diameter of a circle if the radius is 16m?	
9	Knowledge	What do the letters m and c represent in y = mx + c?	m = gradient, c = y-intercept
	Application 1	What do the numbers mean in the following equation: y = 3x + 7 ?	
	Application 2	What do the numbers mean in the following equation: y = 2x + 5 ?	

#	Type	Question	Answer
10	Knowledge	How do you find the value of any term using the nth term rule?	Substitute the number of the term into the nth term rule.
	Application 1	The nth term of a sequence is given by 9 - 5n. What is the value of term 9?	
	Application 2	The nth term of a sequence is given by 6 - 3n. What is the value of term 4?	
11	Knowledge	What is a line of symmetry?	A line which would split a shape into two equal parts, which are mirror images of each other.
	Application 1	How many lines of symmetry does a square have?	
	Application 2	How many lines of symmetry does a rectangle have?	
12	Knowledge	How do you multiply fractions?	Multiply the numerators and multiply the denominators.
	Application 1	$\frac{4}{6} \times \frac{2}{8}$	
	Application 2	$\frac{4}{10} \times \frac{3}{8}$	
13	Knowledge	How do you find the nth term of a linear sequence?	Identify the term-to-term rule, then work out what you have to add/subtract to get to the first term.
	Application 1	State the nth term of the following sequence: 3, 9, 15, 21	
	Application 2	State the nth term of the following sequence: 4, 9, 14, 19	
14	Knowledge	What is the formula for calculating the area of a circle?	Area = $\pi \times \text{radius}^2$
	Application 1	What is the area of a circle with a radius of 12cm? Give your answer in terms of π.	
	Application 2	What is the area of a circle with a radius of 14m? Give your answer in terms of π.	

Term 6 - Homework 2

#	Type	Question	Answer
1	Knowledge	With a calculator, how do you convert a fraction to a decimal?	Type the fraction in and press =, followed by S <=> D
	Application 1	Convert 97/100 into a decimal.	
	Application 2	Convert 8/25 into a decimal.	
2	Knowledge	What does it mean to "solve an equation"?	Find the value or values of the unknown which make the equation correct.
	Application 1	Solve a - 3 = 27	
	Application 2	Solve a + 2 = 20	
3	Knowledge	With a calculator, how do you convert a decimal to a percentage?	Multiply by 100 (%)
	Application 1	Convert 0.18 into a percentage.	
	Application 2	Convert 0.27 into a percentage.	
4	Knowledge	With a calculator, how do you convert a percentage to a decimal?	Type the percentage in and press =, followed by S <=> D
	Application 1	Convert 69% into a decimal.	
	Application 2	Convert 30% into a decimal.	
5	Knowledge	How do you solve an equation with an unknown on one side?	Undo each of the parts of the equation, in reverse BIDMAS order.
	Application 1	Solve 7b + 2 = -19	
	Application 2	Solve 8b + 3 = 35	

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#	Type	Question	Answer
6	Knowledge	With a calculator, how do you convert a decimal to a fraction?	Type the decimal in and press =
	Application 1	Convert 0.06 into a fraction.	
	Application 2	Convert 0.38 into a fraction.	
7	Knowledge	With a calculator, how do you convert a percentage to a fraction?	Type the percentage in and press =
	Application 1	Convert 10% into a fraction.	
	Application 2	Convert 24% into a fraction.	
8	Knowledge	With a calculator, how do you convert a fraction to a percentage?	Multiply by 100 (%) and press S <=> D
	Application 1	Convert 41/100 into a percentage.	
	Application 2	Convert 6/25 into a percentage.	
9	Knowledge	What does it mean to "solve an equation"?	Find the value or values of the unknown which make the equation correct.
	Application 1	Solve a ÷ 3 = 10	
	Application 2	Solve a - 3 = 21	
10	Knowledge	How do you solve an equation with an unknown on both sides?	Simplify, by subtracting the smaller of the two terms containing the unknown, then proceed as normal.
	Application 1	Complete the first step 10c + 2 = 4c - 28	
	Application 2	Complete the first step 10c + 3 = 6c + 23	

Term 6 - Homework 3

#	Type	Question	Answer
1	Knowledge	How do you determine the index when converting large numbers into standard form?	It is the number of digits after the first non-zero digit before the decimal point
	Application 1	What is the index when the number 7910000 is written in standard form?	
	Application 2	What is the index when the number 841000000 is written in standard form?	
2	Knowledge	The first part of a number written in standard from should be between which 2 numbers?	1 and 10 (smaller than 10…)
	Application 1	What is the initial number when 0.867 is written in standard form?	
	Application 2	What is the initial number when 7.31 is written in standard form?	
3	Knowledge	How do you simplify a power raised to another power?	Multiply the indices together
	Application 1	Simplify $(11^5)^4$	
	Application 2	Simplify $(18^6)^5$	
4	Knowledge	How do you divide by a decimal?	Multiply both numbers by 10 repeatedly until you are dividing by a whole number
	Application 1	Calculate 1.4 divided by 0.1	
	Application 2	Calculate 0.0084 divided by 0.0006	
5	Knowledge	What are decimal places?	Digits to the right of a decimal point
	Application 1	How many decimal places does the number 0.00536 have?	
	Application 2	How many decimal places does the number 0.0391 have?	

#	Type	Question	Answer
6	Knowledge	How do you expand double brackets?	Multiply each of the terms in the first bracket by each of the terms in the second bracket.
	Application 1	Expand $(v + 5)(v + 2)$	
	Application 2	Expand $(p + 1)(p + 2)$	
7	Knowledge	How do you simplify the product of two powers with the same base?	Add the indices together
	Application 1	Simplify $18^6 \times 18^3$	
	Application 2	Simplify $11^3 \times 11^3$	
8	Knowledge	How do you expand single brackets?	Multiply the term outside the brackets by each of the terms inside
	Application 1	Expand $5(8s + 3)$	
	Application 2	Expand $5p(7p - 3)$	
9	Knowledge	What is the first step in factorising into single brackets?	Find the highest common factor of the terms.
	Application 1	What is the highest common factor of $3y^3$ and $6x^3$?	
	Application 2	What is the highest common factor of $5y^2$ and $15x^2$?	
10	Knowledge	How do you estimate a square root?	Identify the square numbers either side of it
	Application 1	Between which two integers is the square root of 108?	
	Application 2	Between which two integers is the square root of 56?	

Careers in Maths

Structural Engineer

Structural engineers work alongside architects and builders to ensure that a building or structure is safe and works well in practice.

Your day-to-day duties may include:

- working alongside clients, architects, and other engineering professionals
- use computer software to develop engineering plans
- calculating the amount of weight different areas of a building can hold
- inspect unsafe building, and then deciding whether they should be demolished
- supervising the work of project teams
- giving regular progress reports to clients and senior managers.
- calculating the way to improve energy efficiency

Career Path & Progression:

You could move into construction design, project management, research, and lecturing.

Alternatively, you could consider moving into consultancy work, or providing services to building insurers.

Working Hours and Environment

In general, you will work between 35 to 40 hours a week. These hours will usually be Monday to Friday, 9am - 5pm. Your time will likely be spent either in an office or completing site visits. You could also find yourself working on projects overseas.

In this role, you should be happy to work in a team and to travel for work. As strong attention

Entry Requirements

In general, you'll need to complete a degree or a postgraduate qualification in structural or civil engineering.

You could also enter this career via a vocational route and become a fully qualified structural engineer with further training.

Finally, studying for an accredited qualification in the country you want to work in can help your career prospects.

Skills Required:

You'll need to be confident in the following skills:

- Numeracy
- Practical skills
- Digital literacy
- Technical skills
- Creativity
- Leadership
- The ability to manage a budget

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