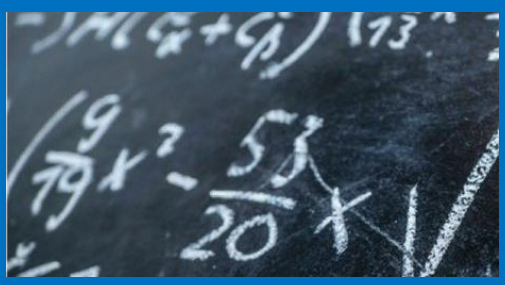
THE DUSTON SCHOOL
Knowledge itself is power
TDS 4-19

Year 9 Higher Maths Knowledge Organiser Term 5

Name:	Class:

Keyword	Definition
Area	A measure of 2D size.
Perimeter	The length around the outside of a 2D shape.
Compound shape	A shape made by combining other shapes.
Equation	An expression which is equal to another expression.
Elimination	In solving equations, elimination refers to removing something from one side of the equation by doing the same operation to both sides.
Unknown	In algebra, an unknown is a letter which represents a value we don't know.
Subject	The subject of an equation is the letter on its own on one side of the equation.
Grid	A set of horizontal and vertical lines.
Term	In sequences, a term is on of the elements in the sequence.
Sequence	A list of elements in a special order.
Linear/arithmetic	A type of sequence where the difference between terms is constant.
Quadratic	A type of sequence where the second difference between terms is constant.

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



Term 5 Overview

Big Questions for the term

Forming and solving equations

- What did we learn in Year 8?
- How do we re-arrange equations?
- How do we solve simultaneous equation?

Sequences, functions and graphs

- What have we learnt so far?
- How can we work out the equation of a straight line?
- What does a quadratic look like?

Area, Perimeter, Volume and Trigonometry

- How do we work out the area of shapes?
- How do we work out the volume of a prism?
- How do we work out parts of a circle?
- How can we apply Pythagoras?
- What is Trigonometry?

Knowledge Retrieval Questions – From Year 7

Unit 7 – Forming and solving equations

None.

Unit 8 – Sequences, functions and graphs

None.

Unit 9 – Area, Perimeter, Volume and Trigonometry

None.

Knowledge Retrieval Questions – From Year 8

Unit 7 – Forming and solving equations

#	Question	Answer
1	How do you solve an equation with an unknown on one side?	Undo each of the parts of the equation, in reverse BIDMAS order.
2	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.
3	What does it mean to "solve an equation"?	Find the value or values of the unknown which make the equation correct.
4	What do you do if you have brackets in your equations?	If you only have one letter, proceed as normal. If you have more than one letter, expand and simplify, then proceed as normal.
5	How do you rearrange an equation so that x is the subject?	Treat it as if you were solving for x, but your answer will be algebraic.
6	What does it mean to "form an equation"?	Write the sentence as an equation, you may need to remember a formula first.

Unit 8 – Sequences, functions and graphs

#	Question	Answer
1	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.
2	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: $x = a$.
3	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.
4	How do you work out the gradient of a line?	Choose 2 points on the line, then divide the change in y by the change in x.
5	What do the letters m and c represent in $y = mx + c$?	m = gradient, c = y-intercept
6	How do you find the equation of a line given two points on it?	Find the gradient. Substitute the gradient and the (x,y) of one of the points into $y = mx + c$ and solve for c.
7	How do you know, given the equations of two lines, if they are parallel?	They have the same gradient.
8	How do you find the midpoint given two points?	The midpoint will have coordinates halfway between the x and y coordinates of the two given points.

Unit 9 – Area, Perimeter, Volume and Trigonometry

#	Question	Answer
1	What is the formula for calculating the area of a circle?	Area $= \pi \times \text{radius}^2$
2	What is the formula for calculating the circumference of a circle?	Circumference $= \pi$ x diameter
3	How do you work out the surface area of a shape?	Work out the area of each face and add them together.
4	What is the relationship between radius and diameter?	Diameter $= 2 \times$ radius
5	What is the formula for the volume of a prism?	Volume = Cross-sectional Area × Length
6	How do you work out the surface area of a prism?	Surface Area = Cross-sectional Area × 2 + Cross-sectional Perimeter × Length
7	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.

Knowledge Retrieval Questions – For Year 9

Unit 7 – Forming and solving equations

#	Question	Answer
1	What is the first step for solving simultaneous equations where one of the equations has one unknown?	Solve the equation with a single unknown.
2	What is the first step for solving simultaneous equations where both have two unknowns, but there is a common term?	If the signs of the common terms is the same, subtract one equation from the other. If the signs are different, add them
3	What is the first step for solving simultaneous equations where both have two unknowns, and one of the terms is a multiple of the other?	Multiply the equation with the smaller term so that it is the same as the other equation, then add or subtract, as appropriate.
4	What is the first step for solving simultaneous equations where both have two unknowns, and neither is a multiple of the other?	Scale both equations to the LCM of one of the unknowns. Then add or subtract, as appropriate.

Unit 8 – Sequences, functions and graphs

#	Question	Answer
1	How do you plot a quadratic graph?	Substitute x values (often -3, -2, -2, 0, 1, 2, 3) into the equation to find y values, then plot those coordinates.
2	How do you know, given the equations of two lines, if they are perpendicular?	The product of their gradients is -1.
3	How do you work out the nth term of a quadratic sequence?	Find the second difference, halve it, this is leading coefficient. Add on the nth term of the difference between the sequence and the quadratic term.

Unit 9 – Area, Perimeter, Volume and Trigonometry

#	Question	Answer
1	What is the formula for calculating the area of a sector?	Area $= \theta/360 \times \pi r^2$
2	What is the formula for calculating arc length?	Arc length $= \theta/360 \times \pi d$
3	What is the formula for $\sin\theta$?	opposite / hypotenuse
4	What is the formula for $\cos\theta$?	adjacent / hypotenuse
5	What is the formula for $\tan\theta$?	opposite / adjacent

Term 5 - Homework 1

#	Type	Question	Answer
1	Knowledge	How do you increase an amount by 40% without a calculator?	
	Application 1	Increase 320 by 40%	
	Application 2	Increase 280 by 40%	
2	Knowledge	How do you simplify the product of two powers with the same base?	
	Application 1	Simplify $11^3 \times 11^4$	
	Application 2	Simplify $19^5 \times 19^3$	
3	Knowledge	How is a negative index related to the same positive index?	
	Application 1	Write 6^{-3} using a positive index	
	Application 2	Write 4^{-7} using a positive index	
4	Knowledge	How do you divide algebraic fractions?	
	Application 1	What is $4(q-1)/r \div 7(q-1)/p$	
	Application 2	What is $2(p-1)/r \div 6(q-1)/q$	
5	Knowledge	How do you share in a ratio if you are given one of the final amounts?	
	Application 1	Carly and Dan share money in the ratio 8:3. Dan gets £210, how much does Carly get?	
	Application 2	Carly and Dan share money in the ratio 7:4. Dan gets £200, how much does Carly get?	

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#	Type	Question	Answer
6	Knowledge	The first part of a number written in standard from should be between which 2 numbers?	
	Application 1	What is the initial number when 45000000000 is written in standard form?	
	Application 2	What is the initial number when 8410000000 is written in standard form?	
7	Knowledge	How do you round to 3 significant figures?	
	Application 1	Round the number 8.66464 to 3 significant figures	
	Application 2	Round the number 5.68656 to 3 significant figures	
8	Knowledge	How do you find the median when you have an even number of pieces of data?	
	Application 1	What is the median of the following data: 10, 11, 16, 17, 10, 10	
	Application 2	What is the median of the following data: 16, 19, 16, 13, 13, 17	
9	Knowledge	How do you estimate a square root?	
	Application 1	Between which two integers is the square root of 95?	
	Application 2	Between which two integers is the square root of 93?	
10	Knowledge	What is the answer to any number raised to the power zero?	
	Application 1	Evaluate 17^0	
	Application 2	Evaluate 13^0	

#	Type	Question	Answer
11	Knowledge	How do you find the range of a set of data?	
	Application 1	What is the range of the following data: 19, 14, 14, 10, 17	
	Application 2	What is the range of the following data: 17, 11, 20, 19, 10	
12	Knowledge	How do you use a calculation to work out the answer to another calculation with the same digits?	
	Application 1	Given that 5450 × 442 = 2408900, what is 545 × 442000	
	Application 2	Given that 5330 × 340 = 1812200, what is 53.3 × 34000	
13	Knowledge	How do you simplify a power raised to another power?	
	Application 1	Simplify $(10^3)^4$	
	Application 2	Simplify $(13^4)^5$	
14	Knowledge	How do you expand single brackets?	
	Application 1	Expand 5(2q - 1)	
	Application 2	Expand 5(3q - 9)	
15	Knowledge	With a calculator, how do you convert a percentage to a decimal?	
	Application 1	Convert 95% into a decimal.	
	Application 2	Convert 27% into a decimal.	

Workings Space

Term 5 - Homework 2

#	Type	Question	Answer
1	Knowledge	With a calculator, how do you increase an amount by a percentage?	
	Application 1	Increase 83 by 5%	
	Application 2	Increase 120 by 29%	
2	Knowledge	How do you round to 3 significant figures?	
	Application 1	Round the number 7.0242 to 3 significant figures	
	Application 2	Round the number 3.77384 to 3 significant figures	
3	Knowledge	How do you multiply numbers in standard form?	
	Application 1	Calculate, giving your answer in standard form, $(6 \times 10^9) \times (2 \times 10^0)$	
	Application 2	Calculate, giving your answer in standard form, $(7 \times 10^0) \times (5 \times 10^0)$	
4	Knowledge	How do you use a calculation to work out the answer to another calculation with the same digits?	
	Application 1	Given that 8810 × 175 = 1541750, what is 88.1 × 175000	
	Application 2	Given that 1710 × 597 = 1020870, what is 17.1 × 59700	
5	Knowledge	With a calculator, how do you convert a percentage to a decimal?	
	Application 1	Convert 33% into a decimal.	
	Application 2	Convert 25% into a decimal.	

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#	Type	Question	Answer
6	Knowledge	How do you simplify the product of two powers with the same base?	
	Application 1	Simplify $11^5 \times 11^4$	
	Application 2	Simplify $20^5 \times 20^4$	
7	Knowledge	How do you simplify surds?	
	Application 1	Simplify √20	
	Application 2	Simplify √175	
8	Knowledge	How do you increase an amount by 40% without a calculator?	
	Application 1	Increase 320 by 40%	
	Application 2	Increase 120 by 40%	
9	Knowledge	What is a scale factor?	
	Application 1	Corresponding sides on two similar shapes are 7cm and 28cm. What is the scale factor?	
	Application 2	Corresponding sides on two similar shapes are 8cm and 28cm. What is the scale factor?	
10	Knowledge	How do you expand single brackets?	
	Application 1	Expand 6(9w - 7)	
	Application 2	Expand 4z(3z + 8)	

#	Type	Question	Answer
11	Knowledge	How do you divide algebraic fractions?	
	Application 1	What is $3(r-1)/r \div 5(p-1)/q$	
	Application 2	What is $2(q-1)/r \div 6(r-1)/r$	
12	Knowledge	How do you add algebraic fractions?	
	Application 1	What is $3r/(r-1) + 5q/(p-1)$?	
	Application 2	What is $2r/(q-1) + 6r/(r-1)$?	
13	Knowledge	How do you expand double brackets?	
	Application 1	Expand $(u + 4)(u + 8)$	
	Application 2	Expand $(s + 5)(s + 4)$	
14	Knowledge	How do you decrease an amount by a percentage?	
	Application 1	Decrease 60 by 15%	
	Application 2	Decrease 110 by 40%	
15	Knowledge	With a calculator, how do you convert a fraction to a percentage?	
	Application 1	Convert 12/25 into a percentage.	
	Application 2	Convert 47/100 into a percentage.	

Workings Space

Term 2 - Homework 3

#	Type	Question	Answer
1	Knowledge	How do you simplify the division of two powers with the same base?	
	Application 1	Simplify $15^4 \div 15^5$	
	Application 2	Simplify $15^6 \div 15^4$	
2	Knowledge	How do you find the range of a set of data?	
	Application 1	What is the range of the following data: 14, 13, 20, 19, 17	
	Application 2	What is the range of the following data: 17, 20, 19, 12, 17	
3	Knowledge	When are brackets used in an expression?	
	Application 1	Write this as an expression: y subtract r all divided by b	
	Application 2	Write this as an expression: x subtract p all divided by c	
4	Knowledge	How do you increase an amount by a percentage?	
	Application 1	Increase 110 by 10%	
	Application 2	Increase 80 by 10%	
5	Knowledge	With a calculator, how do you increase an amount by a percentage?	
	Application 1	Increase 77 by 10%	
	Application 2	Increase 56 by 25%	

#	Type	Question	Answer
6	Knowledge	What is the first step in factorising into single brackets?	
	Application 1	What is the highest common factor of $4x^2$ and $16y^3$?	
	Application 2	What is the highest common factor of $6x^2$ and $18x^3$?	
7	Knowledge	With a calculator, how do you convert a fraction to a percentage?	
	Application 1	Convert 37/50 into a percentage.	
	Application 2	Convert 51/100 into a percentage.	
8	Knowledge	With a calculator, how do you convert a fraction to a decimal?	
	Application 1	Convert 27/50 into a decimal.	
	Application 2	Convert 1/5 into a decimal.	
9	Knowledge	What is a scale factor?	
	Application 1	Corresponding sides on two similar shapes are 10cm and 40cm. What is the scale factor?	
	Application 2	Corresponding sides on two similar shapes are 12cm and 18cm. What is the scale factor?	
10	Knowledge	How do you add algebraic fractions?	
	Application 1	What is $2q/(r-1) + 7p/(q-1)$?	
	Application 2	What is $4q/(q-1) + 3p/(p-1)$?	

Workings Space