

Year 9 Higher Maths

Knowledge Organiser

Term 2

Name:	Class:
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Keyword	Definition
Ratio	Shows the relative sizes of two or more values.
Proportion	The relationship compared to the whole.
Equivalent	Equal to the same amount.
Simplifying	With fractions and ratio, simplifying is finding the equivalent fraction or ratio with the smallest numbers.
Direct Proportion	A relationship between 2 variables, the ratio between them is always constant.
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:	



Term 2 Overview

Big Questions for the term

Ratio and proportion

- What have we learnt so far?
- What is unitary ratio?
- What is inverse proportion?
- What does it mean for shapes to be similar?
- How do we convert Area and Volume metric units?
- What is the relation between Length, Area and Volume Scale Factors for similar shapes?

Fractions, decimals and percentages

- What have we covered so far?
- How can we order Fractions, Decimals and Percentages?
- How can we write recurring decimals?
- How can we work out percentages on a calculator?
- How do we work out percentage change?
- What do we mean by reverse percentages?
- What is compound interest?

Knowledge Retrieval Questions – From Year 7

Unit 2 – Integers, Powers and Roots

#	Question	Answer
1	What does the word product mean?	The result of a multiplication.
2	What sign would the product of 2 negative numbers have?	Positive
3	What sign would the product of a positive and a negative number have?	Negative
4	What sign would the answer to a negative number divided by a positive number have?	Negative
5	What is the definition of a square number?	The product of a number and itself
6	List the first 15 square numbers.	1,4,9,16,25,36,49,64,81,100,121,144,169,196,225
7	What is the definition of a factor?	A number which divides another number exactly.
8	What is the definition of a multiple?	A number in another number's times table.
9	What does HCF stand for?	Highest Common Factor
10	What does LCM stand for?	Lowest Common Multiple
11	What is a cube number?	The product of 3 equal numbers.
12	How do you divide by a fraction?	Multiply by its reciprocal (the fraction flipped over)
13	What is the definition of a prime number?	A number with only 2 factors.

Unit 3 – Ratio and proportion

#	Question	Answer
1	How do you simplify a ratio?	Divide both numbers by a common factor.
2	How do you write a ratio into the form n:1?	Divide both numbers in the ratio by the second number in the ratio.
3	What is the unitary method?	A method where the first step is making the ratio 1:n or n:1
4	How do you calculate best value?	Work out the cost of the same amount for each option and compare those.
5	How do you share an amount in a ratio?	Add the ratio numbers and divide by that to get the value of each part.

Unit 4 – Fractions, decimals and percentages

#	Question	Answer
1	What is a numerator?	Top number in a fraction
2	What is a denominator?	Bottom number in a fraction
3	What operation does a fraction represent?	Division
4	Which operation do we use for the word 'of'?	Multiplication
5	What's the first step when adding or subtracting fractions?	Write the fractions with a common denominator
6	How do you multiply fractions?	Multiply the numerators and multiply the denominators.
7	How do you convert a decimal to a percentage?	Multiply by 100 (%)
8	How do you simplify fractions?	Divide both the numerator and denominator by a common factor.
9	How do you find an equivalent fraction?	Multiply or divide the numerator and denominator by the same number.
10	How do you convert a mixed number to an improper fraction?	Multiply the whole number by the denominator and add it to the numerator

11	How do you find a fraction of an amount?	Divide the amount by the denominator and multiply by the numerator.
12	What does percent mean?	Out of 100
13	How do you convert a fraction to a decimal if the denominator is a factor of 100?	Write the equivalent fraction with a denominator of 100 (then divide by 100)
14	How do you convert a decimal to a fraction?	The numerator is the same digits without the decimal point, the denominator is the place value of the last digit.
15	How do you convert a percentage to a decimal?	Divide by 100 (%)

Knowledge Retrieval Questions – From Year 8

Unit 2 – Integers, Powers and Roots

#	Question	Answer
1	How do you estimate a square root?	Identify the square numbers either side of it
2	How do you simplify the product of two powers with the same base?	Add the indices together
3	How do you simplify the division of two powers with the same base?	Subtract the second index from the first
4	What is the answer to any number raised to the power zero?	1
5	How do you simplify a power raised to another power?	Multiply the indices together
6	How is a negative index related to the same positive index?	The negative index is the reciprocal of the positive one
7	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
8	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
9	The first part of a number written in standard form should be between which 2 numbers?	1 and 10 (smaller than 10...)

Unit 3 – Ratio and proportion

None.

Unit 4 – Fractions, decimals and percentages

#	Question	Answer
1	With a calculator, how do you convert a decimal to a percentage?	Multiply by 100 (%)
2	With a calculator, how do you convert a decimal to a fraction?	Type the decimal in and press =
3	With a calculator, how do you convert a fraction to a percentage?	Multiply by 100 (%) and press S <=> D
4	With a calculator, how do you convert a fraction to a decimal?	Type the fraction in and press =, followed by S <=> D
5	With a calculator, how do you convert a percentage to a decimal?	Type the percentage in and press =, followed by S <=> D
6	With a calculator, how do you convert a percentage to a fraction?	Type the percentage in and press =

Knowledge Retrieval Questions – For Year 9

Unit 2 – Integers, Powers and Roots

#	Question	Answer
1	How do you simplify the product of two powers with the same base?	Keep the base the same and add the indices.
2	How do you simplify the division of two powers with the same base?	Keep the base the same and subtract the second index from the first.
3	How do you multiply numbers in standard form?	Multiply the numbers, add the indices, adjust if necessary
4	How do you divide numbers in standard form?	Divide the numbers, subtract the indices, adjust if necessary
5	What does a fractional power represent?	A root
6	How do you simplify surds?	Separate out any square number factors

Unit 3 – Ratio and proportion

#	Question	Answer
1	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
2	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
3	How do you use exchange rates to convert money?	Scale up the currency you know and apply to the other
4	What is direct proportion?	Describes quantities which have a constant ratio
5	What is indirect proportion?	Describes quantities which have a constant product
6	What is a scale factor?	The ratio between corresponding measurements of similar shapes

Unit 4 – Fractions, decimals and percentages

#	Question	Answer
1	How do you find 30% of an amount without a calculator?	Find 10% by dividing the amount by 10, then multiply by 3.
2	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.
3	How do you increase an amount by a percentage?	Calculate the percentage of the amount, then add it on to the original amount
4	How do you decrease an amount by a percentage?	Calculate the percentage of the amount, then subtract it from the original amount
5	With a calculator, how do you increase an amount by a percentage?	Add the percentage to 100%, then multiply by the amount
6	With a calculator, how do you decrease an amount by a percentage?	Subtract the percentage from 100%, then multiply by the amount
7	How do you work out the value after adding simple interest?	amount + % of amount \times number of years
8	How do you work out percentage change?	$(\text{Change} \div \text{Original}) \times 100$ (%)
9	What does it mean to work out a reverse percentage?	You are given the amount AFTER a percentage has been applied and asked to work out the original amount
10	How do you work out the value after adding compound interest?	amount \times $(100\% + \% \text{ interest})^{\text{number of years}}$

Term 2 - Homework 1

#	Type	Question	Answer
1	Knowledge	How do you multiply numbers in standard form?	
	Application 1	Calculate, giving your answer in standard form, $(8 \times 10^{-2}) \times (2 \times 10^{-9})$	
	Application 2	Calculate, giving your answer in standard form, $(3 \times 10^{-1}) \times (4 \times 10^{-1})$	

2	Knowledge	What does a fractional power represent?	
	Application 1	What does $13^{1/4}$ represent, in words.	
	Application 2	What does $12^{1/3}$ represent, in words.	

3	Knowledge	What is the definition of a multiple?	
	Application 1	Give an example of a multiple of 9	
	Application 2	Give an example of a multiple of 5	

4	Knowledge	The first part of a number written in standard form should be between which 2 numbers?	
	Application 1	What is the initial number when 0.00000442 is written in standard form?	
	Application 2	What is the initial number when 29.3 is written in standard form?	

5	Knowledge	What does LCM stand for?	
	Application 1	What is the LCM of 6 and 9?	
	Application 2	What is the LCM of 10 and 14?	

#	Type	Question	Answer
6	Knowledge	What sign would the product of 2 negative numbers have?	
	Application 1	What is the product of -9 and -3?	
	Application 2	What is the product of -5 and -5?	

7	Knowledge	What is the definition of a prime number?	
	Application 1	Is the number 6 prime?	
	Application 2	Is the number 3 prime?	

8	Knowledge	What sign would the product of a positive and a negative number have?	
	Application 1	What is the product of 5 and -3?	
	Application 2	What is the product of 3 and -3?	

9	Knowledge	What does the word product mean?	
	Application 1	What is the product of 5 and 9?	
	Application 2	What is the product of 6 and 5?	

10	Knowledge	What is the definition of a square number?	
	Application 1	What is the 9th square number?	
	Application 2	What is the 14th square number?	

#	Type	Question	Answer
11	Knowledge	Why do we use BIDMAS?	
	Application 1	Calculate $57 + 2 \times 6$	
	Application 2	Calculate $192 + 6 \times 6$	

12	Knowledge	What is a cube number?	
	Application 1	What is 3 cubed?	
	Application 2	What is 6 cubed?	

13	Knowledge	How do you determine the index when converting large numbers into standard form?	
	Application 1	What is the index when the number 658000 is written in standard form?	
	Application 2	What is the index when the number 7010000 is written in standard form?	

14	Knowledge	What sign would the answer to a negative number divided by a positive number have?	
	Application 1	Calculate -15 divided by 3	
	Application 2	Calculate -21 divided by 7	

15	Knowledge	How do you determine the index when converting small numbers into standard form?	
	Application 1	What is the index when the number 0.0000158 is written in standard form?	
	Application 2	What is the index when the number 0.0000295 is written in standard form?	

Working space

Term 2 - Homework 2

#	Type	Question	Answer
1	Knowledge	What is a scale factor?	
	Application 1	Corresponding sides on two similar shapes are 10cm and 15cm. What is the scale factor?	
	Application 2	Corresponding sides on two similar shapes are 10cm and 25cm. What is the scale factor?	

2	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 10:1. Dan gets £40, how much does Carly get?	
	Application 2	Carly and Dan share money in the ratio 7:4. Dan gets £320, how much does Carly get?	

3	Knowledge	What is direct proportion?	
	Application 1	x and y are in direct proportion. When $x = 10$ $y = 30$. What would x be if $y = 36$?	
	Application 2	x and y are in direct proportion. When $x = 9$ $y = 45$. What would y be if $x = 13$?	

4	Knowledge	What is indirect proportion?	
	Application 1	x and y are in indirect proportion. When $x = 18$ $y = 24$. What would x be if $y = 12$?	
	Application 2	x and y are in indirect proportion. When $x = 30$ $y = 30$. What would x be if $y = 12$?	

5	Knowledge	How do you share an amount in a ratio?	
	Application 1	Share 14 into the ratio 4:3	
	Application 2	Share 20 into the ratio 1:3	

#	Type	Question	Answer
6	Knowledge	How do you write a ratio into the form n:1?	
	Application 1	Write the ratio 1:2 into the form n:1	
	Application 2	Write the ratio 4:10 into the form n:1	

7	Knowledge	How do you use exchange rates to convert money?	
	Application 1	The exchange rate for GBP to USD is 1:1.26. How many Dollars would get for £460?	
	Application 2	The exchange rate for GBP to USD is 1:1.28. How many Dollars would get for £350?	

8	Knowledge	How do you share in a ratio if you are given the difference?	
	Application 1	Anna and Ben share money in the ratio 5:1. Anna gets £240 more than Ben, how much does Anna get?	
	Application 2	Anna and Ben share money in the ratio 7:3. Anna gets £120 more than Ben, how much does Anna get?	

9	Knowledge	What is the unitary method?	
	Application 1	12 pens cost 72p. Work out the cost of 5 pens.	
	Application 2	5 pens cost 35p. Work out the cost of 6 pens.	

10	Knowledge	How do you simplify a ratio?	
	Application 1	Fully simplify 4:18	
	Application 2	Fully simplify 6:42	

Working space

Term 2 - Homework 3

#	Type	Question	Answer
1	Knowledge	How do you increase an amount by a percentage?	
	Application 1	Increase 50 by 15%	
	Application 2	Increase 200 by 35%	

2	Knowledge	How do you work out the value after adding compound interest?	
	Application 1	Calculate the balance if an account with £5400 got 2% compound interest for 3 years.	
	Application 2	Calculate the balance if an account with £5400 got 3% compound interest for 3 years.	

3	Knowledge	How do you increase an amount by 40% without a calculator?	
	Application 1	Increase 400 by 40%	
	Application 2	Increase 120 by 40%	

4	Knowledge	With a calculator, how do you convert a percentage to a decimal?	
	Application 1	Convert 29% into a decimal.	
	Application 2	Convert 60% into a decimal.	

5	Knowledge	With a calculator, how do you increase an amount by a percentage?	
	Application 1	Increase 74 by 17%	
	Application 2	Increase 88 by 3%	

#	Type	Question	Answer
6	Knowledge	With a calculator, how do you decrease an amount by a percentage?	
	Application 1	Decrease 99 by 7%	
	Application 2	Decrease 77 by 8%	

7	Knowledge	How do you decrease an amount by a percentage?	
	Application 1	Decrease 80 by 30%	
	Application 2	Decrease 60 by 10%	

8	Knowledge	How do you find 30% of an amount without a calculator?	
	Application 1	Find 30% of 40	
	Application 2	Find 30% of 50	

9	Knowledge	With a calculator, how do you convert a fraction to a percentage?	
	Application 1	Convert $\frac{31}{50}$ into a percentage.	
	Application 2	Convert $\frac{23}{25}$ into a percentage.	

10	Knowledge	With a calculator, how do you convert a decimal to a fraction?	
	Application 1	Convert 0.85 into a fraction.	
	Application 2	Convert 0.11 into a fraction.	

#	Type	Question	Answer
11	Knowledge	With a calculator, how do you convert a percentage to a fraction?	
	Application 1	Convert 7% into a fraction.	
	Application 2	Convert 14% into a fraction.	

12	Knowledge	How do you work out percentage change?	
	Application 1	Over a year, your bank account goes from £5600 to £10200, calculate the percentage change.	
	Application 2	Over a year, your bank account goes from £6300 to £10200, calculate the percentage change.	

13	Knowledge	With a calculator, how do you convert a fraction to a decimal?	
	Application 1	Convert $\frac{87}{100}$ into a decimal.	
	Application 2	Convert $\frac{73}{100}$ into a decimal.	

14	Knowledge	What does it mean to work out a reverse percentage?	
	Application 1	In a sale where prices are cut by 5% a pair of trainers cost £66.50, work out the original price.	
	Application 2	In a sale where prices are cut by 5% a pair of trainers cost £57.00, work out the original price.	

15	Knowledge	With a calculator, how do you convert a decimal to a percentage?	
	Application 1	Convert 0.291 into a percentage.	
	Application 2	Convert 0.6804 into a percentage.	

Working space