# THE DUST(3N nes <br> <br> Year 9 Higher Maths <br> <br> Year 9 Higher Maths <br> <br> Knowledge Organiser 

 <br> <br> Knowledge Organiser}

## Term 1

## Name:

## Class:

| Keyword | Definition |
| :---: | :---: |
| Integer | A whole number |
| Ascending | Increasing in size, going up |
| Descending | Decreasing in size, going down <br> Decimal <br> A writing numbers which aren't whole. The whole number and <br> the decimal fraction are separated by a decimal point. |
| Fecimal Places | The numbers that come after a decimal point. |
| Multiple | A number which is the result of multiplying an amount by an integer. |
| Prime | A number with only 2 factors. |
| Square (n) | A number formed by multiplying an amount by itself. |
| Cube (n) | A number formed by raising an amount to the power of 3. |


| Homework 1 due: |  |
| :--- | :--- |
| Homework 2 due: |  |
| Homework 3 due: |  |



## Term 1 Overview

## Big Questions for the term

## Calculations and Accuracy

- How do we perform multiplication and division with decimals?
- How do we perform calculations involving negative values?
- How do we represent inequalities?
- How can we represent a number that has been rounded?
- What is the difference between decimals places and significant figures?


## Integers, Powers and Roots

- How can we work out Highest Common Factor and Lowest Common Multiple
- What are the different index laws?
- How do we convert between ordinary and standard form numbers?
- How do we do calculations with standard form numbers
- What is a surd?


## Knowledge Retrieval Questions - From Year 7

## Unit 1 - Calculations and Accuracy

| $\#$ | Question | Answer |
| :---: | :--- | :--- |
| 1 | What does the word sum mean? | The result of addition. |
| 2 | What does consecutive mean? | Following each other continuously. |
| 3 | How do you find the difference between two numbers? | Subtract the smaller number from the larger one. |
| 4 | What should your answer be if the question tells you to <br> calculate? | A number |
| 5 | What should your answer be if the question tells you to <br> evaluate? | A number |
| 6 | How do you divide a number by 10? | Move all the digits 1 place to the right |
| 7 | How do you multiply a number by 10? | Move all the digits 1 place to the left |
| 8 | What is subtracting a negative number equivalent to? | Adding a positive number |
| 9 | What is adding a negative number equivalent to? | Subtracting a positive number |
| 10 | What is a term-to-term rule? | A rule telling you how to get from one term to <br> the next in a sequence |
| 11 | In a sequence, what is meant by a term? | One of the numbers in the sequence |
| 12 | What is the first step when trying to find the next term <br> in a sequence? | Identify the pattern. <br> 13What is a linear sequence? A number pattern which increases or decreases <br> by the same amount each time. <br> 14 How do you work out the value of a digit in a long <br> number? <br> 15 How do you add decimals? <br> 16 How do you subtract decimals?Same method as usual, lining up the decimal <br> points |

## 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 <br> have? | Positive |
| 3 | What sign would the product of a positive and a <br> negative number have? | Negative |
| 4 | What sign would the answer to a negative number <br> 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 <br> over) |
| 13 | What is the definition of a prime number? | A number with only 2 factors. |

## Knowledge Retrieval Questions - From Year 8

## Unit 1 - Calculations and Accuracy

| $\#$ | Question | Answer |
| :---: | :--- | :--- |
| 1 | How do you find the median when you have an odd <br> number of pieces of data? | Put the numbers in order and select the middle <br> number |
| 2 | How do you find the median when you have an even <br> number of pieces of data? | Put the numbers in order and find the mean of <br> the two middle numbers |
| 3 | How do you find the range of a set of data? | Largest number - Smallest number |
| 4 | How do you divide by a decimal? | Multiply both numbers by 10 repeatedly until <br> you are dividing by a whole number |
| 5 | How do you use a calculation to work out the answer to <br> another calculation with the same digits? | Compare each number to the original number, <br> multiply or divide by powers of 10, as <br> appropriate |
| 6 | What are decimal places? | Digits to the right of a decimal point |
| 7 | How do you round to 2 decimal places? | Look at the 3rd decimal place, if less than 5- <br> round down, if 5 or more - round up |

## 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 <br> the same base? | Add the indices together |
| 3 | How do you simplify the division of two powers with <br> the same base? | Subtract the second index from the first |
| 4 | What is the answer to any number raised to the power <br> 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 <br> index? | The negative index is the reciprocal of the <br> positive one |
| 7 | How do you determine the index when converting large <br> numbers into standard form? | It is the number of digits after the first non-zero <br> digit |
| 8 | How do you determine the index when converting small <br> numbers into standard form? | It is the number of digits before the first non-zero <br> digit |
| 9 | The first part of a number written in standard from <br> should be between which 2 numbers? | 1 and 10 (smaller than 10...) |

## Knowledge Retrieval Questions - From Year 9

## Unit 1 - Calculations and Accuracy

| $\#$ | Question | Answer |
| :---: | :--- | :--- |
| 1 | What is a significant figure? | Any digit after the first non-zero digit |
| 2 | How do you round to 3 significant figures? | Look at the 4th significant figure, if less than 5 - <br> round down, if 5 or more - round up |
| 3 | How do you estimate the answer to a calculation? | Round the numbers to 1 significant figure and <br> calculate |
| 4 | What is the difference between an empty circle and a <br> filled in circle on a number line inequality? | The filled in circle includes "or equal to" whereas <br> the empty one does not |

Unit 2 - Integers, Powers and Roots

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

## Term 1 Homework 1 - Calculations and Accuracy Years 7 and 8

| \# | Type | Question | Answer |
| :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | Knowledge | How do you round to 2 decimal places? |  |
|  | Application 1 | Round the number 16.7844 to 2 decimal <br> places |  |
|  | Application 2 | Round the number 37.6495 to 2 decimal <br> places |  |


| $\mathbf{2}$ | Knowledge | How do you find the median when you <br> have an odd number of pieces of data? |  |
| :--- | ---: | ---: | :--- |
|  | Application 1 | What is the median of the following data: <br> $17,17,11,14,14$ |  |
|  | What is the median of the following data: <br> $20,13,19,10,17$ |  |  |


| 3 | Knowledge | How do you work out the value of a digit <br> in a long number? |  |
| :--- | ---: | ---: | :--- |
|  | Application 1 | What is the value of the 3 in the number <br> $42367 ?$ |  |
|  | Application 2 | What is the value of the 5 in the number <br> $85496 ?$ |  |


| $\mathbf{4}$ | Knowledge | How do you multiply a number by 10? |  |
| :--- | :---: | :---: | :--- |
|  | Application 1 | Evaluate 74 multiplied by 10. |  |
|  | Application 2 | Evaluate 167 multiplied by 10. |  |


| $\mathbf{5}$ | Knowledge | What is a linear sequence? |  |
| :---: | :---: | :---: | :--- |
|  | Application 1 | Is the following sequence linear? |  |
|  | Application 2 | Is the following sequence linear? |  |


| \# | Type | Question | Answer |
| :--- | :---: | :---: | :---: |
| $\mathbf{6}$ | Knowledge | What does consecutive mean? |  |
|  | Application 1 | Select 2 of these numbers which are <br> consecutive: $8,13,9,16$. |  |
|  | Application 2 | Select 2 of these numbers which are <br> consecutive: $12,17,14,16$. |  |


| $\mathbf{7}$ | Knowledge | What does the word sum mean? |  |
| :--- | :---: | :---: | :--- |
|  | Application 1 | What is the sum of 8 and $5 ?$ |  |
|  | What is the sum of 12 and $12 ?$ |  |  |


| $\mathbf{8}$ | Knowledge | $\begin{array}{c}\text { How do you find the difference between } \\ \text { two numbers? }\end{array}$ |  |
| :--- | :---: | :---: | :--- |
|  | Application 1 | What is the difference between |  |
|  | 45 and 74? |  |  |$]$


| 9 | Knowledge | How do you find the median when you <br> have an even number of pieces of data? |  |
| :---: | :---: | :---: | :---: |
|  | Application 1 | What is the median of the following data: <br> $14,19,16,14,17,20$ |  |
|  | Application 2 | What is the median of the following data: <br> $13,18,18,20,15,11$ |  |


| $\mathbf{1 0}$ | Knowledge | What is subtracting a negative number <br> equivalent to? |  |
| :--- | :---: | :---: | :---: |
|  | Application 1 | Calculate $8-(-1)$ |  |
|  | Calculate $12-(-17)$ |  |  |


| \# | Type | Question | Answer |
| :---: | :---: | :---: | :---: |
| $\mathbf{1 1}$ | Knowledge | How do you find the range of a set of <br> data? |  |
|  | Application 1 | What is the range of the following data: <br> $17,17,11,14,14$ |  |
|  | Application 2 | What is the range of the following data: <br> $20,13,19,10,17$ |  |


| $\mathbf{1 2}$ | Knowledge | How do you use a calculation to work out <br> the answer to another calculation with <br> the same digits? |  |
| :---: | :---: | :---: | :--- |
|  | Application 1 | Given that $3230 \times 152=490960$, what is <br> $32.3 \times 152000$ |  |
|  | Application 2 | Given that $9730 \times 859=8358070$, what is <br> $97.3 \times 8590$ |  |


| $\mathbf{1 3}$ | Knowledge | What should your answer be if the <br> question tells you to calculate? |  |
| :---: | :---: | :---: | :--- |
|  | Application 1 | Calculate 5 multiplied by 7 |  |
|  | Calculate 17 multiplied by 2 |  |  |


| $\mathbf{1 4}$ | Knowledge | What is a term-to-term rule? |  |
| :---: | :---: | :---: | :--- |
|  | Application 1 | What is the term-to-term rule in the <br> following sequence $8,13,18,23,28 ?$ |  |
|  | What is the term-to-term rule in the <br> following sequence $12,24,36,48,60 ?$ |  |  |


| $\mathbf{1 5}$ | Knowledge | What is the first step when trying to find <br> the next term in a sequence? |  |
| :---: | :---: | :---: | :--- |
|  | Application 1 | What is the next term in the following <br> sequence $8,13,18,23,28 ?$ |  |
|  | What is the next term in the following <br> sequence $12,24,36,48,60 ?$ |  |  |

Workings Space

## Term 1 Homework 2 - Calculations and Accuracy Years 8 and 9

| \# | Type | Question | Answer |
| :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | Knowledge | Application 1 | How many is a significant figure? <br> number 3.06593 have? |
|  | Application 2 | How many significant figures does the <br> number 0.00483 have? |  |
|  |  |  |  |


| $\mathbf{2}$ | Knowledge | How do you use a calculation to work out <br> the answer to another calculation with <br> the same digits? |  |
| :---: | :---: | :---: | :--- |
|  | Application 1 | Given that $9750 \times 874=8521500$, <br> what is $97.5 \times 87.4$ |  |
|  | Application 2 | Given that $1790 \times 342=612180$, <br> what is $1.79 \times 34200$ |  |


| 3 | Knowledge | How do you divide by a decimal? |  |
| :--- | :---: | :---: | :--- |
|  | Application 1 | Calculate 0.168 divided by 0.008 |  |
|  | Application 2 | Calculate 0.0224 divided by 0.0008 |  |


| 4 | Knowledge | How do you find the range of a set of <br> data? |  |
| :---: | :---: | :---: | :--- |
|  | Application 1 | What is the range of the following data: <br> $16,18,20,20,16$ |  |
|  | Application 2 | What is the range of the following data: <br> $19,20,18,17,16$ |  |


| $\mathbf{5}$ | Knowledge | What is the difference between an empty <br> circle and a filled in circle on a number <br> line inequality? |  |
| :--- | :---: | :---: | :--- |
|  | Application 1 | Draw a number line to represent the <br> inequality $x \leq 1$ |  |
|  | Application 2 | Draw a number line to represent the <br> inequality $x<0$ |  |


| \# | Type | Question | Answer |
| :--- | :---: | :---: | :---: |
| 6 | Knowledge | How do you estimate the answer to a <br> calculation? |  |
|  | Application 1 | Estimate the answer to $291 \times 18840$ |  |
|  | Application 2 | Estimate the answer to $618 \times 1618$ |  |


| $\mathbf{7}$ | Knowledge | What are decimal places? |  |
| :--- | :---: | :---: | :--- |
|  | Application 1 | How many decimal places does the <br> number 0.0926 have? |  |
|  | Application 2 | How many decimal places does the <br> number 0.0713 have? |  |


| $\mathbf{8}$ | Knowledge | How do you find the median when you <br> have an even number of pieces of data? |  |
| :--- | ---: | ---: | :--- |
|  | Application 1 | What is the median of the following data: <br> $15,14,14,16,17,12$ |  |
|  | Application 2 | What is the median of the following data: <br> $13,19,13,19,16,18$ |  |


| 9 | Knowledge | How do you find the median when you <br> have an odd number of pieces of data? |  |
| :---: | ---: | ---: | :--- |
|  | Application 1 | What is the median of the following data: <br> $16,18,20,20,16$ |  |
|  | Application 2 | What is the median of the following data: <br> $19,20,18,17,16$ |  |


| $\mathbf{1 0}$ | Knowledge | How do you round to 3 significant figures? |  |
| :---: | :---: | :---: | :--- |
|  | Application 1 | Round the number 1.71544 to <br> 3 significant figures |  |
|  | Application 2 | Round the number 5.44229 to <br> 3 significant figures |  |

Workings Space

Term 1 Homework 3 - Integers, Powers and Roots Years 7 and 8

| \# | Type | Question | Answer |
| :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | Application <br> 1 | Between which two integers is <br> the square root of 137? | How do you estimate a square <br> root? |
|  | Application <br> 2 | Between which two integers is <br> the square root of 62? |  |


|  | Knowledge | What is the definition of a prime <br> number? |  |
| :---: | :---: | :---: | :---: |
| $\mathbf{2}$ | Application <br> 1 | Is the number 7 prime? |  |
|  | Application <br> 2 | Is the number 13 prime? |  |


|  | Knowledge | The first part of a number <br> written in standard from should <br> be between which 2 numbers? |  |
| :---: | :---: | :---: | :--- |
| 3 | Application <br> 1 | What is the initial number when <br> 0.00000836 is written in <br> standard form? |  |
| Application |  |  |  |
| 2 |  |  |  | | What is the initial number when |
| :---: |
| 30.5 is written in standard form? |


|  | Knowledge | List the first 15 square numbers. |  |
| :---: | :---: | :---: | :--- |
| 4 | Application <br> 1 | What is the 4th square number? |  |
| Application <br> 2 | What is the 16th square <br> number? |  |  |


| $\mathbf{5}$ | Knowledge <br> Application <br> 1 | What sign would the product of <br> 2 negative numbers have? |  |
| :---: | :---: | :---: | :--- |
|  | What is the product of -8 and $-6 ?$ |  |  |
|  | What is the product of <br> -18 and $-10 ?$ |  |  |


| \# | Type | Question | Answer |
| :---: | :---: | :---: | :--- |
| 6 | Knowledge | What sign would the product of <br> apositive and a negative number <br> have? |  |
|  | What is the product of <br> 10 and -6? |  |  |
|  | Application <br> 2 | What is the product of <br> 11 and -6? |  |


|  | Knowledge | How do you determine the index <br> when converting large numbers <br> into standard form? |  |
| :---: | :---: | :---: | :--- |
| 7 | Application <br> 1 | What is the index when the <br> number 98800000 is written in <br> standard form? |  |
| Application <br> 2 | What is the index when the <br> number 377000 is written in <br> standard form? |  |  |


| $\mathbf{8}$ | Knowledge | What is the answer to any <br> number raised to the power <br> zero? |  |
| :---: | :---: | :---: | :--- |
|  | Application <br> 1 | Evaluate $17^{\circ}$ |  |
|  | Application <br> 2 | Evaluate $13^{\circ}$ |  |


| 9 | Knowledge | How do you simplify the division <br> of two powers with the same <br> base? |  |
| :---: | :---: | :---: | :--- |
|  | Application <br> 1 | Simplify $13^{5} \times 13^{3}$ |  |
|  | Application <br> 2 | Simplify $18^{4} \times 18^{3}$ |  |


|  | Knowledge | What sign would the answer to a <br> negative number divided by a <br> positive number have? |  |
| :---: | :---: | :---: | :--- |
| $\mathbf{1 0}$ | Application <br> 1 | Calculate -60 divided by 6 |  |
|  | Application <br> 2 | Calculate -209 divided by 19 |  |


| $\#$ | Type | Question | Answer |
| :---: | :---: | :---: | :--- |
|  | Knowledge | What does the word product <br> mean? |  |
| $\mathbf{1 1}$ | Application <br> 1 | What is the product of 10 and 8? |  |
|  | Application <br> 2 | What is the product of 7 and 18? |  |


|  | Knowledge | What does HCF stand for? |  |
| :---: | :---: | :---: | :--- |
| $\mathbf{1 2}$ | Application <br> 1 | What is the HCF of 10 and $11 ?$ |  |
|  | Application <br> 2 | What is the HCF of 66 and $60 ?$ |  |


|  | Knowledge | How do you simplify the product <br> of two powers with the same <br> base? |  |
| :---: | :---: | :---: | :--- |
|  | Application <br> 1 | Simplify $15^{3} \times 15^{3}$ |  |
|  | Application <br> 2 | Simplify $14^{3} \times 14^{4}$ |  |


|  | Knowledge | What is a cube number? |  |
| :---: | :---: | :---: | :--- |
| 14 | Application <br> 1 | What is 2 cubed? |  |
|  | Application <br> 2 | What is 9 cubed? |  |


|  | Knowledge | What is the definition of a <br> multiple? |  |
| :---: | :---: | :---: | :--- |
| 15 | Application <br> 1 | Give an example of a multiple of <br> 8 |  |
| Application <br> 2 | Give an example of a multiple of <br> 18 |  |  |

Workings Space

