

#### Year 10 Maths Intermediate Knowledge Booklet Term 2

#### Name:

Class:

Order	Unit	Links	Pre-requisite skills
1	Integers, powers & roots		
2	Lines, angles & shape		
3	Simplifying & substituting	Unit 1	Using powers, listing factors, understanding product / sum.
4	Area and perimeter	Unit 2	Forming expressions for area/perimeter algebraically through use of brackets, correct notation and simplifying expressions.
5	Calculations & Accuracy	Unit 1	Understanding numbers.
6	FDP	Unit 1	Using powers, understanding lowest common multiples.
7	Sequences, functions and graphs	Unit 3/5	Substituting into a function applying BIDMAS to calculate coordinates, factorising for roots of quadratics, understanding powers and all 4 operations with negatives.
8	Ratio & Proportion	Unit 1/7	Decimals/powers as multipliers, calculating/understanding fractions as parts.
9	Transformations	Unit 2/8	Identifying 90/180/270 degrees, plotting mirror lines of basic functions.
10	Pythagoras and Trigonometry	Unit 1/2/3/4/5	Powers/surds, types of triangles, use in area/perimeter problems to find required lengths, rounding answers.
11	Forming and solving	Unit 3/4	Properties of 2d shapes, angle facts including polygons & parallel lines, algebraic notation and simplifying, forming expressions.
12	Measures	Unit 1/7	Calculating, multiplying decimals and powers of 10 for metric conversions.
13	Volume and Surface area	Unit 4/5/13	Area of 2d shapes, rounding/calculating with bounds, conversion of units (length/area/volume), calculating missing sides using pythagoras/ trigonometry.
14	Probability	Unit 1/7	Types of numbers, calculating with fractions & decimals.
15	Inequalities	Unit 12/8/5/7	Solving equations, rounding, plotting graphs for regions, calculating with fractions.
16	Statistics	Unit 1/6/9/16	Using a protractor for pie charts, proportion to calculate angles for a pie chart, use of inequality symbols for recording data.

Homework 1 Due	
Homework 2 Due	
Homework 3 Due	



Overview	Learning Objective		
Topic: Area and Perimeter	- Solve problems involving area	- Calculate the	
Big Questions	and perimeter.	length of an arc	
- Show me a sector with a bigger area than a circle.		sector.	
- A square has an area of 100m, what is the perimeter of this square?			
- A farmer has 1000m of fencing. What is the largest area he can enclose with			
Topic: Calculations and	Introduction to upper and lower		
Accuracy	bounds.		
Big Questions	- Use inequality notation to		
- What's the difference between bounds and rounding?	rounding.		
- Show me an example of a division calculation using decimals that ap- proximates to 60			
- what do you understand from the terms: over estimate and underesti-			
Topic: Fractions, decimals and per-	- Convert between im-	-Calculate with	- Calculate
<u>centages</u>	proper & mixed fractions.	mixed numbers.	compound
	- Multiply and divide frac-	- Compare frac-	preciation
<u>Big Questions</u>	nons.	percentages.	-Calculate
- The original price of a top was re-	mals.	-Express one quanti-	percentage
plain why the original price was not	- Find a fraction of an amount.	ty of another as a	change.
£48.	- Express one quantity of anoth-	percentage. (Non-	-Work out re-
- What is the difference between sim- ple and compound interest?	er as a percentage. (With Cal- culator).	- Find percentage	centage problems.
-Dividing by a decimal gives you a smaller answer—true/smaller/never.	-Find a percentage of an amount (Non – calculator).	-Find a percentage	
	-Increase/decrease an amount	multipliers (Calc)	
	by a given percent. (Non- calc)	- Increase/ decrease a quanti-	
	- Compare & order frac- tions.	ty by a given per- centage using	
	-Add & subtract fractions.	multipliers. (Calc)	
		-Calculate simple	



**DUSTON** 

Knowledge Recall

Term 2 HW: 1

SCHOOL	Date Due		Score to beat	
Section A.Number		Section B: Algebra	Section C: Using and	l applying
<ol> <li>To increase an amount by 4.6%, what single multiplier would you use?</li> </ol>		<ol> <li>Expand &amp; simplify: 5(x - 3) - 2(2x + 1)</li> </ol>	21. 5	p
2. Increase £340 by 12%		12. Factorise: 4ay – 2y	To find 'd' choose one $\sqrt{5^2 + 5^2}$ OR $\sqrt{5^2 - 5^2}$	5m calculation:
3. Divide 56 in the ratio of 3:1		13. Simplify: 6y <sup>a</sup> ÷ 3y <sup>4</sup>	22. 10.2cm is rounded to o	one decimal place.
<ol> <li>Carlo and Danielle share money in the ratio 2:5. Carlo gets £24 less than Carlo, how much money do they share?</li> </ol>		14. Give the inequality	Write down the maxim length it could have be	num possible en.
5. Work out : $\frac{5}{8} \times \frac{2}{3}$		<ol> <li>Make c the subject of the formula:</li> <li>A= cd</li> </ol>	23. Sam ran at 6km/h for 2 What distance did he r	2h 20min. un?
6. Work out: $\frac{5}{8} \div \frac{2}{3}$		16. Work out the value of: 5x - 2y When x = -2 and y = -3		
<ol> <li>Round off 0.521 to one significant figure</li> </ol>		<ol> <li>Write down the nth term of this sequence: 3 8 13 18</li> </ol>	24. 500 tickets are sold for The probability that Bil	a prize draw. Il wins first prize
8. Estimate the answer to: 3772 ÷ 44		18. Write down the $3^{rd}$ term in the sequence given by: $T(n) = n^2 + n$	is $\frac{1}{20}$ . How many ticke	ets did he buy?
9. Write down the first 3 multiples of 20		19. If $y = x^2 + 2x$ , find the value of y when $x = -2$	25. <u>Use π on the calcul</u> Work out the volume c (Correct to 1 decimal place)	<u>iotor</u> of this cylinder?
10. Write down the LCM of 20 and 15		20. Write down the equation of a graph with a gradient of 3 and y-intercept of -6	, i i i i i i i i i i i i i i i i i i i	E
Total (A)		Total (B)	Total (	(C)
Test Total (A+B+C)		R (0-9)	Υ (10-19)	G (20-25)

20
200
EQ
-0,
in
HO

DIRECTED NUMBER RULES

CALCULATIONS AND ACCURACY KNOWLEDGE ORGANISER

# JPPER AND LOWER BOUNDS

- The lower bound is the smallest number that rounds up to the given number. The upper bound is the largest number that rounds down to the given number Any recorded measurement has almost certainly been rounded. The true value will be somewhere between the lower bound and the upper bound
  - - Students should use 'half a unit above' and 'half a unit below' to find upper and lower bounds
      - For discrete data: data that can only take certain values within a given range

+

+ .1. +

+ 11 + × +

+ 11 + +

...

1 - [-

+

11

I

×

I

...

1

- e.g. a coach is carrying 50 people, to the nearest 10. The lower bound is 45, and the upper bound is 54
  - For continuous data: data that can take any value within a given range
- E.g. The length of a stick of wood is 32 cm, measured to the nearest centimetre. The lower bound is 31.5 cm, and the upper bound is 32.5 cm Due to a mathematical peculiarity the upper bound is 32.5 cm rather than 32.49 cm
  - The lower and upper bounds are sometimes known as the limits of accuracy and the range between them is the error interval
    - E.g. The error interval for the 32 cm stick is as follows; 31.5 cm  $\leq$  length of stick < 32.5 cm
      - Note the use of the strict inequality (<) for the upper bound</li>

•

+

I

I

11

+ •••

I

11

+ ×

11

+

- The following table shows the combinations to give minimum and maximum values for all four operations of two numbers, a and b: - a and b lie within limits  $a_{min} \leq a < a_{max}$  and  $b_{min} \leq b < b_{max}$
- $a_{max} + b_{max}$  $a_{max} - b_{min}$  $a_{max} \times b_{max}$  $a_{max} \div b_{min}$ Maximum  $a_{min} + b_{min}$  $a_{min} - b_{max}$  $a_{min} \div b_{max}$  $a_{min} \times b_{min}$ Minimum Multiplication  $(a \times b)$ Subtraction (a - b)Addition (a + b)Division  $(a \div b)$ Operation

Remember to kept the place value of each number by insert zeros where

Rounding to.

10, 100 & 10<u>00</u>

applicable.

4 + below = the number being rounded stays the same.

**5** + above the number being rounded increases by 1.

HALFWAY VALUES-THE DECISION

Look at the number which represents the place value, look to the right, if this

If the number is 4 or less the number stays the same. E.g. Round **17 839** to the nearest 10, 100 & 1000 (i) Nearest 10 – 17 840

digit is 5 or more the number rounds up by 1.

#### Estimating

When estimating you are **not guessing** you are making the numbers 'easier' for you to work out the sum. To estimate a sum, you need to

- Round each number to 1s.f.
   Then calculate the sum using BIDMAS

# If the decider is 4 or less then leave the digit as it is.

Then look to the right of this digit, this is called the decider, this number now

decides whether the decimal place is rounded up or kept the same.

If the decider is 5 or more then round the digit up.

ω. 4.

Identify the position of the decimal place to be rounded to, e.g. 2d.p. would

be the 2<sup>nd</sup> digit after the decimal place

(iii) Nearest 1000 – 18 000 (ii) Nearest 100 – 17 800

Decimal places (d.p.)

÷

Ч.

Example 1:

Estimate –

## Significant figures (s.f.)

- 1. The first significant number is the first digit of a number which isn't zero.
  - The  $2^{nd}$ , digits follow immediately after the  $1^{st}$  , regardless of zeros. 0.002309 2.03070

SIG. FIGS: 1st 2nd 3rd 4th 1st 2nd 3rd 4th (If were rounding to say, 3 sf, then the LAST DIGIT is simply the 3rd sig. fig.)

÷

When rounding numbers the place value of each digit must be the same.

### Estimate 23.43 ×4.3 0.483 $29.91 \times 38.3$ $3.1 \times 3.9$

Example 2:

- Round to 1s.f.
  - = 1001200 12 II

Round to 1s.f.

 $20 \times 4$ 0.5

 $=\frac{80}{0.5}=160$ 

- $30 \times 40$ 3 ×4

**DUST** SOHOOL

Knowledge Recall

Term 2 HW: 2

SCHOOL	Date Due	Score to beat
Section A:Number	Section B: Algebra	Section C: Using and applying
C.1	C.6	21.
1. To increase an amount by 5.4%, what	11. Expand & simplify:	am d
single multiplier would you use?	3(x - y) - 4(x + 2y)	
C1	C.6	, 10m
2. Decrease £280 by 73%	12. Factorise 7b <sup>2</sup> + 14b	To find 'd' choose one calculation: V5 <sup>2</sup> + 3 <sup>2</sup> OR V10 <sup>2</sup> - 3 <sup>2</sup> OR V5 <sup>2</sup> - 3 <sup>2</sup>
C.2	C.7	22.
3. Divide £48 in ratio of 5: 3	13. Simplify $\frac{7^2 \times 7^3}{7}$	40 is rounded to the nearest whole. Write down the minimum possible
C.2	C.8	length it could have been.
4. Share 450 in the ratio of 4:5	14. Solve: 2x -1>3	
C.3	C9	23.
5. Work out: $2\frac{2}{5} \cdot \frac{5}{5}$	15. Make c the subject of the formula:	It took 5hours to drive from Durham to
3 6	A= C + 0	Birmingham.
C.3	C.9	The average speed was 48mph.
f 1 2 5	<ol><li>Work out the value of: xy + 5</li></ol>	What is the distance from Durham to
b. Work out: $\underline{x} = \frac{x}{3} 6$	When $x = 2$ and $y = -3$	Birmingham?
C.4	C.10	24.
<ol><li>Round off 0.267 to one significant</li></ol>	17. Write down the nth term of this	The relative frequency of a drawing pin
figure	sequence: 5 11 17 23	falling pin up was 3%. How many times
C.4	C.10	would vou event it to fall air un in 120
8. Estimate the answer to:	18. Write down the 5 <sup>th</sup> term in the	drops?
3987÷213	sequence given by: $T(n) = n^2 + 2n$	
C.5	C.11	25. Use $\pi$ on the calculator
<ol><li>Write down the first 3 multiples of 9</li></ol>	19. If $y = x^2 - x$ ,	Work out the volume of this cylinder?
	find the value of y when x = -4	(Correct to 1 decimal place)
C.5	C11	L I I I I I I I I I I I I I
10. Write down the LCM of 9 and 12	<ol> <li>A graph has the equation y = 5x + 7</li> </ol>	Scm
	What is its gradient and y-intercept	•
Total (A)	Total (B)	Total (C)
Test Total (A+B+C)	R (0-9)	(10-19) G (20-25)

Key terms	13	r 2
Fraction – written in the form $\frac{a}{2}$ , means	4 54	
"a divided by b".	The remainder	is 2 out of 4
Numerator - the top number of a fraction,	<sup>2</sup> /, can be written	as 1/2 or 0.5
represent the number of parts being studied		
Denominator – the bottom number of a	$54 \div 4 = 13$ <sup>1</sup>	a or 13.5
fraction, represents the number of parts to	Vou cale acc nov	the buc ston
make one whole		
Equivalent – worth the same amount as	method of divisio	n to find answers
Simplify – reducing a fraction to the equivalent	as decimals. This	represents the
with the lowest possible numerator and	fraction	(
denominator		
Decimal – a number that is not an integer	Example: What is 7.368 – 1.15 ?	X
Percentage – written as a number out of 100	Line the decimals up: 7.368	>
COMPAPING & OPDERING	- 1 <mark>.</mark> 15	) ~
DECIMALS	"Pad" with zeros: 1.452	7
STEP 1: Stack the numbers STEP 2: Add zanos so that	+ 1.3 00	of this circle is shaded.
being compared Line up each number has the same the deamal points. number of deamal digits.	Add: 1.452	
4.8 H.800	+ 1.300	To convert decimals to
Ч.826 Ч.826 ч.ог	2.752	percentages, multiply by 100.
4.006 H.006	Example: Add 1.452 to 1.3	
STEP 3: Compare each place STEP 4: Order the numbers value one by one. If a from least to greatest or	Line the decimals up: 1.452	For example, 0.36 = 36%
trumber is the some, move greatest to least. Here, to the next place. They are ordered from 1 1 1 1	+ 1 <mark>.</mark> 3	0.5 = 50%
H. 8 0 0 4.006.4.080.4.800.4.826	"Pad" with zeros: 1.452	
1.020 Remove the zeros you Previously determined to a contract of the previously determined to the prev	+ 1.3 <mark>00</mark>	Do the inverse (divide) to convert
4.006 4.006 4.008, 4.8, 4.826	Add: 1.452	percentages to decimals
	+ 1.300 2.752	
	<b>(ey terms</b> <b>raction</b> – written in the form $\frac{a}{b}$ , means a divided by b". <b>Jumerator</b> - the top number of parts being studied <b>Denominator</b> - the bottom number of parts to <b>nake one whole</b> <b>raction, represents the number of parts to</b> <b>nake one whole</b> <b>quivalent</b> – worth the same amount as <b>quivalent</b> – worth the lowest possible numerator and <b>denominator</b> <b>becimal</b> – a number that is not an integer <b>here a mount as a number out of 100</b> <b>COMPAPING</b> & OPDERING <b>DOMPAPING</b> & OPDERING <b>COMPAPING</b> & OPDERING <b>COMPAPING</b> & OPDERING <b>The same amount as a number out of 100</b> <b>STB</b> 3. Compare the number <b>the active to a number of accenter of ac</b>	Experms       13         Experms       13         raction - written in the form $\frac{\pi}{p}$ , means       a divided by b".       The remainder         Immerator - the bottom number of a raction, represent the number of parts being studied by b".       The remainder       13         ensertion - written for moment of a raction, represent the number of parts being studied by b".       The remainder       13         action, represent the number of parts being studied by b".       The remainder       13       14         ensertion, represents the number of parts to a number of a raction to the equivalent worth the same amount as a raction, represent state number out of 100 twith the lowest possible numerator and enominator the lowest possible numerator and the number with denominator the equivalent worth the same amount as a number out of 100 twith the decimals up: 7,368 - 1.15 fraction         COMPARING & ORDERING       Example: What is 7.368 - 1.15 fraction         Ectimals = a number out of 100 tender down agains       This fraction         Commander of the decimals up: 1,452 to 1.3 tender with zeros: 1,452 to 1.3 tender to the decimals up: 1,452 to 1.3 tender to the deci

<b>DUST</b> <b>ON</b>	Knowledge Recall	Term 2 HW: 3
SCHOOL	Date Due	Score to beat
Section A.Number	Section B: Algebra Geometry & measures	Section C: Using and applying
<ol> <li>To increase an amount by 7%, what single multiplier would you use?</li> </ol>	11. Expand & simplify: 3(x+2) -2(x -1)	21. 3m
2. Share 80 in ratio 5 : 3	12. Solve: x + 1 < 5	Find 'a'
3. Work out: $2\frac{1}{2} \times 1\frac{3}{5}$	<ol> <li>Make n the subject of the formula:</li> <li>M=3n</li> </ol>	22. Work out the volume of this prism?
<ol> <li>Estimate the answer to: 0.17 x 193</li> </ol>	<ol> <li>Write down the nth term of this sequence: 1 4 9 16</li> </ol>	12m² 6m
5. Give the LCM of 12 and 9	15. If $y = 3x^2 + 4$ , find the value of y when $x = 2$	23.A plane flies 1440miles at a speed of 240mph. How long does it take?
6. Write 0. 29 as a fraction	16. Factorise: x <sup>2</sup> + 5x + 4	
<ol> <li>Work out the balance for £4500 invested for 2 years at 4% per annum</li> </ol>	17. Multiply & simplify: $(3x - 2)^2$	24. On a spinner: P(3) = $\frac{1}{24}$ and the p(4) = $\frac{1}{24}$ What is the probability of getting 3 or 4
<ul> <li>8. In a '20% off' sale, a coat was £220.</li> <li>Work out the original price.</li> </ul>	18. Make r the subject of the formula: $A = \pi r^2$	
9. Write 84000 in standard form:	u = -1 19. $S = u^2 + v^2$ Find S when, $v = -2$ 2a $a = 2$	25.What inequality is represented here?
10. Work out $(4x10^4) \times (2 \times 10^3)$ Give your answer in standard form	20. If tanx = <u>3</u> , find x (3sf)	
Total (A)	Total (B)	Total (C)
Test Total (A+B+C)	R (0-9)	Y (10-19) G (20-25)