

## Year 10 Maths Intermediate Knowledge Booklet Term 5

#### 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. Forming expressions for area/perimeter algebraically through Area and perimeter Unit 2 4 use of brackets, correct notation and simplifying expressions. Unit 1 5 Calculations & Accuracy Understanding numbers. 6 Construction and LOCI Unit 2 Measuring angles for bearings, parallel line angle facts. 7 FDP Unit 1 Using powers, understanding lowest common multiples. Substituting into a function applying BIDMAS to calculate Sequences, functions and 8 Unit 3/5 coordinates, factorising for roots of guadratics, understanding graphs powers and all 4 operations with negatives. Decimals/powers as multipliers, calculating/understanding 9 Ratio & Proportion Unit 1/7 fractions as parts. Identifying 90/180/270 degrees, plotting mirror lines of basic 10 Transformations Unit 2/8 functions. Pythagoras and Powers/surds, types of triangles, use in area/perimeter problems 11 Unit 1/2/3/4/5 Trigonometry to find required lengths, rounding answers. Properties of 2d shapes, angle facts including polygons & parallel 12 Forming and solving Unit 3/4 lines, algebraic notation and simplifying, forming expressions. Calculating, multiplying decimals and powers of 10 for metric 13 Measures Unit 1/7 conversions. Area of 2d shapes, rounding/calculating with bounds, conversion 14 Volume and Surface area Unit 4/5/13 of units (length/area/volume), calculating missing sides using pythagoras/ trigonometry. Types of numbers, calculating with fractions & decimals. 15 Probability Unit 1/7 Solving equations, rounding, plotting graphs for regions, 16 Inequalities Unit 12/8/5/7 calculating with fractions. Using a protractor for pie charts, proportion to calculate angles 17 Statistics Unit 1/6/9/16 for a pie chart, use of inequality symbols for recording data.

Homework 1 Due	
Homework 2 Due	
Homework 3 Due	



### Year 10 - Term 5: Intermediate

<u>Overview</u>	Learning Objective		
Topic: Measures Big Questions - What happens to ttime as speed increases? - What happens to speed as time increases? - What is the difference between speed and ac- celeration?	<ul> <li>Understand compound measures.</li> <li>Solve SDT problems.</li> <li>Solve basic MDV questions.</li> <li>Convert compound measure problems. E.g 80km/h into mph</li> <li>Interpret distance time graphs.</li> </ul>	<ul> <li>Use compound measures such as speed and density.</li> <li>Draw and interpret distance- time graphs.</li> <li>Solve simple speed problems.</li> </ul>	- Calculate com- plex average speeds from dis- tance time graphs
Topic: Volume and Surface AreaBig Questions- A cuboid has a volume of 120cm³. What could its di- mensions be?- A prism has a volume of 70m³, and a length of 7m, what is the area of its cross- section?	<ul> <li>Calculate the volume of cylinders</li> <li>Calculate the surface area of cylinders.</li> </ul>	<ul> <li>Calculate the volume of pyramids.</li> <li>Calculate the surface area of pyramids</li> <li>Calculate the volumes of cones</li> <li>Calculate the surface areas of cones</li> <li>Calculate the volume of spheres.</li> <li>Calculate the surface area of spheres.</li> <li>Find the volume of the frustum of a truncated cone.</li> </ul>	
Topic: ProbabilityBig Questions- What is the same/ different about the prob- lems here:- A bag contains 4 blue counters and 5 red coun- ters. Julie picks a counter, replaces it, and then picks again A bag contains 4 black counters and 5 pink coun- ters. Sandra picks out two counters	<ul> <li>Introduction to the probability notation (U; n; P(A); P(A)'</li> <li>Draw tree diagrams and use them to find probabilities of successive independent events.</li> <li>Sampling populations.</li> </ul>	- Draw tree diagrams and use them to find probabilities of successive dependent events. (Both with & without replace- ment)	-Calculate proba- bilities using Venn diagrams. (3 cir- cles).

DRGANISER	How to convert decimal hours to HOURS & MINUTES	3.1 hours is <u>not</u> 3hrs and 10 minutes! 0.25 hours is <u>not</u> 25 minutes!	Every 0.1 is worth 6 minutes. It is a quarter of an hour, therefore 19 minutes	0.1 x 60 = 6 minutes Another way to change the units is to this a fraction of an hour multiply the decimal part by 60	So, 3.1 hours is 3 hours 6 minutes So, 0.25 hours is calculated:	0.25 x 60 = 15 minutes	0.1 hour = 6 minutes 0.6 hour = 36 minutes 0.2 hour = 12 minutes 0.7 hour = 42 minutes	0.3 hour = 18 minutes         0.8 hour = 48 minutes           0.4 hour = 24 minutes         0.9 hour = 54 minutes           0.6 hour = 20 minutes         0.7 hour = 16 minutes	Other real life graphs	Graphs can be used to represent a number of real life situations. It is important to read the labels on both	axes to determine the meaning of the graph.	Example: A test tube containing a chemical liquid is used in an experiment. During th	experiment the depth d of the liquid changes with time t. Match the differe parts of the graph to the statements below.	(b) bit	th of liqt	Dep	<ol> <li>Liquid is added slowly to the test tube.</li> <li>Time 2. The level of the liquid remains constant.</li> </ol>	<ol> <li>Some liquid is poured out quickly.</li> <li>Some liquid is poured in quite quickly</li> <li>The test tube is emptied.</li> </ol>
MEASURES KNOWLEDGE C	Imperial and Metric Conversions	The ones that you need to memorise are:	Distance 5 miles ≈ 8 Kilometre 1 gallon ≈ 4.5Litres	1 mile # 1.6 Kilometres X1.6 allone = X4.5 for the second	Miles Kilometres +4.5	Mass (Weight) 1 Kilogram ± 2.2 contimetres	X22 X25	Kilograms pounds riches centine		a train which travels 243km in 2hrs 15mins	Speed = Distance/Time	(Time = 2hrs 15mins)		(15mins = 0.25hr)	$\frac{243}{243}$	2.25	<b>Sneed</b> = 108km/h	The train is travelling at 108km/h
	IOCHO'S	Key Facts			D = Distance; S = Speed T = Time	0	<sup>9</sup> Distance-Time Graphs	Gradient = speed	inm e for the steady speed	Find the speed of	3 steady speed		0 1 2 3 4 5 6 7 8 9 10 11maine	Distance-time graphs	Distance time graphs show distance away from a point.	When an object is stationary, the line on the graph is	horizontal. When an object is moving at a steady speed, the line on the graph is straight, but shoped. The steener	the line, the greater the <b>speed</b> of the object.

Knowledge Recall

Date Due

Term 5 HW: 1

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Section A:Number	Section B: Algebra Geometry & measures	Section C: Using and applying
<ol> <li>To increase an amount by 5.4%, what single multiplier would you use?</li> </ol>	<ol> <li>11. Expand &amp; simplify: 3(x - y) - 4( x + 2y)</li> </ol>	21. Use <i>π</i> on the calculator Work out the volume of this prism? (correct to 2 DP)
2. Share 450 in the ratio of 4:5	12. Solve: 2x -1>3	2cm
3. Work out: $2\frac{2}{3} \cdot \frac{5}{6}$	<ol> <li>Make c the subject of the formula:</li> <li>A= c + d</li> </ol>	22. 40 is rounded to the nearest whole. Write down the minimum possible length it could have been.
4. Estimate the answer to: 3987 ÷ 213	14. Write down the nth term of this sequence: -3 3 13 27	
5. Write down the LCM of 9 and 12	15. If $y = x^3 + x$ , find the value of y when $x = -2$	23. The relative frequency of a drawing pin falling pin up was ¾. How many times would you expect it to fall nin up
6. Write 0. 0 <sup>6</sup> as a fraction	16. Factorise: a <sup>2</sup> – b <sup>2</sup>	in 120 drops?
<ol> <li>Work out the balance for £1500</li> <li>Invested for 2 years at 3.7% per annum</li> </ol>	17. Multiply & simplify: (4b - 3)(2b + 1)	24. Alf & Amy but tickets in a raffle P(Alf wins 1st prize) = 0.4 P(Amy wins 1st prize) = 0.1
<ol> <li>The cost of aTV has increased by</li> <li>15% to £437. Work out the original price.</li> </ol>	18. Make c the subject of the formula: $a = b + c^2$	What is the probability that Alf or Amy win 1st prize?
9. Write 765000 in standard form:	19. h = ut - ½gt² Find h when u = 200 t=1½ & g=9.8	25. What inequality is represented here?
10. Work out (4x10³) x (1.3 x 10 <sup>4</sup> ) Give your answer in standard form	20. If sin 52° = $\frac{7}{x}$ , find x (3sf)	1 2 3
		0 1 2 3 4
Total (A)	Total (B)	Total (C)
Test Total (A+B+C)	R (0-9)	Y (10-19) G (20-25)



## It's units are always "cubic", that is, the number of little Volume is the measure of the amount of space inside of a solid figure, like a cube, ball, cylinder or pyramid. element cubes that fit inside the figure.



The volume of a prism is the area of the cross-section x A prism is a shape which has a uniform cross-section. the length. Below are examples of prisms.



# Surface area of a prism

VOLUME AND SURFACE AREA KNOWLEDGE ORGANIS-



this shape we need to add together the area of the two L-shapes and the area of the 6 rectangles that make up the surface of the shape. Total surface area

 $2\pi r \times h$ 

 $\pi r^2$ 

HE SURFACE AREA OF A CYLI

TT-2

 $A=2\pi r(r+h)$ 

= 2 × 22 + 18 + 9 + 12 + 6 + 6 + 15 = 110 cm<sup>2</sup>

5 cm

# Surface Area of a Triangular Prism



Steps for finding surface area 1. Find the area of each face 2. Add up all the areas.

 $A=\pi r^{2}+\pi rL$ 

ż

Surface area of Cone

3m

Volume of a Frustum

 $V = \frac{\pi h}{12} (d^2 + db + b^2)$ 

Surface Area

Triangular-based Pyramid (Tetrahedron) Volume  $=\frac{1}{2}x$  base area x height Cube (olume = side<sup>3</sup> 6 faces 8 vertices 12 edges All edges same length 4 faces
4 vertices
6 edges Square-based Pyramid Volume  $=\frac{1}{3}x$  base area x height **Sphere** Volume = <sup>4</sup>/<sub>2</sub> × ∏ × radius³ 1 faces
0 vertices
0 edges 5 faces
5 vertices
8 edges **Triangular Prism** Volume  $=\frac{1}{2}x$  base x height x length Cylinder Volume = ∏ × radius² × height 3 faces 0 vertices 2 edges 5 faces
6 vertices
9 edges Cuboid Volume = length x width x length Volume =  $\frac{1}{3} \times \Pi \times \text{radius}^2$ Cone 2 faces
1 vertices (apex)
1 edge 6 faces
8 vertices
12 edges













p = perimeter of base

A = Area of base s = slant height

**DUSTON** 

Knowledge Recall

Term 5 HW: 2

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Score to beat

Section A:Number		Section B: Algebra		Section C: Using and applying	
<ol> <li>To increase an amount by 5%, what single multiplier would you use?</li> </ol>	x 1.05	11. Expand & simplify: 5(x - 1) - 3(x + 4)	2x - 17	21. 3cm	7 6.7cm
2. Increase 47 litres by 5%	49.35litres	12. Factorise: 4x <sup>2</sup> + 8x	4x(x+2)	Find 'x' to 3 significant figures.	1.02011
3. Divide 520 in ratio of 1: 3	130:390	13. Simplify: 12b <sup>5</sup> ÷ 4b <sup>2</sup>	3b³	<ol> <li>22.</li> <li>39 is rounded to the nearest whole.</li> </ol>	
Jen and Imran shared 108. sweets.		14. Give the inequality		Write down the minimum possible length it could have been.	38.5
Jen had 60 less sweets than Imran. What was the ratio of sweets shared in its simplest form.	2:7		-3 <x<1< td=""><td></td><td></td></x<1<>		
5. Work out: $2\frac{2}{3} \times 5$	$13\frac{1}{3}$	<ol> <li>Make c the subject of the formula:</li> <li>A= c - d</li> </ol>	c=A+d	<ol> <li>23.</li> <li>Oil has a volume of 9000cm<sup>3</sup> and a density of 0.8g/cm<sup>3</sup>.</li> </ol>	-0005
6. Work out: $2\frac{2}{3} - \frac{3}{4}$	$1^{11}_{12}$	16. Work out the value of: xy - 3 When x = 2 and y = -3	6-	What is the mass of the oil?	3007/
<ol> <li>Round off 345 to one significant figure</li> </ol>	300	<ol> <li>Write down the nth term of this sequence: 2 3 4 5 6</li> </ol>	n+1	24. The relative frequency of green on a	
8. Estimate the answer to: 423 x 0.3	120	18. Write down the $2^{rd}$ term in the sequence given by: $T(n) = n^2 - 2n$	0	spinner is 76. now many times would you expect a green in 300 spins?	250
9. Write down all the factors of 18	1,18,2,9,3,6	19. If y = x² - x , find the value of y when x = 2	2	25. Work out the volume of this prism?	
10. Write down the LCM of 18 and 27	54	<ol> <li>Write down the equation of a line parallel to y = 4x +1</li> </ol>	γ=4x+/- ?	15cm <sup>2</sup> 20cm	300cm <sup>2</sup>
Total (A)		Total (B)		Total (C)	
Test Total (A+B+C)		R (0-9)	Y (10	-19) G (20-25)	



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# Experimental probability:

Is when you calculate the probability of an event based on data that has been collected. Example: a dice is rolled 60 times. The results are in the table:

Result	1	2	3	4	5	9
No of Result	20	5	12	10	7	9
Experimental Probability	$\frac{20}{60}$	5 60	$\frac{12}{60}$	$\frac{10}{60}$	$\frac{7}{60}$	<u>60</u>

**EXPERIMENTAL PROBABILITY** is also known as **RELATIVE FRE**-

Experimental Probability = number of times result happened / total trials

We call this the "union" of B and G. ВUG

1 student lies in B N G

We write the event that

a student has brown

eyes or glasses as

ഗ ⊃ B

6 students lie in

It's the event that either B or G happens.

Term 5 HW: 3	Section C: Using and applying	21. fcm	8cm	To find 'x' choose o <u>ne calc</u> ulation: V8 <sup>2</sup> + 6 <sup>2</sup> OR V8 <sup>2</sup> - 6 <sup>2</sup>	23. Jane cycles 28km at 12km/h. How long does she take?		24. The relative frequency of blue on a spinner is $\frac{3}{5}$ . How many times would you expect not to get a blue in	- 250 spins?	24. Alf & Amy buy tickets in a raffle P(Alf wins 1st prize) = 0.7 P(Amy wins 1st prize) = 0.12 What is the prohability that Alf or	Amy win 1 <sup>st</sup> prize?	25.What inequality is represented here?		Total (C)	-19) G (20-25)
Knowledge Recall Score to beat	Section B: Algebra & Shape, space & measures	11. Expand & simplify: x(x - 5) - x( 2x -3)	12. Give the inequality	-5 -4 -3 -2 -1 0 1 2 3 4 5	<ol> <li>Make b the subject of the formula: P= 2a + b</li> </ol>	14. Write down the $3^{rd}$ term in the sequence given by: $T(n) = n^2 - 2n$	15. If $y = x^2 - x - 3$ , find the value of y when $x = 3$	16. Factorise: 4x <sup>2</sup> – 9y <sup>2</sup>	17. Multiply & simplify: (3x - 2)(2x - 5)	<ol> <li>Make r the subject of the formula: S= r<sup>2</sup> - 2t</li> </ol>	$\frac{\text{Give your answer correct to 3sf}}{19. \text{ v}=\sqrt{\text{u}^2 + 2\text{as}} \text{ Find v when } \text{u} = 2.4$ $\text{a}=3.2 \text{ & s}=5.25$	20. If tan $x^0 = \frac{12}{5}$ , find x (3sf)	Total (B)	R (0-9) Y (10
<b>DUSTON</b> Bute Due	Section A:Numbers & calculating	<ol> <li>To decrease an amount by 85%, what single multiplier would you use?</li> </ol>	2. Increase 250ml by 85%		<ol> <li>Without a calculator work out:</li> <li>6 ÷ 0.1</li> </ol>	<ol> <li>Round off 0.043 to one significant figure</li> </ol>	5. Use a calculator to work out:(1dp)	6. Write 0. 7 as a fraction	<ol> <li>The value of a mobile depreciates</li> <li>40% per year. Work out the current value</li> <li>of a mobile bought 3 years ago for £124.</li> </ol>	<ol> <li>In a '60% off' sale, an outfit was £86.</li> <li>Work out the original price.</li> </ol>	9. Write 5.6 x 10 <sup>-4</sup> as an ordinary number	10. Work out (5x10 <sup>-5</sup> ) x (2 x 10 <sup>4</sup> ) Give your answer in standard form	Total (A)	Test Total (A+B+C)