THE DUSTON SCHOOL
Knowledge itself is power

Year 10 Maths Foundation 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.
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	Construction and LOCI	Unit 2	Measuring angles for bearings, parallel line angle facts.
7	FDP	Unit 1	Using powers, understanding lowest common multiples.
8	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.
9	Ratio & Proportion	Unit 1/7	Decimals/powers as multipliers, calculating/understanding fractions as parts.
10	Transformations	Unit 2/8	Identifying 90/180/270 degrees, plotting mirror lines of basic functions.
11	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.
12	Forming and solving	Unit 3/4	Properties of 2d shapes, angle facts including polygons & parallel lines, algebraic notation and simplifying, forming expressions.
13	Measures	Unit 1/7	Calculating, multiplying decimals and powers of 10 for metric conversions.
14	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.
15	Probability	Unit 1/7	Types of numbers, calculating with fractions & decimals.
16	Inequalities	Unit 12/8/5/7	Solving equations, rounding, plotting graphs for regions, calculating with fractions.
17	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.

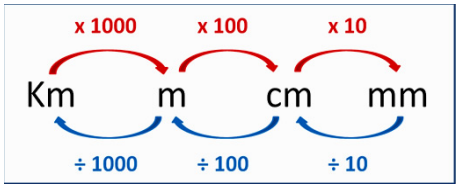
Homework 1 Due	
Homework 2 Due	
Homework 3 Due	

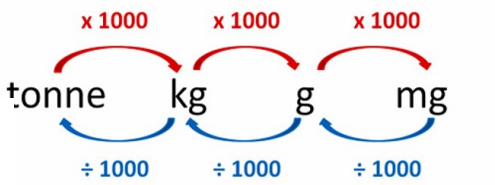
Year 10 - Term 5: Foundation

Overview	Learning Objectives		
Topic: Measures **Big Questions** - What happens to time as speed increases? - What happens to speed as time increases? - What is the difference between speed and acceleration?	- Understand compound measures. - Solve SDT problems. - Solve basic MDV questions. -Convert compound measure problems. E.g 80km/h into mph - Interpret distance time graphs.		
Topic: Volume and Surface Area **Big Questions** - A cuboid has a volume of 120cm³. What could its dimensions be? - A prism has a volume of 60m³. It's length is 10m. What is the area of it's cross-section?	Calculate the volume of a cube or cuboid - Calculate the surface area of a cube or cuboid. - Calculate the volume of triangular prims - Calculate the surface area of triangular prisms - Calculate the height of a cuboid, given volume, width and depth.	- Calculate the volume of cylinders - Calculate the surface area of cylinders.	
Topic: Probability **Big Questions** - What is the difference between probability and relative frequency? - Give an example of an independent or dependent event.	- Understand relative frequency as an estimate of probability. - Use relative frequency to compare outcomes of experiments. - Venn diagrams introduction (2 circles).	- Introduction to the probability notation, eg: U ; n ; P(A); P(A)' - Draw tree diagrams and use them to find probabilities of successive independent events. - Sampling populations.	

MEASURES KNOWLEDGE ORGANISER

METRIC CONVERSIONS					
1 gram	=	1000 milligrams	1g	=	1000 mg
1 kilogram	=	1000 grams	1 kg	=	1000 g
1 tonne (1 megagram)	=	1000 kilograms	1 tonne (1 Mg)	=	1000 kg





Conversion Factors

'≈' means 'approximately equal to'

Length
1 inch ≈ 2.5 centimetres
1 foot ≈ 30 centimetres
1 mile ≈ 1.6 kilometres
5 miles ≈ 8 kilometres

Capacity
1 pint ≈ 570 millilitres
1 gallon ≈ 4.5 litres
1¾ pints = 1 litre

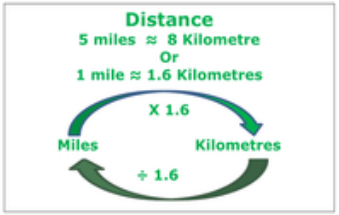
Weight
1 pound ≈ 450 grams
2.2 pounds ≈ 1 kilogram

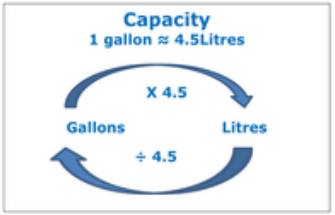
60 seconds in a minute

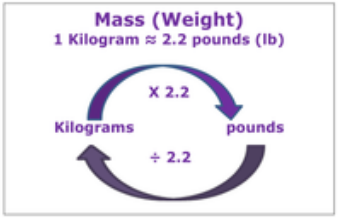
60 minutes in an hour

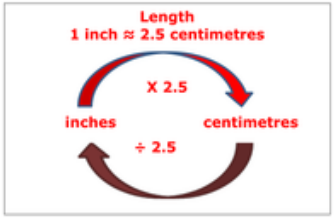
Imperial and Metric Conversions

The ones that you need to memorise are:









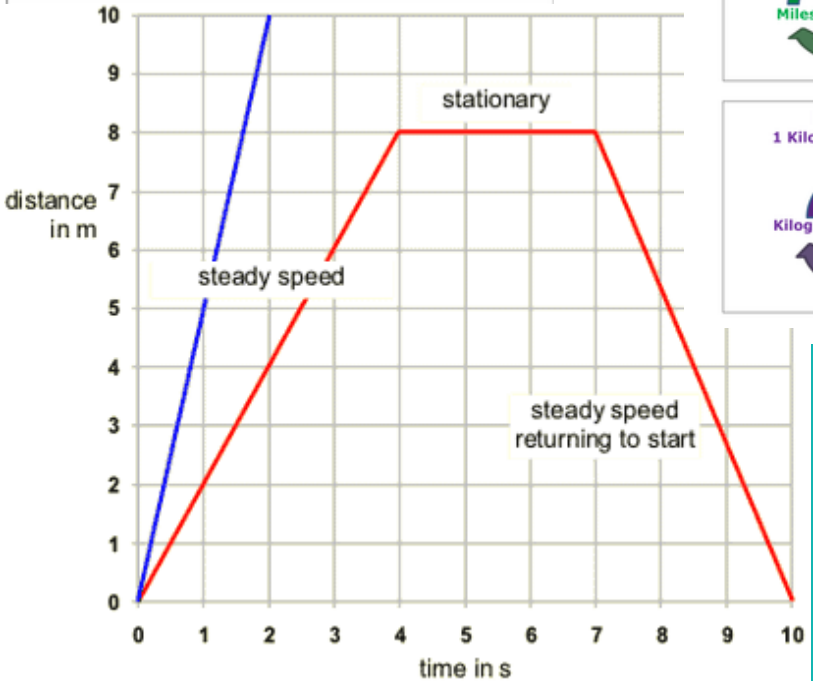
3.1 hours is not 3hrs and 10 minutes!

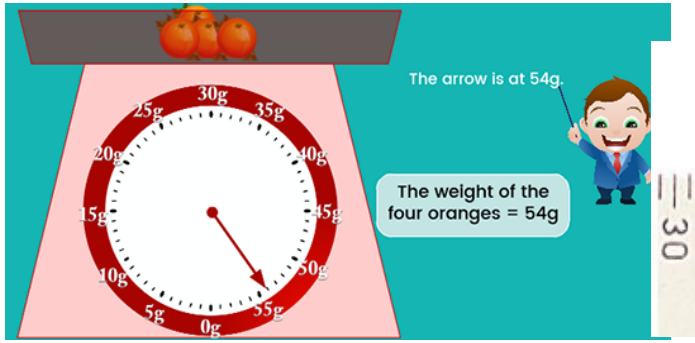
Every 0.1 is worth 6 minutes.

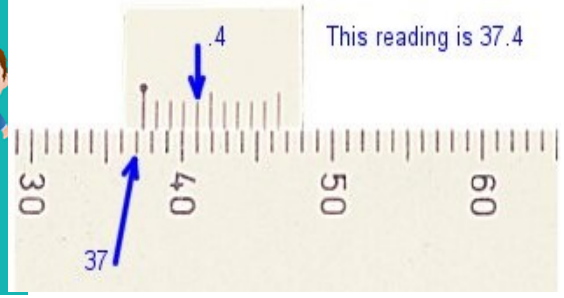
0.1 x 60 = 6 minutes

It is a fraction of an hour

So, 3.1 hours is **3 hours 6 minutes**



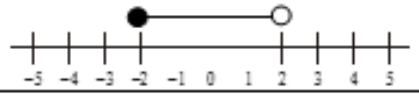
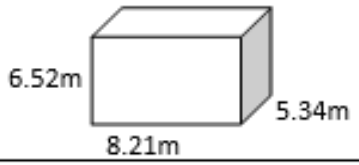




THE DUSTON SCHOOL

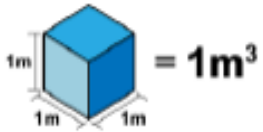
Knowledge Recall **Term 5 HW: 1**

Date Due _____ **Score to beat** _____

Section A:Number		Section B: Algebra Geometry & measures		Section C: Using and applying	
1. Which is bigger: $\frac{7}{8}$ or $\frac{3}{4}$?		11. Factorise: 3 - 6x		21. Work out the height of a parallelogram of base 5cm and area 45cm^2.	
2. Increase 44 by 10%		12. Solve: 3(x - 3) = 0			
3. 5 bags of plaster cover 35m^2 What will 7 bags cover?		13. If T(n) = 6n +2, what is the 3rd term?		22. Five of the angles of a hexagon are 90^0, 156^0, 32^0, 88^0 and 28^0. What is the size of the 6th angle?	
4. Estimate: 3670 ÷ 48		14. If y=4x + 3, find the value of y when x = -2			
5. Work out: $5 \times \frac{3}{4}$		***Use π on the calculator*** 15. Calculate the area of a circle with radius of 2cm (1dp)		23. A block of copper weighs 2160g and has a volume of 240cm^3. What is the density of the copper?	
6. To decrease an amount by 60%, what single multiplier would you use?		16. Expand & simplify: x(x + 2) + x(x + 3)			
7. Decrease £1280 by 60%		17. Give the inequality 		24. In an experiment the colours of 50 cars passing was recorded. 17 silver cars were recorded. What is the relative frequency of a silver car passing?	
8. Without a calculator work out: 20 ÷ 0.5		18. Work out the value of: xy + 5 When x = 2 and y = 3			
9. Round off 0.482 to one significant figure		19. Write down the 1st term in the sequence given by: T(n) = n^2 + 2n		25. Work out the volume of this cuboid? *(correct to 1decimal place)* 	
10. Use a calculator to work out: (2dp) $\frac{6.38 + 4.52}{4.71 + 9.53}$		20. If y = x^2 - x , find the value of y when x = -3			
Total (A)		Total (B)		Total (C)	
Test Total (A+B+C)		R (0-9)	Y (10-19)	G (20-25)	

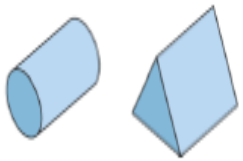
VOLUME AND SURFACE AREA KNOWLEDGE ORGANIS-

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



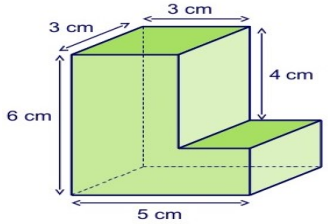
$= 1m^3$

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



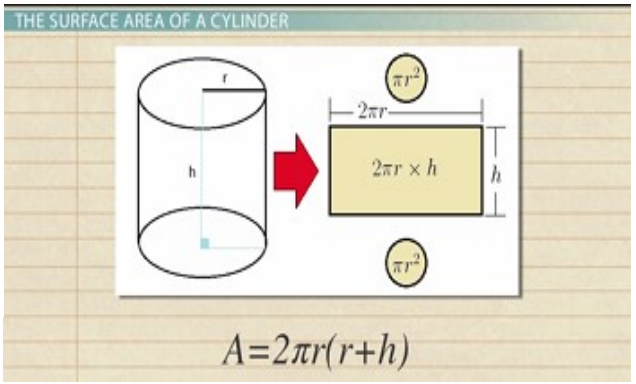
Surface area of a prism

What is the surface area of this L-shaped prism?



To find the surface area of 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 × 22 + 18 + 9 + 12 + 6 + 6 + 15
= 110 cm²

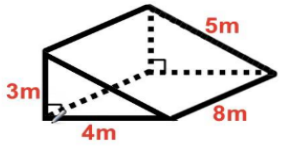


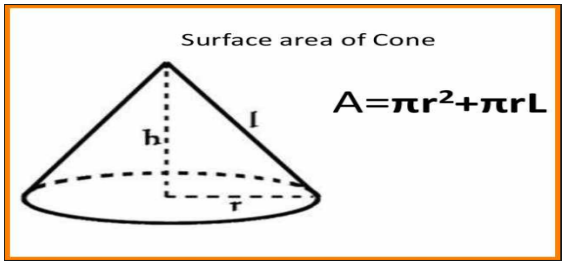
Surface Area of a Triangular Prism

Surface Area =

Triangle Area x 2 → $\frac{1}{2} \times 4 \times 3$
+
Rectangle Area 1 (Floor)
+
Rectangle Area 2 (Left Wall)
+
Rectangle Area 3 (Slope)

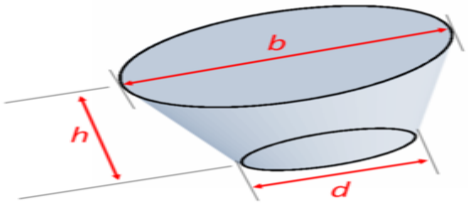
Steps for finding surface area
1. Find the area of each face.
2. Add up all the areas.

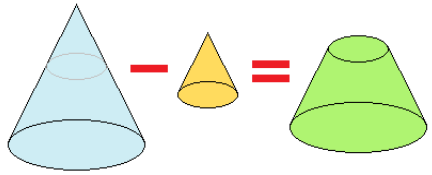




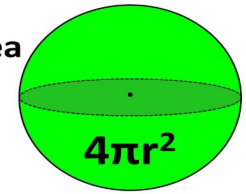
Volume of a Frustum

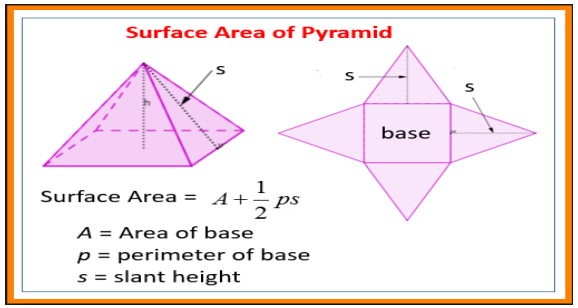
$$V = \frac{\pi h}{12}(d^2 + db + b^2)$$

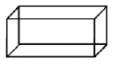




Surface Area of a Sphere



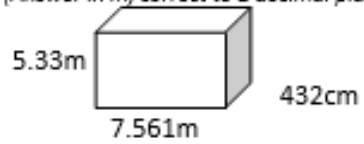


			
Cone Volume = $\frac{1}{3}$ x ∏ x radius² • 2 faces • 1 vertices (apex) • 1 edge	**Cylinder** Volume = ∏ x radius² x height • 3 faces • 0 vertices • 2 edges	**Sphere** Volume = $\frac{4}{3}$ x ∏ x radius³ • 1 faces • 0 vertices • 0 edges	**Cube** Volume = side³ • 6 faces • 8 vertices • 12 edges • *All edges same length*
			
Cuboid Volume = length x width x length • 6 faces • 8 vertices • 12 edges	**Triangular Prism** Volume = $\frac{1}{2}$ x base x height x length • 5 faces • 6 vertices • 9 edges	**Square-based Pyramid** Volume = $\frac{1}{3}$ x base area x height • 5 faces • 5 vertices • 8 edges	**Triangular-based Pyramid (Tetrahedron)** Volume = $\frac{1}{3}$ x base area x height • 4 faces • 4 vertices • 6 edges

THE DUSTON SCHOOL

Knowledge Recall **Term 5 HW: 2**

Date Due_____ **Score to beat**_____

Section A:Number		Section B: Algebra Geometry & measures		Section C: Using and applying	
1. Which is bigger: 17.5% or $\frac{1}{6}$?		11. Expand: y(5 – 3y)		21. Work out the height of a parallelogram of base 4cm and area 32cm^2.	
2. Decrease £1200 by 2%		12. Solve: 3x + 1 = 3			
3. 6 bags of plaster cover 42m^2 What will 10 bags cover?		13. Find the 10th term 2 5 8 11 14 ...		22. Five of the angles of a hexagon are 70^0, 123^0, 98^0, 108^0 and 168^0. What is the size of the 6th angle?	
4. Estimate: 285 ÷ 3.25		14. If x + y = 10, find the value of y when x = 3			
5. Work out: $\frac{2}{3}$ x 2		***Use π on the calculator*** 15. Calculate the length of the circumference of a circle with diameter of 6.2cm (1dp)		23. It took 5hours to drive from Durham to Birmingham. The average speed was 48mph. What is the distance from Durham to Birmingham?	
6. To increase an amount by 5.4%, what single multiplier would you use?		16. Expand & simplify: 3(x – y) + 4(x + 2y)			
7. Increase £3000 by 5.4%		17. Solve: 2x - 1 > 3		24. The relative frequency of a drawing pin falling pin up was ⅜. How many times would you expect it to fall pin up in 400 drops?	
8. Without a calculator work out: 9 ÷ 0.3		18. Work out the value of: xy + 5 When x = 2 and y = -3			
9. Round off 0.267 to one significant figure		19. Write down the next term in this sequence: 49 36 25 16 ...		25. Work out the volume of this cuboid? *(Answer in m, correct to 2 decimal place))* 	
10. Use a calculator to work out: (1dp) $\frac{2.3 + 6.82}{3.74 + 1.09}$		20. If y = x^2 - x , find the value of y when x = 6			
Total (A)		Total (B)		Total (C)	
Test Total (A+B+C)		R (0-9)	Y (10-19)		G (20-25)

PROBABILTY KNOWLEDGE ORGAN-

Basic Probability:

- Probability should always be expressed as either a fraction, decimal or percentage less than 1.
- The probability of an event occurring can never be greater than 1.
- The sum of the probabilities of every outcome must = 1.

We use numbers on the probability scale.

0	$\frac{1}{2}$	1
0	0.5	1
0	50%	100%

Impossible — Unlikely — Equally likely — Likely — Certain

We use words on the probability scale.

Important Facts About Probability

- Probability **adds up to 1**
- Events are **mutually exclusive** when they cannot happen at the same time
- Events are **exhaustive** if they include all possible outcomes

Calculating Basic Probability:

P (event) = $\frac{\text{Number of ways the event can occur}}{\text{Total number of outcomes}}$

$P(\text{rolling a } 6) = \frac{1}{6}$

P (event **not** happening) = 1 - P (event happening).

$P(\text{not rolling a } 6) = 1 - \frac{1}{6} = \frac{5}{6}$

Theoretical Probability:

Theoretical Probability is what we expect the probability of an event to be. E.g the theoretical probability of rolling a 1 on a regular 6 sided dice is $\frac{1}{6}$

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	6
No of Result	20	5	12	10	7	6
Experimental Probability	$\frac{20}{60}$	$\frac{5}{60}$	$\frac{12}{60}$	$\frac{10}{60}$	$\frac{7}{60}$	$\frac{6}{60}$

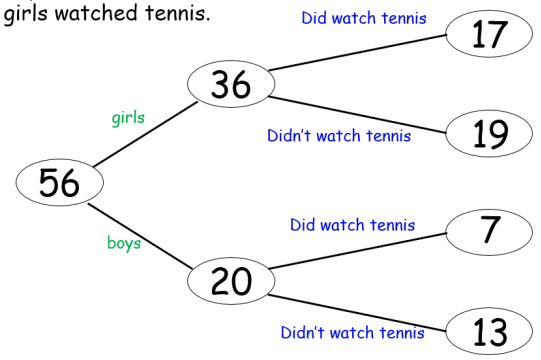
Experimental Probability = number of times result happened / total trials

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

Two way tables show data that consider **two different** bits of information.

An example is whether you are a girl or boy (1st bit of info) and whether you have blond, brown, blue, green or black hair (2nd bit of info)

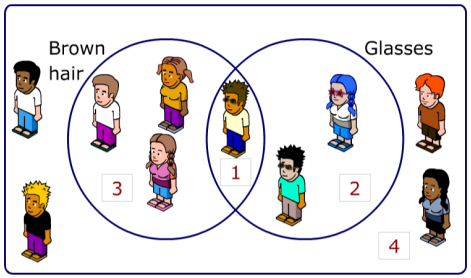
56 students were asked if they watched tennis.
20 of the students are boys.
13 boys did not watch tennis.
17 girls watched tennis.



Frequency tree.

- A frequency tree is a pictorial version of a two way table.
- It takes numerical information and summarises it in a chart format.
- Not to be confused with a tree diagram, which on a superficial glance they will be.

A Venn diagram is used to sort data.



Then n(B) = 4

and n(G) = 3

Also n(B') = 6 (↑ not B)

We write the event that a student has brown eyes and glasses as

B ∩ G

We call this the "intersection".

It's the event that both B and G happen.

1 student lies in B ∩ G

We write the event that a student has brown eyes or glasses as

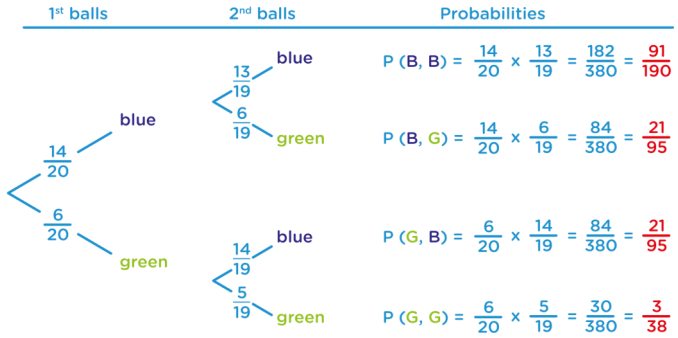
B U G

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

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

6 students lie in B U G

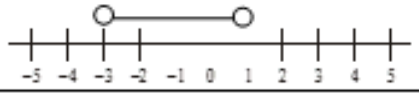
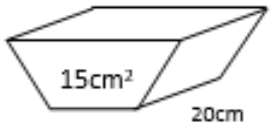
Probability Tree Diagrams



THE DUSTON SCHOOL

Knowledge Recall **Term 5 HW: 3**

Date Due_____ **Score to beat**_____

Section A:Number		Section B: Algebra Geometry & measures		Section C: Using and applying	
1. Which is bigger: 0.96 or $\frac{19}{20}$?		11. Factorise: 9x - 6xy		21. Work out the area of a triangle of base 9cm and height 4cm.	
2. Increase 1500 by 50%		12. Solve: 5x + 4 = 3			
3. 8 bags of plaster cover 32m^2 What will 17 bags cover?		13. If T(n) = 3+ 2n, what is the 5th term?		22. Five of the angles of a hexagon are 170^0, 111^0, 122^0, 115^0 and 168^0. What is the size of the 6th angle?	
4. Estimate: 285 x 32.5		14. If x + y = 6, find the value of y when x = -2			
5. Work out: $6 \div \frac{3}{5}$		***Use π on the calculator*** 15. Calculate the area of a circle with radius of 6.5m (1dp)		23. Oil has a volume of 9000cm^3 and a density of 0.8g/cm^3. What is the mass of the oil?	
6. To decrease an amount by 60%, what single multiplier would you use?		*C.6* 16. Expand & simplify: $5(x-1)-3(x+4)$			
7. Decrease 64 by 60%		*C.8* 17. Give the inequality 		24. The relative frequency of green on a spinner is 5/6. How many times would you expect a green in 300 spins?	
8. Without a calculator work out: 25 ÷ 0.5		*C.9* 18. Work out the value of: xy - 3 When x = 2 and y = -3			
9. Round off 345 to one sig. figure		*C.10* 19. Write down the 2nd term in the sequence given by: T(n) = n^2 - 2n		25. Work out the volume of this prism? 	
10. Use a calculator to work out: (1dp) $\frac{423 \times 18}{176 - 38.3}$		*C.11* 20. If y = x^3 + x , find the value of y when x = 2			
Total (A)		Total (B)		Total (C)	
Test Total (A+B+C)		R (0-9)	Y (10-19)		G (20-25)