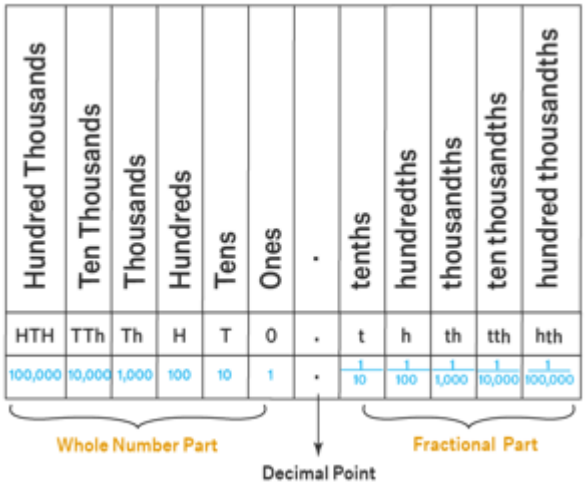
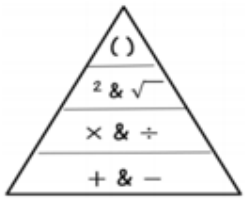
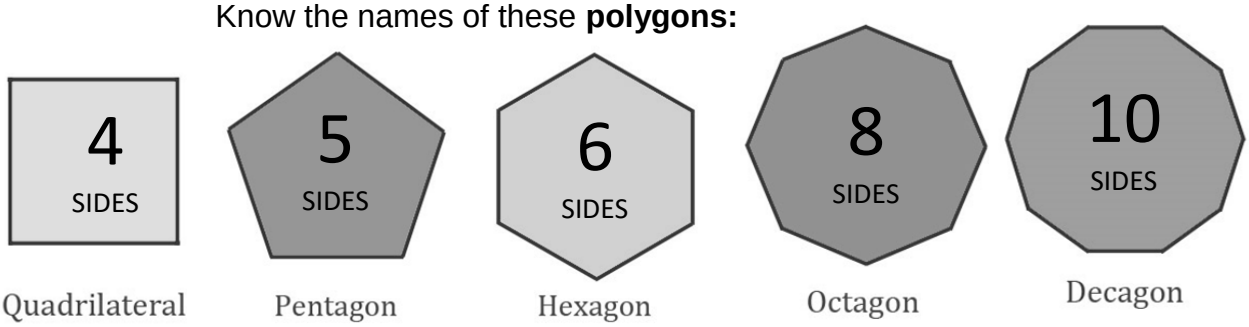
ESSENTIAL KNOWLEDGE FOR YEAR 8

(LEARN THESE KEY FACTS FROM PREVIOUS YEARS)

1.	**Integer** means 'whole number'.
2.	Place Value chart 
3.	**Square numbers** are: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100… This is a **quadratic** sequence.
4.	**Cube numbers** are: 1, 8, 27, 64, 125
5.	**Triangle numbers** are 1, 3, 6, 10, 15, 21, 28…
6.	An **arithmetic** or **linear** sequence increases or decreases by the same amount each time. E.g. 3, 7, 11, 15… or 20, 15, 10, 5…
7.	A **geometric** sequence multiplies or divides by the same number each time. E.g. 1, 3, 9, 27, 81… or 100, 50, 25, 12.5…
8.	The **Fibonacci** sequence is 1, 1, 2, 3, 5, 8, 13, 21…To find the next number in a Fibonacci sequence you add the last two terms together.
9.	**Evaluate** means to work out the answer.
10.	An inverse operation is the opposite or reverse operation. Addition ↔ Subtraction (inverse) Multiplication ↔ Division (inverse)
11.	**Product** means 'multiply' (e.g. the product of 4 and 3 is 12)
12.	The **multiples** of a number are its times table (e.g. multiples of 10 are 10, 20, 30, …) **LCM** is the **Lowest Common Multiple** – the smallest number that is a multiple of two or more numbers.
13.	A **factor** goes into another number (e.g. the factors of 10 are 1 & 10, 2 & 5) **HCF** is the **Highest Common Factor** – the biggest number that is a factor of two or more numbers.
14.	A **prime number** has exactly two factors (1 and itself) Learn the first few primes: 2, 3, 5, 7, 11, 13, 17, 19, …
15.	To write a number as a product of its primes you use a prime factor tree.
16.	Learn these powers of 10 and 2. $10^0 = 1$ $10^1 = 10$ $10^2 = 100$ $10^3 = 1000$ $10^4 = 10000$ $10^5 = 1000000$ $10^6 = 1000000 = 1\ million$ $10^9 = 1\,000\,000\,000 = 1\ billion$ $2^0 = 1$ $2^1 = 2$ $2^2 = 4$ $2^3 = 8$ $2^4 = 16$ $2^5 = 32$
17.	**Solve** means find the value of the unknown.

18.	The **difference** between two quantities or values involves subtraction. The smaller number is subtracted from the larger number.
19.	The **sum** means finding the total of 2 or more numbers by adding them together.
20.	 Mathematical operations need to be done in the correct order. This is called the **order of operations.** Work from the top of the triangle down.
21.	An **expression** is a combination of numbers or letters e.g. 5h, $3a + 9b^2$ (An expression does not include an = symbol)
22.	A **term** in a number in a sequence or a part of an algebraic expression which can be a number, letters or both.
23.	In algebra, a **coefficient** is the number part of a **term** (e.g. in 4x – 3y, the coefficient of x is 4 and the coefficient of y is -3.)
24.	A **formula** is a mathematical rule written using symbols (letters), usually as an equation describing a certain relationship between quantities.
25.	**Percentage** is a proportion of a whole represented as a number between 0 and 100.
26.	The top number of a fraction is called the **numerator**. The bottom number of a fraction is called the **denominator**.
27.	$\frac{1}{4} = 0.25 = 25\%$ $\frac{1}{2} = 0.5 = 50\%$ $\frac{3}{4} = 0.75 = 75\%$ $\frac{1}{10} = 0.1 = 10\%$ $\frac{1}{5} = 0.2 = 20\%$ $\frac{1}{3} = 0.\dot{3} = 33.\dot{3}\%$ $\frac{1}{100} = 0.01 = 1\%$
28.	A **proper fraction** is where the numerator is smaller than the denominator. E.g. $\frac{2}{3}$
29.	An **improper fraction** is where the numerator is larger than or equal to the denominator. E.g. $\frac{5}{2}$
30.	A **mixed number** is a number written as a whole number with a fraction. E.g. $2\frac{1}{2}$
31.	**Equivalent** fractions have the same value. E.g. $\frac{1}{2} = \frac{2}{4}$
32.	To **simplify** a fraction means to write an equivalent fraction using the smallest integers possible. You do this by dividing the numerator and denominator by the same number.
33.	**Ascending** means 'going up' or 'getting bigger'
34.	**Descending** means 'going down' or 'getting smaller'
35.	< means less than > means greater than = means equal to ≤ means less than or equal to ≥ means greater than or equal to ≠ means not equal to
36.	A **polygon** is any shape with straight sides (e.g. triangle, hexagon, octagon)
37.	A **regular** polygon has <u>all equal sides</u> and <u>all equal angles</u>
38.	**Perimeter** is the total distance around the outside of a shape
39.	**Units of length**: 10mm = 1cm 100cm = 1m 1000m = 1km
40.	**Units of mass/weight:** 1000g = 1kg 1000kg = 1 tonne

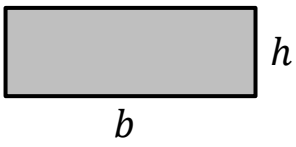
41. Know the names of these **polygons:**



42.

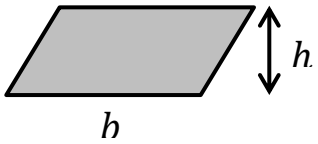
<u>Rectangle</u>

$Area = b \times h$



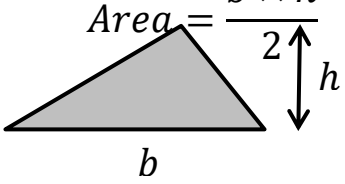
<u>Parallelogram</u>

$Area = b \times h$



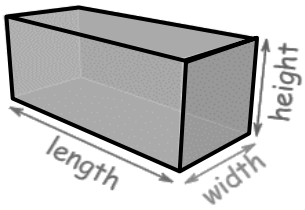
<u>Triangle</u>

$Area = \frac{b \times h}{2}$

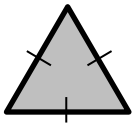


43. Volume of a cuboid

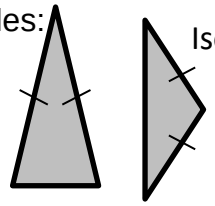
$Volume = l \times w \times h$



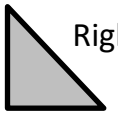
44. Know these special triangles:



Equilateral triangle
(3 equal sides)



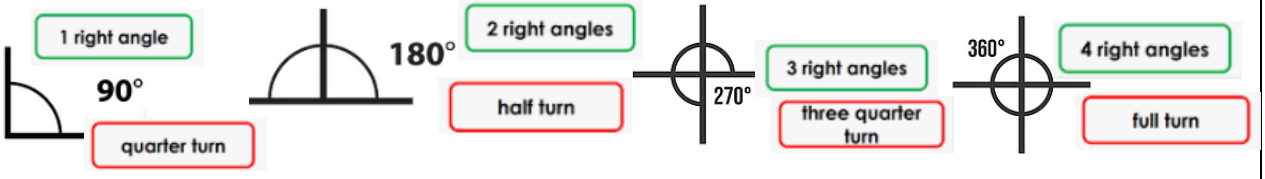
Isosceles triangle
(2 equal sides)



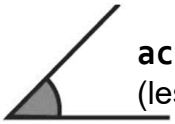
Right-angled triangle

Scalene triangle
(no equal sides)

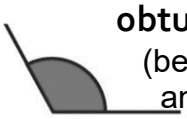
45.



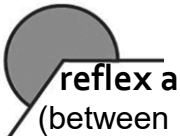
46.



acute angle
(less than 90°)

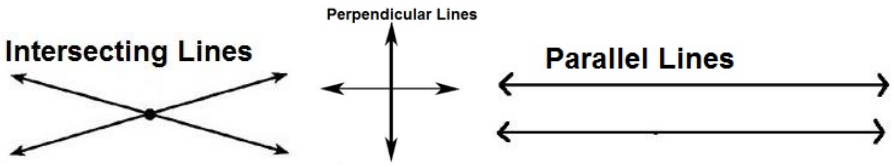


obtuse angle
(between 90° and 180°)

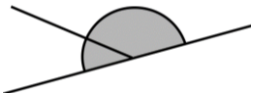


reflex angle
(between 180° and 360°)

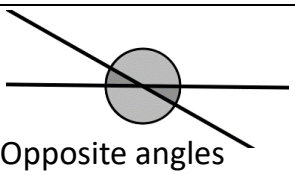
47.



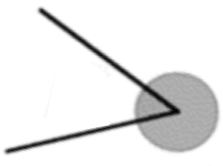
48. Basic angle rules:



Angles on a straight line add up to 180°



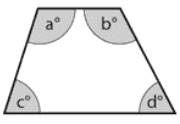
Opposite angles are equal



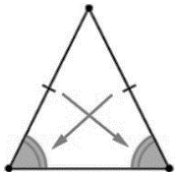
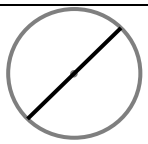
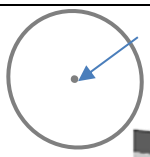
Angles around a point add up to 360°

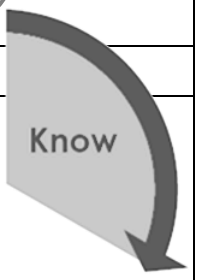
49. More angle rules to know:

Angles in a triangle add up to 180°



Angles in a quadrilateral add up to 360°

50.	The **base angles** in an isosceles triangle are equal. 
51.	*radius* Know these parts of a circle:  *diameter*  *centre*
52.	**Frequency** means how often something happens.
53.	The three averages are median, mode and mean. **Median** – the middle number when all the values are in order. **Mode** – the most common value **Mean** – the sum of all the values divided by how many there are. The **range** is not an average – it tells us how spread out the data is. You do the biggest number – smallest number



1x table	2x table	3x table	4x table	5x table	6x table
1x1=1	1x2=2	1x3=3	1x4=4	1x5=5	1x6=6
2x1=2	2x2=4	2x3=6	2x4=8	2x5=10	2x6=12
3x1=3	3x2=6	3x3=9	3x4=12	3x5=15	3x6=18
4x1=4	4x2=8	4x3=12	4x4=16	4x5=20	4x6=24
5x1=5	5x2=10	5x3=15	5x4=20	5x5=25	5x6=30
6x1=6	6x2=12	6x3=18	6x4=24	6x5=30	6x6=36
7x1=7	7x2=14	7x3=21	7x4=28	7x5=35	7x6=42
8x1=8	8x2=16	8x3=24	8x4=32	8x5=40	8x6=48
9x1=9	9x2=18	9x3=27	9x4=36	9x5=45	9x6=54
10x1=10	10x2=20	10x3=30	10x4=40	10x5=50	10x6=60
11x1=11	11x2=22	11x3=33	11x4=44	11x5=55	11x6=66
12x1=12	12x2=24	12x3=36	12x4=48	12x5=60	12x6=72

7x table	8x table	9x table	10x table	11x table	12x table
1x7=7	1x8=8	1x9=9	1x10=10	1x11=11	1x12=12
2x7=14	2x8=16	2x9=18	2x10=20	2x11=22	2x12=24
3x7=21	3x8=24	3x9=27	3x10=30	3x11=33	3x12=36
4x7=28	4x8=32	4x9=36	4x10=40	4x11=44	4x12=48
5x7=35	5x8=40	5x9=45	5x10=50	5x11=55	5x12=60
6x7=42	6x8=48	6x9=54	6x10=60	6x11=66	6x12=72
7x7=49	7x8=56	7x9=63	7x10=70	7x11=77	7x12=84
8x7=56	8x8=64	8x9=72	8x10=80	8x11=88	8x12=96
9x7=63	9x8=72	9x9=81	9x10=90	9x11=99	9x12=108
10x7=70	10x8=80	10x9=90	10x10=100	10x11=110	10x12=120
11x7=77	11x8=88	11x9=99	11x10=110	11x11=121	11x12=132
12x7=84	12x8=96	12x9=108	12x10=120	12x11=132	12x12=144

1. Learn them so you can say them without stopping: 1x4=4, 2x4=8, 3x4=12, 4x4=16….
2. Be able to answer questions out of order and in reverse: what is 5x3, what is 2x3, what is 3x8?
3. Be able to answer related division: what is 12÷6, what is 66÷6, what is 36÷6?