



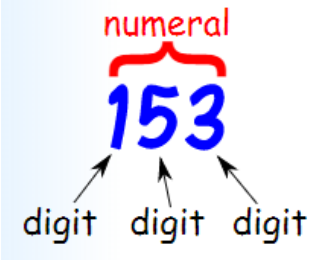
MATHS AUTUMN 1 KNOWLEDGE ORGANISERS















Year 5 Unit 1

Read and write numbers up to 1,000,000



Ascending order	Arranged from smallest to largest	14, 15, 18, 23 
Descending order	Arranged from largest to smallest	123, 101, 99, 53 
Digit	One of the symbols of a number system most commonly the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. The position or place of a digit in a number tells you its value.	
Numeral	A symbol used to denote a number. The Arabic numerals 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 are used in the Hindu-Arabic system giving numbers in the form that is widely used today.	

M	HTh	TTh	Th	H	T	O
						

Millions	Thousands			Ones		
O	H	T	O	H	T	O
						

312, 524

First, read the thousands **three hundred and twelve thousand** and then read the ones, **five hundred and twenty four.**

Greater Than

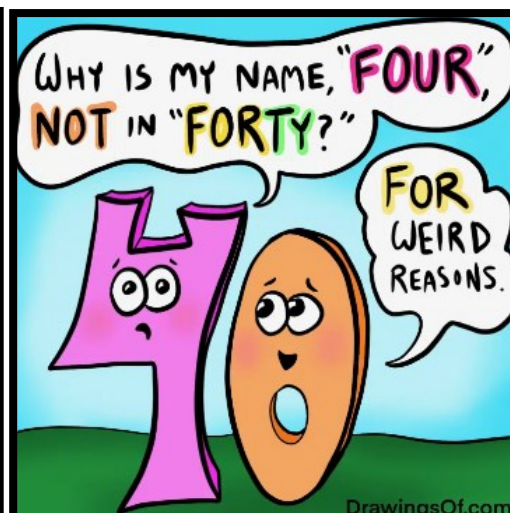
$$8 > 5$$

Less Than

$$5 < 8$$

Equal To

$$7 = 7$$



Year 5 Unit 2

Addition and Subtraction



Addition	The joining of two or more numbers or quantities.	In addition two or more numbers are joined to get one number which is the sum or the total .
Sum Total	The result of adding; the whole amount	
Subtraction	When one quantity is taken away from another	80 subtract 30 is 50.
Difference	The result of subtracting one number from another	The difference between 80 and 30 is 50
Commutative	Numbers can be added in any order, but in subtraction the order is important.	$a + b = b + a$ $6 + 2 = 8$ or $2 + 6 = 8$

$104,328 + 61,731 = 166,059$

HTh	TTh	Th	H	T	O
10000		1000 1000 1000 1000	1000 1000 1000	100 100	1 1 1 1 1 1 1 1
	10000 10000 10000 10000 10000 10000	1000	1000 1000 1000 1000 1000 1000 1000	100 100 100	1

1	0	4	3	2	8
+	6	1	7	3	1
<hr/>					
1	6	6	0	5	9
<hr/>					
					1

$$\begin{array}{r} 3 \ 1 \\ 4357 \\ - 2735 \\ \hline 1622 \end{array}$$

$4,357 - 2,735 = 1,622$

Thousands	Hundreds	Tens	Ones
4 3	3	5	7
2 7	7	3	5
1	6	2	2

Year 5 Unit 4

Powers of 10



174,308 One hundred and seventy four thousand, three hundred and eight.

Thousands			Ones		
H	T	O	H	T	O
●	●●● ●●● ●	●●● ●	●●●		●●● ●●● ●●
1	7	4	3	0	8

100,000	200,000	300,000	400,000	500,000	600,000	700,000	800,000	900,000
10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000
1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9

There are 10 ones in 1 ten. $10 \times 1 = 10$



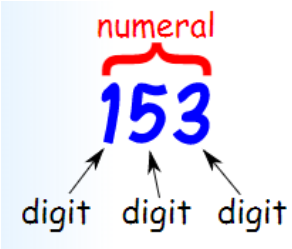
There are 10 tens in 1 hundred $10 \times 10 = 100$

There are 10 hundreds in 1 thousand $10 \times 100 = 1000$

Year 6 Unit 1

Place Value—Ordering and Comparing



Ascending order	Arranged from smallest to largest	14, 15, 18, 23 
Descending order	Arranged from largest to smallest	123, 101, 99, 53, 1 
Digit	One of the symbols of a number system most commonly the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. The position or place of a digit in a number tells you its value.	
Numeral	A symbol used to denote a number. The Arabic numerals 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 are used in the Hindu-Arabic system giving numbers in the form that is widely used today.	

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
5	8	2	4	4	2	8

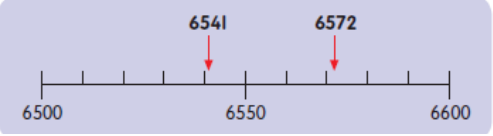
First we read the millions part: five million.

Then we read the thousands part: eight hundred and twenty-four thousand.

Finally we read this part: four hundred and twenty-eight.

5 824 428 is five million, eight hundred and twenty-four thousand, four hundred and twenty-eight.

- =** is equal to, equals
- ≠** is not equal to
- ≈** is approximately equal to
- <** is less than
- >** is greater than
- ≤** is less than or equal to
- ≥** is greater than or equal to



6541 is between 6500 and 6600.
6541 is nearer to 6500 than to 6600.
6541 is **6500** when rounded to the nearest hundred.

6572 is between 6500 and 6600.
6572 is nearer to 6600 than to 6500.
6572 is **6600** when rounded to the nearest hundred.

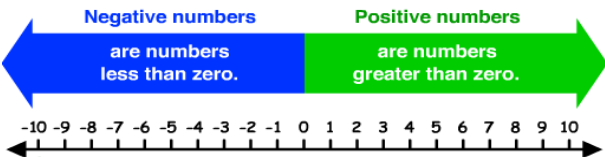
4 8 3 2	4 8 3 7	1 9 5
No	Yes	Yes
4 8 3 0	4 8 4 0	2 0 0

**5 or more, ↑
let it soar.**

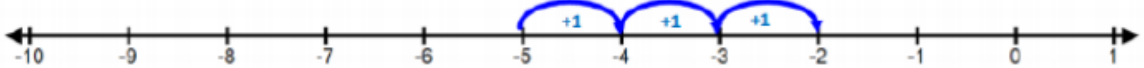
**4 or less, ↓
let it rest.**

Negative numbers are numbers that are less than zero.

4 is greater than -7, -3 is greater than -9



We can use a numberline to help to find the difference between 2 numbers. To find the difference between -2 and -5 we need to count the jumps between them. The difference is 3



Year 6 Unit 2 – Addition, subtraction, multiplication and division



Addition	The joining of two or more numbers or quantities.	In addition two or more numbers are joined to get one number which is the sum or the total .
Sum Total	The result of adding; the whole amount	
Subtraction	When one quantity is taken away from another	80 subtract 30 is 50.
Difference	The result of subtracting one number from another	The difference between 80 and 30 is 50
Product	The result when two numbers are multiplied.	
Factor	Numbers we can multiply together to get another number.	
Multiple	The result of multiplying a number by a positive whole number	6, 12, 18, 20, 24 are all multiples of 6
Commutative	Numbers can be multiplied in any order, but in division the order is important.	
Inverse	The reverse or opposite of an operation.	
Square Number	To square a number: just multiply it by itself. 4 squared is $4 \times 4 = 16$. Often shown with a little 2 in the corner like this: $4^2 = 16$ that is said "4 squared equals 16"	
Cube Number	The result of using a whole number in a multiplication three times.	 $5 \times 5 \times 5 = 125$ so $5^3 = 125$
Prime Numbers	A whole number greater than 1 that can not be made by multiplying other whole numbers. They only have 2 factors; one and themselves	

prime numbers to 100									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

Order of Operations

- Brackets
- Powers /Indices
- Multiplication or Division
- Addition or Subtraction

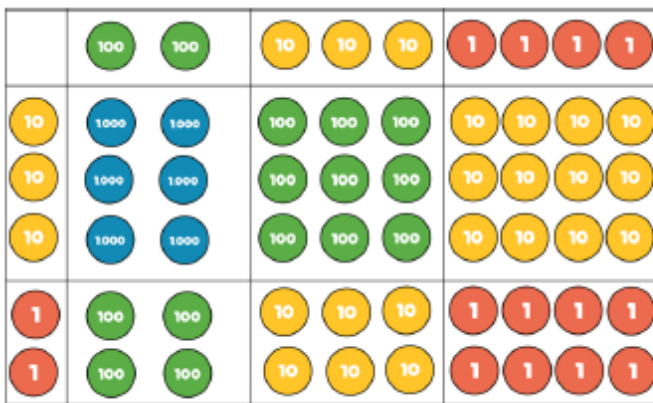
Year 6 Unit 2 – Addition, subtraction, multiplication and division—part 2



Multiplication methods



$$\begin{array}{r} 34 \\ \times 5 \\ \hline 170 \\ \hline 12 \end{array}$$



	Th	H	T	O
		2	3	4
x			3	2
		4	6	8
17	1	0	2	0
	7	4	8	8

x	200	30	4
30	6,000	900	120
2	400	60	8

$$234 \times 32 = 7,488$$

Division methods

		0	3	6
	12	4	43	72

$$432 \div 12 = 36$$

$$7,335 \div 15 = 489$$

		0	4	8	9
15		7	73	133	135

15	30	45	60	75	90	105	120	135	150
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Year 6 Unit 2 – Addition, subtraction, multiplication and division



Addition	The joining of two or more numbers or quantities.	In addition two or more numbers are joined to get one number which is the sum or the total .
Sum Total	The result of adding; the whole amount	
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Commutative	Numbers can be multiplied in any order, but in division the order is important.	
Inverse	The reverse or opposite of an operation.	
Square Number	To square a number: just multiply it by itself. 4 squared is $4 \times 4 = 16$. Often shown with a little 2 in the corner like this: $4^2 = 16$ that is said "4 squared equals 16"	<p>4 2^2 or $2 \times 2 = 4$</p> <p>9 3^2 or $3 \times 3 = 9$</p>
Cube Number	The result of using a whole number in a multiplication three times.	<p>$5 \times 5 \times 5 = 125$</p> <p>so $5^3 = 125$</p>
Prime Numbers	A whole number greater than 1 that can not be made by multiplying other whole numbers. They only have 2 factors; one and themselves	

prime numbers to 100									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

Order of Operations

- Brackets
- Powers /Indices
- Multiplication or Division
- Addition or Subtraction

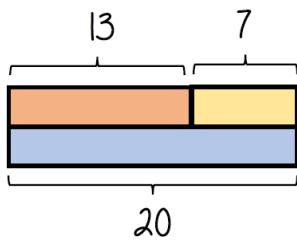
Year 7 -Unit 2

Expressions and Equations



term	A number or variable or a combination combined by multiplication or division.
Commutative	When an operation gives the same result whatever the order of the terms involved.
Equation	Statement to show that 2 expressions are equal

Fact Families

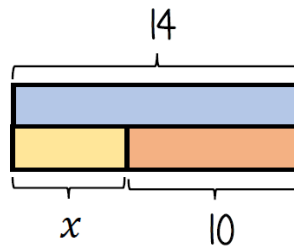


$$13 + 7 = 20$$

$$7 + 13 = 20$$

$$20 - 13 = 7$$

$$20 - 7 = 13$$



$$x + 10 = 14$$

$$10 + x = 14$$



$$14 - x = 10$$

$$14 - 10 = x$$

Like and Unlike Terms

Like terms are those whose **variables** are the same.

 and 3  are like terms
 the variable is the same

 and 3  are unlike terms
 the variables are NOT the same

Like terms

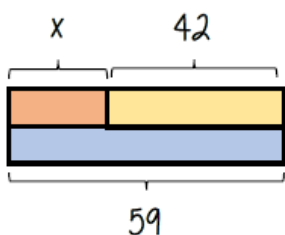
$y, 7y$
 $2x^2, x^2$
 $ab, 10ba$
 $5, -2$

Un-like terms

$y, 7x$
 $2x^2, 2c^2$
 $ab, 10a$
 $5, -2t$

Note here ab and ba are commutative operations, so are still like terms

Solving Equations



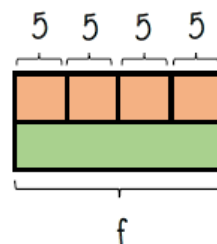
$$x + 42 = 59$$

$$x + 42 = 59$$

$$42 + x = 59$$

$$59 - x = 42$$

$$59 - 42 = 42$$



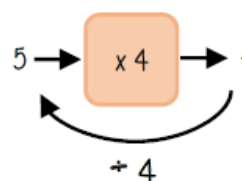
$$\frac{f}{4} = 5$$

$$f \div 4 = 5$$

$$f \div 5 = 4$$

$$4 \times 5 = f$$

$$5 \times 4 = f$$



Year 7 -Unit 2 and 3

Algebraic Thinking



Function	An operation that links an input and an output.	$3 \xrightarrow{\text{Input}} \boxed{\times 2} \xrightarrow{\text{Output}} 6$ <p>The function is to multiply by 2</p>
Variable	A quantity that can take a range of values, often represented by a letter.	<p>Coefficient Variable</p> $4x - 7 = 5$ <p>Operator Constants</p>
Coefficient	A number used to multiply a variable. 6a means 6 times a Variables with no number have a coefficient of 1. a just means 1 times a	
Constant	A fixed value	
Expression	A mathematical statement, using numbers, symbols and operators	<p><i>Expression</i></p> $4x - 7 = 5$
Equation	An equation says that two things are equal	
Substitute	Exchanging letters for numerical values	$x + \frac{x}{2}$ $x = 5 \rightarrow 5 + \frac{5}{2}$
Commutative	Numbers can be added or multiplied in any order.	$a + b = b + a$ $6 + 2 = 8$ <p style="text-align: center;">or</p> $2 + 6 = 8$
Notation	In algebra we use particular notation for different calculations.	<div style="display: flex; flex-wrap: wrap;"> <div style="border: 1px solid purple; padding: 5px; width: 50%;"> <p>We group letters together</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid purple; padding: 2px;"> $a + a + a$ means 3 lots of a $3 \times a$ </div> <div style="border: 1px solid purple; padding: 2px;"> $b + b$ means 2 lots of b $2 \times b$ </div> </div> </div> <div style="border: 1px solid yellow; padding: 5px; width: 50%;"> <p>We do not use multiplication signs</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid yellow; padding: 2px;"> $3 \times a = 3a$ $5 \times b = 5b$ </div> <div style="border: 1px solid yellow; padding: 2px;"> $a \times b = ab$ $a \times b \times c = abc$ </div> </div> </div> <div style="border: 1px solid green; padding: 5px; width: 50%;"> <p>We write division using fraction notation</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid green; padding: 2px;"> $a \div 2$ is written as $\frac{a}{2}$ or $\frac{1}{2}a$ </div> <div style="border: 1px solid green; padding: 2px;"> $b \div 3$ is written as $\frac{b}{3}$ or $\frac{1}{3}b$ </div> </div> </div> <div style="border: 1px solid red; padding: 5px; width: 50%;"> <p>We use indices/powers</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid red; padding: 2px;"> $a \times a$ $= a^2$ (a squared) </div> <div style="border: 1px solid red; padding: 2px;"> $b \times b \times b$ $= b^3$ (b cubed) </div> </div> </div> </div>

Year 7 – Unit 3

Place Value



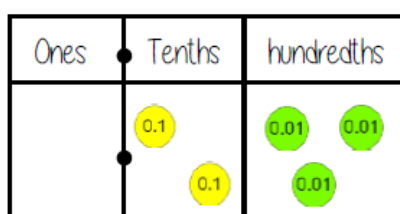
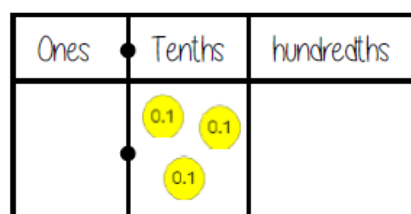
Digit	One of the symbols of a number system most commonly the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. The position or place of a digit in a number tells you its value.	
Numeral	A symbol used to denote a number. The Arabic numerals 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 are used in the Hindu-Arabic system giving numbers in the form that is widely used today.	
Integer	A positive number, a negative number or zero but not a fraction or a decimal.	
Significant Figure	The digits in a number that are needed to specify the size of the number, starts from the first non zero digit.	
Standard Form	Numbers are recorded as a number multiplied by a power of 10.	

Billions			Millions			Thousands			Ones		
H	T	O	H	T	O	H	T	O	H	T	O
		3	1	4	8	0	3	3	0	2	9

3,148,033,029 is **three billion**, **one hundred and forty eight million**, **thirty three thousand and twenty nine**.

- = is equal to, equals
- ≠ is not equal to
- ≈ is approximately equal to
- < is less than
- > is greater than
- ≤ is less than or equal to
- ≥ is greater than or equal

Comparing Decimals



$$0.3 > 0.23$$

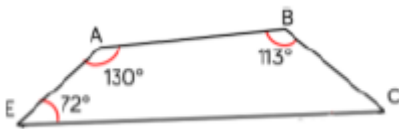
0.3 has more tenths than 0.23

Year 8 Unit 1— Construction, measuring and geometric notation



Polygon	A 2D shape having 3 or more straight sides. Regular polygons have all sides and angles equal.	3 sides—triangle 5 sides—Pentagon 7 sides—Heptagon/Septagon 9 sides—Nonagon	4 sides—Quadrilateral 6 sides—Hexagon 8 sides—Octagon 10 sides—Decagon
Parallel	Lines that remain the same distance apart.		
Perpendicular	Lines that intersect (cross over) at right angles.		

Notation

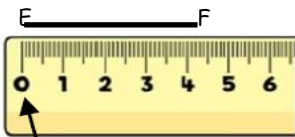


ABC is the notation for the angle at B that measures 113°

EC is the **line segment** that joins the points E and C

<p>3 equal sides 3 equal angles</p> <p>Equilateral</p>	<p>2 equal sides 2 equal angles</p> <p>Isosceles</p>
<p>1 angle is a right angle (90°)</p> <p>Right-angled</p>	<p>no equal sides no equal angles</p> <p>Scalene</p>

Measuring a line segment

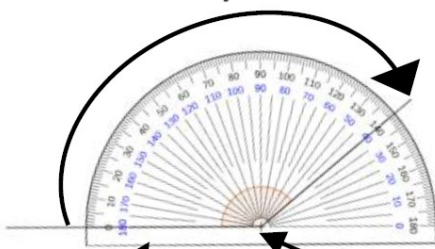


EF is 43mm long, this is 4.3cm
(10mm = 1cm)

Remember to start from 0

Measuring an angle

This is an obtuse angle, greater than 90°



Line up one of the line segments with 0

Put the cross where the two lines meet

A quadrilateral is a shape with four sides.

<p>Square 4 equal sides 4 right angles</p>	<p>Rectangle opposite sides are equal 4 right angles</p>	<p>Trapezium 1 pair of parallel sides</p>
<p>Rhombus 4 equal sides opposite sides are parallel opposite angles are equal</p>	<p>Parallelogram opposite sides are equal and parallel</p>	<p>Kite 2 pairs of adjacent sides are equal</p>

Types of angle

<p>Acute Angle $< 90^\circ$</p>	<p>Right Angle = 90°</p> <p>Notice the special notation</p>
<p>$90^\circ <$ Obtuse angle $< 180^\circ$</p>	<p>Straight Line = 180°</p>
<p>$180^\circ <$ Reflex angle $< 360^\circ$</p>	

Year 8 Unit 2—Sets and Probability



Set	A collection of things. All members of a set are unique. {1,2,3,4} is the set of counting numbers less than 5
Element	Each item in a set is called an element. The number 2 is an element of the set {1,2,3}
Intersection	The overlapping part of a Venn diagram. The symbol is an upside down U like this: \cap
Union	Two ellipses/circles that join. The symbol is a special u like this: \cup

Identify and represent sets

The **universal** set has the symbol ξ this means **everything** in the Venn diagram is in this set.

$\xi = \{\text{the numbers between 1 and 50 inclusive}\}$

My sets can include every number between 1 and 50 including those numbers

$A = \{\text{Square numbers}\}$

$A = \{1, 4, 9, 16, 25, 36, 49\}$

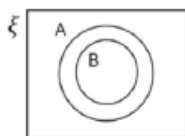
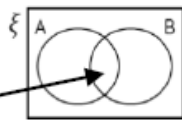
Interpret and create Venn diagrams



Mutually exclusive sets

The two sets have nothing in common
No overlap

Union of sets
The two sets have some elements in common — they are placed in the intersection



Subset

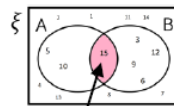
All of set B is also in Set A so the ellipse fits inside the set.

Around the outside of every Venn diagram will be a box. If an element is not part of any set then it will be placed outside of the ellipse, but within the box.

Intersection of sets

Elements in the Intersection are in sets A and B

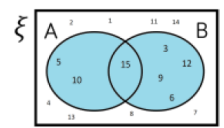
$\xi = \{\text{the numbers between 1 and 15 inclusive}\}$
 $A = \{\text{Multiples of 5}\}$ $B = \{\text{Multiples of 3}\}$



The element in $A \cap B$ is 15

Union of sets

Elements in the union could be in sets A or B



The notation for this is $A \cup B$

$\xi = \{\text{the numbers between 1 and 15 inclusive}\}$
 $A = \{\text{Multiples of 5}\}$ $B = \{\text{Multiples of 3}\}$

The elements in $A \cup B$ are
5, 10, 15, 3, 9, 6, 12

Mutually exclusive

Events that do not happen at the same time. Kings and Aces are Mutually Exclusive. A card can't be an Ace and a King at the same time.

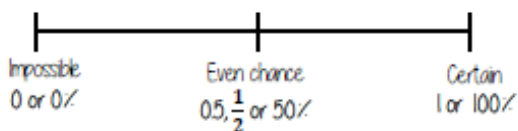
Probability

The likelihood of an event happening.

Random

When an event happens by chance and cannot be predicted.

The Probability Scale



The more likely an event the further up the probability it will be in comparison to another event (it will have a probability closer to 1)



There are 2 pink and 2 yellow balls, so they have the same probability

There are 5 possible outcomes
So 5 intervals on this scale, each interval value is $\frac{1}{5}$

Probability of a single event

A probability can be a fraction, decimal or a percentage. It is always a value between 0 and 1.



Probability notation
 $P(\text{event})$

Probability = $\frac{\text{number of times event happens}}{\text{total number of possible outcomes}}$

$$P(\text{Blue}) = \frac{4}{10}$$

← There are 4 blue sectors
← There are 10 sectors overall

$$= \frac{2}{5}$$

Sum of probabilities

The sum of probabilities is always 1.



The probability of getting a blue ball is $\frac{1}{5}$
∴ The probability of NOT getting a blue ball is $\frac{4}{5}$

Year 8 Unit 3

Prime Numbers and Proof



Product	The result when two numbers are multiplied.	$6 \times 3 = 18$ 																																																																																																				
Factor	Numbers we can multiply together to get another number.																																																																																																					
Multiple	The result of multiplying a number by a positive whole number	6, 12, 18, 20, 24 are all multiples of 6																																																																																																				
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Cube Number	The result of using a whole number in a multiplication three times.	$5 \times 5 \times 5 = 125$ so $5^3 = 125$																																																																																																				
Triangular Number	A number that can make a triangular dot pattern. 1, 3, 6, 10, 15																																																																																																					
Lowest Common Multiple	The smallest number that is the multiple of two or more other numbers.	<p>15 is the lowest common multiple (LCM) of 3 and 5</p>																																																																																																				
Highest Common Factor	The highest number that is a factor of two or more numbers.	<p>Factors of 12: 1, 2, 3, 4, 6, 12</p> <p>Factors of 16: 1, 2, 4, 8, 16</p> <p>Common Factors: 1, 2, 4</p> <p>4 is the highest common factor (HCF) of 12 and 16</p>																																																																																																				
Prime Numbers	A whole number greater than 1 that can not be made by multiplying other whole numbers. They only have 2 factors; one and themselves	<p style="text-align: center; background-color: #0070C0; color: white; padding: 2px;">prime numbers to 100</p> <table border="1" style="width: 100%; text-align: center; border-collapse: collapse;"> <tbody> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> <tr><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td>36</td><td>37</td><td>38</td><td>39</td><td>40</td></tr> <tr><td>41</td><td>42</td><td>43</td><td>44</td><td>45</td><td>46</td><td>47</td><td>48</td><td>49</td><td>50</td></tr> <tr><td>51</td><td>52</td><td>53</td><td>54</td><td>55</td><td>56</td><td>57</td><td>58</td><td>59</td><td>60</td></tr> <tr><td>61</td><td>62</td><td>63</td><td>64</td><td>65</td><td>66</td><td>67</td><td>68</td><td>69</td><td>70</td></tr> <tr><td>71</td><td>72</td><td>73</td><td>74</td><td>75</td><td>76</td><td>77</td><td>78</td><td>79</td><td>80</td></tr> <tr><td>81</td><td>82</td><td>83</td><td>84</td><td>85</td><td>86</td><td>87</td><td>88</td><td>89</td><td>90</td></tr> <tr><td>91</td><td>92</td><td>93</td><td>94</td><td>95</td><td>96</td><td>97</td><td>98</td><td>99</td><td>100</td></tr> </tbody> </table>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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