


KPI 7.01 Numerical Skills

1) Place Value	The value of a digit relating to its position in a number. In 1482 the digits represent 1 thousand, 4 hundreds, 8 tens and 2 ones.	2) Integer	Whole numbers including zero. -2, -1, 0, 1, 2, 3 ...																					
3) Decimal	A number with a decimal point in it. It can be positive or negative. 0.3, 1.26, -3.4 etc.	4) Positive Number	Any number above zero. 1, 2, 3, 4 ...																					
5) Negative Number	Any number below zero. Always written with a negative sign in front of it: -1, -2, -3 ...	6) Zero Place Holder	A zero that is used as a place holder to denote the absence of a power of 10 E.g. 506 has no tens so there is a 0 in the tens column.																					
7) Even Number	Any integer that can be divided by 2 without leaving a remainder. 2, 4, 6, 8, 10 ...	8) Odd Number	Any integer that cannot be divided by 2 without leaving a remainder. 1, 3, 5, 7, 9 ...																					
9) Square Number	The result of multiplying a number by itself. It will always be positive. 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144 ...	10) Square Root	The opposite of squaring a number to find the original factor. E.g. $\sqrt{9} = 3$ or -3																					
11) Inequality	When one number, or quantity, is not equal to another. $a < b$ a is less than b $a > b$ a is greater than b $a = b$ a is equal to b $a \neq b$ a is not equal to b	12) Ascending	Smallest to largest.																					
		13) Descending	Largest to smallest.																					
14) Decimal Place Value	The value of each digit after the decimal point. Tenth, hundredth, thousandth etc.	17) Rounding	<table border="1"> <thead> <tr> <th>Round to</th> <th>Circle, Underline, Decide</th> <th>Answer</th> </tr> </thead> <tbody> <tr> <td>Nearest 1000</td> <td>5 <u>7</u> 8 3 . 1 9 9</td> <td>≈ 6000</td> </tr> <tr> <td>Nearest 100</td> <td>5 7 <u>8</u> 3 . 1 9 9</td> <td>≈ 5800</td> </tr> <tr> <td>Nearest 10</td> <td>5 7 8 <u>3</u> . 1 9 9</td> <td>≈ 5780</td> </tr> <tr> <td>Nearest integer</td> <td>5 7 8 3 . <u>1</u> 9 9</td> <td>≈ 5783</td> </tr> <tr> <td>1 d.p.</td> <td>5 7 8 3 . <u>1</u> 9 9</td> <td>≈ 5783.2</td> </tr> <tr> <td>2 d.p.</td> <td>5 7 8 3 . 1 <u>9</u> 9</td> <td>≈ 5783.20</td> </tr> </tbody> </table>	Round to	Circle, Underline, Decide	Answer	Nearest 1000	5 <u>7</u> 8 3 . 1 9 9	≈ 6000	Nearest 100	5 7 <u>8</u> 3 . 1 9 9	≈ 5800	Nearest 10	5 7 8 <u>3</u> . 1 9 9	≈ 5780	Nearest integer	5 7 8 3 . <u>1</u> 9 9	≈ 5783	1 d.p.	5 7 8 3 . <u>1</u> 9 9	≈ 5783.2	2 d.p.	5 7 8 3 . 1 <u>9</u> 9	≈ 5783.20
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15) Decimal Places	The number of digits after the decimal point. E.g. 14.278 has 3 decimal places.																							
16) Estimate	Find a rough or approximate answer by rounding. e.g. $2.3 \times 18.4 \approx 2 \times 20 = 40$ \approx 'approximately equal to'																							

KPI 7.02 Order of Operations

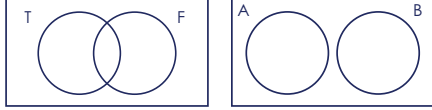
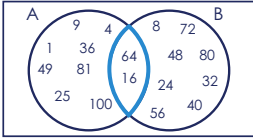
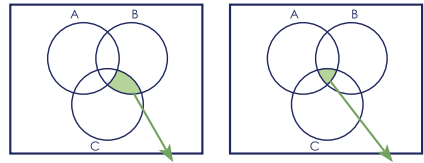
1) Operation	A rule for combining numbers + - × ÷	2) Evaluate	To work out the value of.
3) Index Notation	The index tells us how many times the base is being multiplied by itself. The plural of index is indices.	Power →  → Index Base →	
4) Order of Operations	B = Brackets I = Indices and Roots	DM = Division and Multiplication AS = Addition and Subtraction	
	If we have a calculation with addition or subtraction only then we calculate from left to right. $18 - 10 + 2$ $8 + 2$ 10	If we have a calculation with multiplication or division only then go from left to right. $8 \times 5 \div 4 \times 10$ $8 \times 5 \div 4 \times 10$ $40 \div 4 \times 10$ $10 \times 10 = 100$	

KPI 7.03 Introduction to Algebra

1) $2a$	$2 \times a$	2) ab	$a \times b$
3) a^2	$a \times a$	4) $3a^2$	$3 \times a \times a$
5) a subtracted from b	$b - a$	6) a less than b	$b - a$
7) a subtract b	$a - b$	8) a reduced by b	$a - b$
9) a divided by b	$\frac{a}{b}$	10) b divided by a	$\frac{b}{a}$
11) 4 times smaller than a	$\frac{a}{4}$	12) 4 times larger than a	$4 \times a \rightarrow 4a$
13) 5th power of a	a^5	14) Variable	A letter used to represent any number.
15) Coefficient	The number to the left of the variable. This is the value that we multiply the variable by. $4x \rightarrow$ The coefficient of x is 4. $x \rightarrow$ The coefficient of x is 1.	16) Term	A single number, variable or numbers and variables multiplied together.
17) Expression	A mathematical statement which contains one or more terms combined with addition and/or subtraction signs. E.g. $4x + 3y$.	18) Collecting like terms	Combining the like terms in an expression. $7x + 3y - 2x$ is simplified to $5x + 3y$.
19) Substitute	Replace a variable with a given value. E.g. if $b = 10$, $2b = 2 \times 10 = 20$ $b - 2 = 10 - 2 = 8$	20) Rearrange	Alter the position of variables using the 4 operations. $5 = \frac{a}{t}$ $t = \frac{a}{5}$ $a = 5 \times t$

KPI 7.04 Primes, Factors and Multiples

1) Factor	Any whole number that divides exactly into another number leaving no remainder is a factor. Factors of 20 are: 1, 2, 4, 5, 10, 20	2) Multiple	The result of multiplying a number with a whole number (all times tables!). The multiples of 7: 7, 14, 21, 28, 35, 42, 49, 56, 63, 70 ...
3) Highest Common Factor (HCF)	The HCF of 2 or more numbers is the largest number that is a factor of each of those numbers. E.g. HCF of 18 and 45 = 9 18: 1, 2, 3, 6, 9, 18 45: 1, 3, 5, 9, 15, 45	4) Lowest Common Multiple (LCM)	The LCM of 2 or more numbers is the smallest number that is a multiple of each of those numbers. E.g. LCM of 6 and 8 = 24 6: 6, 12, 18, 24, 30, 36, 42, 48, 54, 60 8: 8, 16, 24, 32, 40, 48, 56, 64, 72, 80
5) Prime Numbers	A prime number only has two distinct factors: 1 and itself. 2 is the only even prime number. 1 is not a prime number. Prime numbers between 1 and 100 are: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97		

6) Venn Diagrams	These were created by an English Mathematician, John Venn (1834 – 1923). They are used to sort groups of data and consist of two or more circles, often overlapping, contained inside a rectangle.	
7) One Intersection	In a Venn diagram with 2 circles, an overlap represents a section where elements (E.g. numbers) lie in both sets (E.g. A and B). The overlap between the sets, is called the intersection. E.g. A = First ten square numbers B = First ten multiples of 8	<p>16 and 64 are in the intersection as they are in both sets.</p> 
8) Multiple Intersections	If a Venn diagram is representing three sets, it will have three circles. Each circle will <u>often</u> overlap with another data set twice, with all three circles overlapping at the centre.	


KPI 7.05 Expanding and Factorising 1

1) Expand	Multiply out the bracket(s) in the expression. E.g. $3(5x + 7) = 15x + 21$	2) Factorise	Identify the HCF and rewrite the expression with brackets. E.g. $6x^2 + 9x = 3x(2x + 3)$
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KPI 7.06 Addition and Subtraction

1) Addition Plus, add, sum, more than.	To find the total of two or more numbers. The inverse operation is subtraction.	2) Subtraction Subtract, minus, take away, less than.	To find the difference between two numbers. The inverse operation is addition.																
3) Commutative Addition is commutative – the order of addition does not change the result. Subtraction is not commutative.		4) Associative When you add you can do so regardless of how the numbers are grouped. Subtraction is not associative.																	
5) Two-way Table	A visual representation of the possible relationships between two sets of categorical data. You can add and subtract values horizontally and vertically to find totals or missing values.	<table border="1" data-bbox="837 350 1300 440"> <thead> <tr> <th></th> <th>Child</th> <th>Adult</th> <th>Total</th> </tr> </thead> <tbody> <tr> <th>Male</th> <td>7</td> <td>9</td> <td>16</td> </tr> <tr> <th>Female</th> <td>8</td> <td>6</td> <td>14</td> </tr> <tr> <th>Total</th> <td>15</td> <td>15</td> <td>30</td> </tr> </tbody> </table> <p>The values in a row have a total at the right-hand side of the row.</p> <p>The values in a column have a total at the bottom of the column.</p>			Child	Adult	Total	Male	7	9	16	Female	8	6	14	Total	15	15	30
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KPI 7.07 Perimeter

1) Perimeter	The total distance around the outside of a closed shape. <div style="text-align: center;">  <p>Perimeter = $5 + 8 + 5 + 8 = 26$ cm</p> </div>	2) Polygon A 2D shape which has 3 or more straight sides.	3) Regular Polygon A polygon where all sides are equal length, and all angles are of equal size. 4) Irregular Polygon A polygon where all sides are not equal and/or all angles are not equal. 5) Units of Length 1 cm = 10mm; 1 m = 100 cm; 1 km = 1000 m
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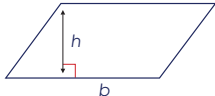
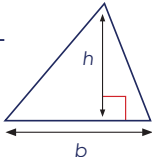
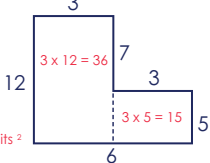
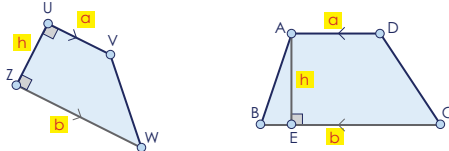
KPI 7.08 Mean

1) Average	A number expressing the central or typical value in a set of data.	2) Mean	The sum of the numbers divided by how many numbers are being averaged. E.g. Calculate the mean of 14, 6, 18, 2, 3. 1) Add the values: $14 + 6 + 18 + 2 + 3 = 43$ 2) Divide by 5 3) Mean is $\frac{43}{5} = 8.6$
3) Reversing the Mean	If we have the mean but one of the data points is missing, we can find the missing value by: 1) Multiplying the 'mean' by the number of data points to get the total of the values. 2) Subtracting the sum of the known values from the total of all values.	E.g. The mean of three numbers is 5. Two of the numbers are 3 and 10. Find the third value. <div style="text-align: right;"> Total of the values: $5 \times 3 = 15$ $15 - (3 + 10) = 2$ The third value is 2 </div>	


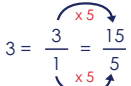
KPI 7.09 Multiplication and Division

1) Multiplication lots of, times, product, of	Multiplication is the operation of scaling one number by another. Multiplication is the inverse operation of division. Multiplication is commutative – the order of multiplication does not change the result. E.g. $2 \times 3 = 3 \times 2$. Multiplication is associative – when you multiply you can do so regardless of how the numbers are grouped. E.g. $1 \times (2 \times 3) = (1 \times 2) \times 3$		
2) Multiplying Integers	$\begin{array}{r} 29 \\ \times 3 \\ \hline 87 \\ \hline 2 \end{array}$	3) Multiplying Decimals	Remove the decimal points Multiply Insert the same number of decimal points in the answer as in the question 0.5×0.3 $5 \times 3 = 15$ $0.5 \times 0.3 = 0.15$
4) Division	Division can be thought of as sharing. The number being divided is shared equally into the stated number of parts. Division is the inverse operation of multiplication.	$D \div \square = \square \quad \square \overline{)D} = \square$ E.g. $8 \div 9 = 9 \overline{)8} = \frac{8}{9}$	$4524 \div 3 = 1508$ $\begin{array}{r} 1508 \\ 3 \overline{)4524} \\ \underline{45} \\ 24 \\ \underline{24} \\ 4 \\ \underline{4} \\ 0 \end{array}$ $3 \div 8 = 0.375$ $\begin{array}{r} 0.375 \\ 8 \overline{)3.000} \\ \underline{24} \\ 60 \\ \underline{56} \\ 40 \\ \underline{36} \\ 40 \\ \underline{40} \\ 0 \end{array}$
5) Dividend	The number being divided. $15 \div 3 \rightarrow 15$ is the dividend.	6) Divisor	The number by which another is divided. $15 \div 3 \rightarrow 3$ is the divisor.

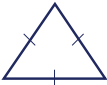



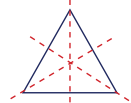



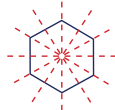


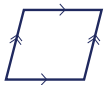
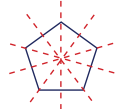
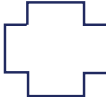





KPI 7.10 Area

1) Area	A measure of the space inside a 2D shape. Area is measured in square units. E.g. square centimetres (cm ²), square metres (m ²).		
2) Area of a Rectangle	Area = length x width 	3) Area of Parallelogram	Area = base x height 
4) Area of Triangle	Area = $\frac{\text{base} \times \text{height}}{2}$ 	5) Compound Area	Split into regular shapes Find the area of each Sum the areas 
6) Units of Area	$1 \text{ cm}^2 = 100 \text{ mm}^2$; $1 \text{ m}^2 = 10,000 \text{ cm}^2$		
7) Area of Trapezium	Sum of the parallel sides. Divide by 2. Multiply by the vertical height.	$A = \left(\frac{a+b}{2}\right) \times h$	

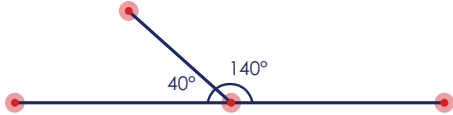
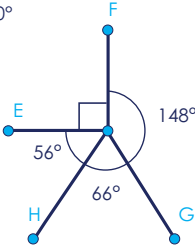
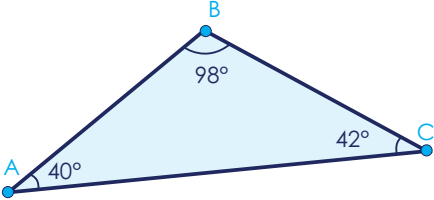
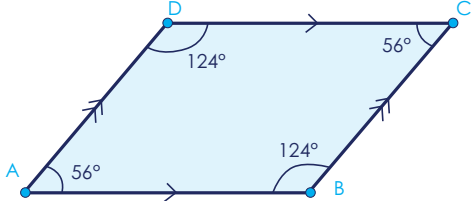
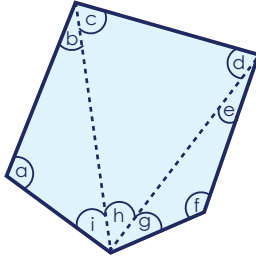
KPI 7.11-7.14 Fractions

<p>1) Fraction</p>	<p>Part of a whole. The result of dividing one integer by a second (non-zero) integer.</p>	<p>$\frac{3}{4}$ ← Numerator How many equal parts do you have? ← Denominator How many equal parts is the whole divided into?</p>	
<p>2) Proper Fraction</p>	<p>The numerator is smaller than the denominator e.g. $\frac{5}{6}$</p>	<p>3) Improper fraction</p>	<p>The numerator is greater than or equal to the denominator e.g. $\frac{11}{8}$</p>
<p>4) Mixed number</p>	<p>A whole number combined with a fraction. e.g. $2\frac{1}{3}$</p>	<p>5) Simplify a fraction</p> <p>Divide both the numerator and the denominator of the fraction by their HCF.</p> 	
<p>6) Writing one number as a fraction of another</p>	<p>Write £15 as a fraction of £25. $\frac{15}{25} = \frac{3}{5}$</p>		
<p>7) Equivalent Fractions</p>	<p>Fractions which have the same value. The numerator and the denominator can be multiplied or divided by the same number.</p>	<p>E.g. Fractions equivalent to $\frac{3}{5}$: $\frac{3}{5} \times \frac{2}{2} = \frac{6}{10}$ $\frac{3}{5} \times \frac{3}{3} = \frac{9}{15}$ $\frac{3}{5} \times \frac{4}{4} = \frac{12}{20}$ $\frac{3}{5} \times \frac{10}{10} = \frac{30}{50}$</p>	
<p>8) Convert an integer to a fraction</p>	<p>Whole numbers are an integer with a denominator of 1.</p>	<p>$3 = \frac{3}{1} = \frac{15}{5}$</p> 	
<p>9) Converting an improper fraction to a mixed number</p>	<p>Divide the numerator by the denominator. Write down the whole number of the answer and the remainder as the numerator of the fraction. The denominator of the mixed number is the same as the denominator of the improper fraction.</p>	<p>$\frac{15}{7} = 2\frac{1}{7}$</p>	
<p>10) Converting a mixed number to an improper fraction</p>	<p>Change the whole number into a fraction (same denominator) and add on the fraction part.</p>	<p>$2\frac{3}{4} = \frac{8}{4} + \frac{3}{4} = \frac{11}{4}$</p>	
<p>11) Add/Subtract Fractions</p>	<p>Make the denominators the same (find the LCM). Use equivalent fractions to change each fraction to the common denominator. Add/subtract the numerators only.</p>	<p>$\frac{2}{7} + \frac{2}{5} = \frac{10}{35} + \frac{14}{35} = \frac{24}{35}$</p>	
<p>12) Order Fractions</p>	<p>Find the lowest common denominator. Write equivalent fractions with the LCD. Order from the smallest to largest numerator. Rewrite original fractions in the new order.</p>	<p>$\frac{2}{3}, \frac{5}{6}, \frac{4}{5}$ $\frac{20}{30}, \frac{25}{30}, \frac{24}{30}$ $\frac{2}{3}, \frac{4}{5}, \frac{6}{6}$</p>	
<p>13) Convert fractions to decimals</p>	<p>Use short division. E.g. to convert $\frac{3}{8}$ to a decimal: $8 \overline{)3.000} \begin{matrix} 0.375 \\ 364 \\ 3000 \end{matrix}$</p>	<p>14) Fractions of an amount</p>	<p>We divide the amount by the denominator and then multiply the result by the numerator. E.g. $\frac{2}{7}$ of 35 $35 \div 7 = 5$ $2 \times 5 = 10$</p>

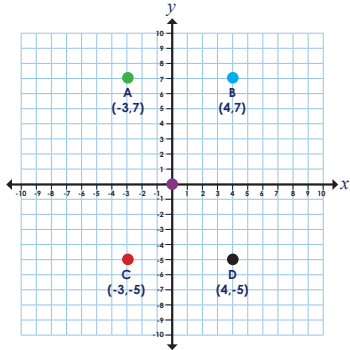
KPI 7.15 Polygons

1) 3 sides	Triangle	2) 4 sides	Quadrilateral	23) Line symmetry	24) Rotational symmetry
3) 5 sides	Pentagon	4) 6 sides	Hexagon	The mirror lines of a shape. If a polygon is regular, the number of sides is equal to the number of lines of symmetry.	The number of positions in which the rotated object appears unchanged. The number of positions is called the order of the symmetry. For example, Order 3 tells us that a shape can be rotated into three positions where the shape appears unchanged.
5) 7 sides	Heptagon	6) 8 sides	Octagon		
7) 9 sides	Nonagon	8) 10 sides	Decagon		
9) 11 sides	Hendecagon	10) 12 sides	Dodecagon		
11) Equilateral Triangle	<ul style="list-style-type: none"> • 3 equal angles • 3 equal sides 	12) Isosceles Triangle	<ul style="list-style-type: none"> • 2 equal angles • 2 equal sides 		
13) Scalene Triangle	<ul style="list-style-type: none"> • All angles are different • All sides are different 	14) Right-angled Triangle	<ul style="list-style-type: none"> • One angle of 90° • Can be isosceles or scalene 	<p>Three lines of symmetry</p>  <p>Equilateral Triangle</p>	 <p>No rotational symmetry</p>
15) Square	<ul style="list-style-type: none"> • 4 right angles • 4 equal sides • 2 pairs of parallel sides 	16) Rectangle	<ul style="list-style-type: none"> • 4 right angles • 2 pairs of parallel sides • 2 pairs of equal sides 	<p>Six lines of symmetry</p>  <p>Regular Hexagon</p>	 <p>Order 3</p>
17) Parallelogram	<ul style="list-style-type: none"> • 2 pairs of equal sized angles • 2 pairs of parallel sides • 2 pairs of equal sides 	18) Rhombus	<ul style="list-style-type: none"> • 4 equal sides • 2 pairs of equal sized angles • 2 pairs of parallel sides 	<p>Five lines of symmetry</p>  <p>Regular Pentagon</p>	 <p>Order 4</p>
19) Trapezium	<ul style="list-style-type: none"> • 1 pair of parallel sides 	20) Right-angled Trapezium	<ul style="list-style-type: none"> • 2 right angles • 1 pair of parallel sides 		
21) Isosceles Trapezium	<ul style="list-style-type: none"> • 1 pair of parallel sides • 2 pairs of equal sides • 2 pairs of equal sized angles 	22) Kite	<ul style="list-style-type: none"> • 1 pair of equal sized angles • 2 pairs of equal sides 		 <p>Order 5</p>

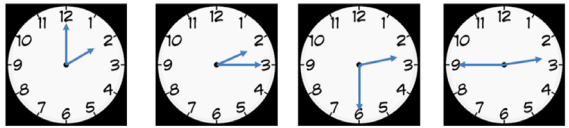
KPI 7.16 Angles

<p>1) Angle</p>	<p>An angle is a measure of turn from one line segment to another. One whole turn is equal to 360 degrees.</p>	<p>2) Degree</p>	<p>The most common unit of measurement for angles.</p>
<p>3) Acute Angle</p>	<p>Less than 90°</p>	<p>4) Right Angle</p>	<p>Exactly 90°</p>
<p>5) Obtuse Angle</p>	<p>Greater than 90° but less than 180°</p>	<p>6) Reflex Angle</p>	<p>Greater than 180°</p>
<p>7) Angles on a straight line</p>	<p>Angles on a straight line sum to 180°</p> 	<p>8) Angles around a point</p>	<p>Angles around a point sum to 360°</p> 
<p>9) Angles in a triangle</p>	<p>Angles in a triangle sum to 180°</p> 	<p>11) Angles in any polygon</p>	<p>Any polygon can be split into several triangles to find the sum of the total interior angles.</p> $a + b + i = 180^\circ$ $c + d + h = 180^\circ$ $e + f + g = 180^\circ$ <p>So, total sum of interior angles = 540° This information allows us to find a missing angle.</p>
<p>10) Angles in a quadrilateral</p>	<p>Angles in a quadrilateral sum to 360°</p> 		

KPI 7.17 Co ordinates

<p>1) Coordinates</p>	<p>Written in pairs and inside a bracket. The first number is the <i>x</i> coordinate (horizontal position). The second number is the <i>y</i> coordinate (vertical position).</p>		<p>Point A is in the SECOND quadrant</p> <p>Point B is in the FIRST quadrant</p> <p>Point C is in the THIRD quadrant</p> <p>Point D is in the FOURTH quadrant</p> <p>The coordinate (0,0) is also known as the ORIGIN</p>
<p>2) Origin</p>	<p>The coordinate (0,0) is where the <i>x</i> axis and <i>y</i> axis intersect.</p>	<p>6) Midpoint of two coordinates</p>	<p>6) Midpoint of two coordinates</p> <ol style="list-style-type: none"> 1. Add the <i>x</i> coordinates, divide by 2. 2. Add the <i>y</i> coordinates, divide by 2. 3. Write as a coordinate (<i>x</i>, <i>y</i>). <p>E.g. The midpoint of (2, 2) and (8, 4) = (5, 3)</p> <p>midpoint of <i>x</i> coordinates: $\frac{2+8}{2} = \frac{10}{2} = 5$</p> <p>midpoint of <i>y</i> coordinates: $\frac{2+4}{2} = \frac{6}{2} = 3$</p>
<p>3) Axis Plural-Axes</p>	<p><i>x</i> axis is horizontal (<i>y</i> = 0). <i>y</i> axis is vertical (<i>x</i> = 0).</p>		
<p>4) Vertical lines</p>	<p>Always in the form <i>x</i> = <i>a</i>.</p>		
<p>5) Horizontal lines</p>	<p>Always in the form <i>y</i> = <i>a</i>.</p>		

KPI 7.18 Time

<p>1) Analogue</p>												
<p>2) Digital</p>	<p>Times will appear differently on digital clocks depending on whether they are in 12-hour clock or 24-hour clock mode.</p> <table style="width: 100%; text-align: center;"> <tr> <td style="color: green;">2:00 am → 02:00</td> <td style="color: green;">2:15 am → 02:15</td> <td style="color: green;">2:30 am → 02:30</td> <td style="color: green;">2:45 am → 02:45</td> </tr> <tr> <td style="color: green;">2:00 pm → 14:00</td> <td style="color: green;">2:15 pm → 14:15</td> <td style="color: green;">2:30 pm → 14:30</td> <td style="color: green;">2:45 pm → 14:45</td> </tr> </table>				2:00 am → 02:00	2:15 am → 02:15	2:30 am → 02:30	2:45 am → 02:45	2:00 pm → 14:00	2:15 pm → 14:15	2:30 pm → 14:30	2:45 pm → 14:45
2:00 am → 02:00	2:15 am → 02:15	2:30 am → 02:30	2:45 am → 02:45									
2:00 pm → 14:00	2:15 pm → 14:15	2:30 pm → 14:30	2:45 pm → 14:45									
<p>3) Days</p>	<p>There are 24 hours in one day.</p>	<p>4) Hours</p>	<p>1 hour = 60 minutes</p>	<p>5) Minutes</p>	<p>1 minute = 60 seconds</p>							