Mid Key Stage 3 Maths - Topic List

Paper 1 - Calculator (50 marks):

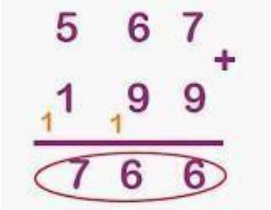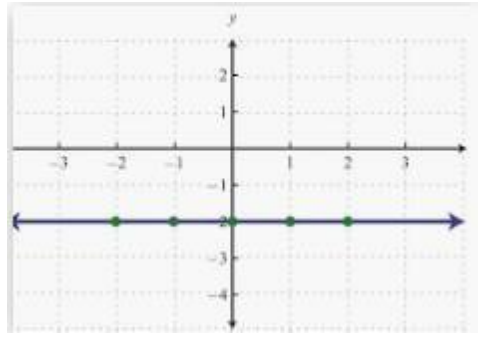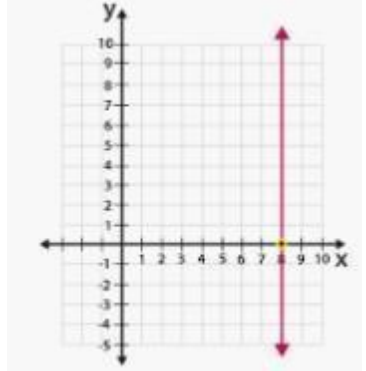| Topic	Marks available
Types of number	8
Use of a calculator	6
Algebra skills - solving, simplifying, substitution, expanding	12
Properties of 2D shapes	2
Area and Perimeter	10
Sequences	5
Representing data - bar charts, pie charts	4
Use of angle facts to find missing angles.	3

Paper 2 - Non-Calculator (50 marks):

Topic	Marks available
Place Value and rounding	8
Written calculations - four operations	10
Calculations using the four operations with fractions	7
Order of Operations	4
Calculating a fraction or percentage of an amount	10
Coordinates and simple straight lines	3
Calculating missing angles on straight lines, around a point and in triangles.	5
Algebra skills - solving, simplifying, substitution, expanding	3

Please see following pages for knowledge organisers for each of the key topics on the assessment.

Addition and Subtraction

Topic/Skill	Definition/Tips	Example
1. Addition	… where a group of values are added together to find the overall total.	
2. Addition: – Key words	"total", "sum", "combined", "plus", "altogether", "how many", "increase"	Find the total of 45, 62 and 35 … 45 + 62 + 35 = 142 Increase 85 by 192 … 85 + 192 = 277
3. Subtraction	… where a group of values are subtracted together to find how many remain.	
4. Subtraction: - Key words	"difference", "minus", "less than", "decrease", "reduce", "deduct"	Deduct 85 from 193 193 – 85 = 108 What is the difference of 820 and 190? 820 – 190 = 630
5. Integer	… meaning the value used has to be a whole number.	Integer – 8, 10, 50, 140, 940 [… any whole number]
6. Decimal	… meaning the value is not whole or complete and uses a decimal point.	Decimal – 1.5, 10.2, 17.84, 0.412 [… any number using a decimal point]
7. Financial Addition	… where a total is required using a given currency. On bank statements, the term 'credit' is used when money is paid into an account.	he total of £1.05, £2.10 and £4.26 1.05 + 2.10 + 4.26 = £7.41
8. Financial Subtraction	… where a total is required using a given currency. On bank statements, the term 'debit' is used when money is paid out of an account.	Jack pays £4.80 with a £10 note. How much change does he get? 10.00 – 4.80 = £5.20

Coordinates

Topic/Skill	Definition/Tips	Example
1. Coordinates	Written in **pairs**. The **first** term is the **x-coordinate** (movement **across**). The **second** term is the **y-coordinate** (movement **up or down**)	A: (4, 7) B: (-6, -3)
2. Horizontal lines	Horizontal lines show a line where ever co-ordinate has the same *y* value. The way to remember which is which: Horizontal shows the Horizon These lines must cut the y axis.	Graph for *y* = -2
3. Vertical lines	Vertical lines show a line where ever co-ordinate has the same *x* value. The way to remember which is which: Vertical shows Vertigo (Fear of Heights) These lines must cut the *x* axis.	Graph for x = 8

Perimeter

Topic/Skill	Definition/Tips	Example
1. Perimeter	The **total distance** around the **outside** of a shape. Units include:cm, m, km etc.	**8 cm** **5 cm** [rectangle] Perimeter = 8 + 5 + 8 + 5 = 26cm

2. Compound Shape	A shape made up of a **combination of other known shapes** put together.	

Place Value

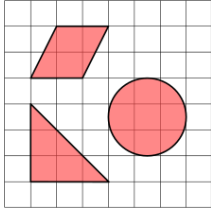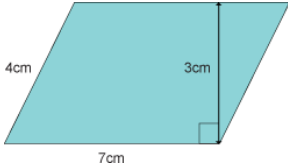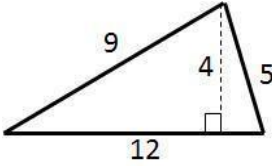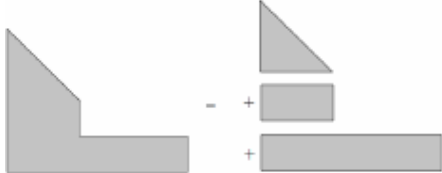| Topic/Skill	Definition/Tips	Example
1. Digit	Any of the ten numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9	The number 23,452 has five digits
2. Place Value	The **value** of a **digit** depending on its position.	The numbers 432, 24, 2 004 all have the number 2. The place value of 2 is different 43**2** the value is 2 as it is the ones column **2**4 the value is 20 as it is in the tens column **2,**004 the value is 2000 as it is in the thousands column
3. Place Value Columns	A chart or grid to show the place value of digits**.** As we move left, each position is 10 **times bigger.**	<table><tr><td>Millions</td><td>Hundred Thousands</td><td>Ten Thousands</td><td>Thousands</td><td>Hundreds</td><td>tens</td><td>Ones</td></tr><tr><td>2</td><td>4</td><td>1</td><td>3</td><td>6</td><td>2</td><td>7</td></tr></table> Two million, four hundred and thirteen thousand, six hundred and twenty - seven
4. Read and write numbers	The place value columns helps us **read** and **write** numbers.	<table><tr><td>Millions</td><td>Hundred Thousands</td><td>Ten Thousands</td><td>Thousands</td><td>Hundreds</td><td>tens</td><td>Ones</td></tr><tr><td></td><td></td><td></td><td>3</td><td>5</td><td>2</td><td>7</td></tr></table> umber is made of 3,000 +500 + 20 + 7 Three thousand, five hundred and twenty-seven
5. Integers	Whole numbers. These can be positive or negative.	4, 78, 124 and -34 are all integers
6. Powers of 10	10 multiplied by itself a certain number of times	10, 100, 1000, 10,000, 100,000, 1,000,000

7. Comparing Integers	We can use the symbols = ≠ < > to compare integers. < less than > greater than = equal to ≠ not equal to	902 < 93 (less than) 8106 > 8099 (greater than) 305 = three hundred and five (equal to) 305 ≠ 350 (not equal)
8. Decimals	Decimal means "based on 10" Digits can be placed to the left or right of a decimal point, to show values greater than one or less than one.	17.591 is a decimal number On the left of the decimal is a whole number

9. Decimal Point	The **decimal point** positions all the digits in a number.	2.3 means 2 ones and 3 tenths
	Place value chart including decimals As we move left, each position is 10 **times bigger.** As we move right, each position is 10 **times smaller.**	Write in figures seventy-two hundredths 0.72
10. Decimal Place	The **position** of a digit to the **right of a decimal point**.	In the number 0.372, the 3 is in the **1st decimal place**. Its value is 0.3 or 3 **tenths**

11. Comparing Decimals	We can put the numbers in order from smallest to biggest (ascending order)
	
	   1. Find the value of each digit starting from the left.
	
	0. Compare the digits with the same place value starting from the left.
		Put these numbers in ascending order 346.01
		
		    361.04310.46
		
		1st digit is 3 - 300 is the same in all 2nd digit is 4, 6, and 1 - 1 is the smallest in the tens column so 310.46 is the smallest.
		The next smaller is 4 and last is 6. So in order
		
		310.46 346.01361.04

Rounding

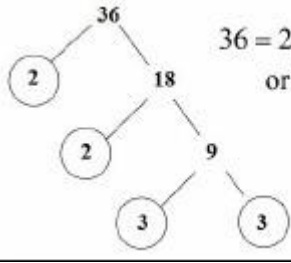| Topic/Skill	Definition/Tips	Example
1. Integers	Whole numbers. These can be positive or negative	4, 78, 124 and -34 are all integers
2. Powers of 10	10 multiplied by itself a certain number of times	10, 100, 1000, 10,000, 100,000, 1,000,000
3. Rounding to 10	To make a number simpler but keep its value close to what it was. If the **digit to the right** of the rounding digit is **less than 5, round down**. If the **digit to the right** of the rounding digit is **5 or more, round up**.	46 rounds up to **50**, because 46 is closer to 50 than 40. 246 rounds up to 2**50** which is the nearest 10. 3,246 rounds to 3,2**50** which is the nearest 10
4. Rounding to 100	To make a number simpler but keep its value close to what it was.	278 rounds up to **300** which is the nearest 100 3,278 rounds up to 3,**300** which is the nearest 100
5. Rounding to 1,000	To make a number simpler but keep its value close to what it was.	4,367 rounds down to 4,000 which is the nearest 1,000 4,867 rounds up to 5,000 which is the nearest 1,000
6. Significant Figure	The significant figures of a number are the digits which **carry meaning** (ie. are significant) to the size of the number. The **first significant figure** is the first non zero digit from the left In a number with a decimal, trailing zeros are not significant. The zeros at the end are not significant	In the number 4,867 are 4 significant figures and the 1ˢᵗ one is 4 In the number 0.00821, there are three significant figures the 1ˢᵗ significant figure is the 8 In the number 2,740 the 0 is not a significant figure. This number has 3 significant figures..

Area

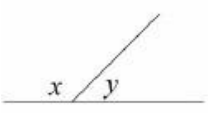| Topic/Skill	Definition/Tips	Example
1.Area	The amount of **space inside** a shape. Units include: mm2, cm2, m2	
2. Area of a Rectangle	**Length x Width**	9 cm 4 cm $A=36cm^2$
3. Area of a Parallelogram	**Base x Perpendicular Height** Not the slant height.	4cm 3cm 7cm A=21cm2
4. Area of a Triangle	**Base x Height ÷ 2**	9 4 5 12 $A=24cm^2$
5. Compound Shape	A shape made up of a **combination of other known shapes** put together.	

Averages
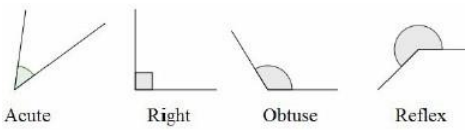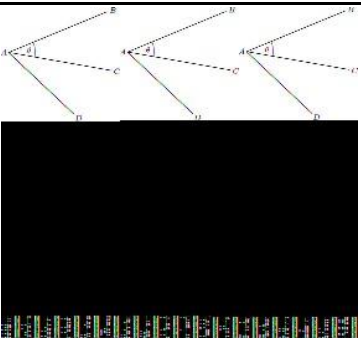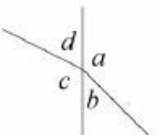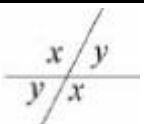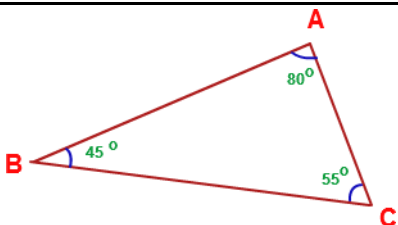
Topic/Skill	Definition/Tips	Example
1. Mean	**Add** up the values and **divide** by how many values there are.	The mean of 3, 4, 7, 6, 0, 4, 6 is $3+4+7+6+0+4+67=5$
2. Median Value	The **middle** value. Put the data in order and find the middle one. If there are **two middle values**, find the number half way between them by **adding them together and dividing by 2**.	Find the median of: 4, 5, 2, 3, 6, 7, 6 Ordered: 2, 3, 4, **5**, 6, 6, 7 Median = 5
3. Mode /Modal Value	**Most** frequent/common. Can have more than one mode (called bi-modal or multi-modal) or no mode (if all values appear once)	Find the mode: 4, 5, 2, 3, 6, 4, 7, 8, 4 Mode = 4

| 4. Range | **Highest value subtract the Smallest value**

Range is a 'measure of spread'. The smaller the range the more consistent the data. | Find the range: 3, 31, 26, 102, 37, 97.

Range = 102-3 = 99 |

Types of Number

Topic/Skill	Definition/Tips	Example
1. Multiple	The result of multiplying a number by an integer. The **times tables** of a number.	The first five multiples of 7 are: 7, 14, 21, 28, 35
2. Factor	A number that **divides exactly** into another number without a remainder. It is useful to write factors in pairs	The factors of 18 are: 1, 2, 3, 6, 9, 18 The factor pairs of 18 are: 1, 18 2, 9 3, 6
3. Lowest Common Multiple (LCM)	The **smallest** number that is in the **times tables** of each of the numbers given.	The LCM of 3, 4 and 5 is 60 because it is the smallest number in the 3, 4 and 5 times tables.
4. Highest Common Factor (HCF)	The **biggest** number that **divides exactly** into two or more numbers.	The HCF of 6 and 9 is 3 because it is the biggest number that divides into 6 and 9 exactly.
5. Prime Number	A number with **exactly two factors**. A number that can only be divided by itself and one. The number **1 is not prime**, as it only has one factor, not two.	The first ten prime numbers are: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29
6. Prime Factor	A factor which is a prime number.	The prime factors of 18 are: 2, 3
7. Product of Prime Factors	Finding out which **prime numbers multiply** together to make the **original** number. Use a **prime factor tree.** Also known as 'prime factorisation'.	

Angles

Topic/Skill	Definition/Tips	Example
1. Types of Angles	**Acute angles** are less than 90°. **Right angles** are exactly 90°. **Obtuse angles** are greater than 90° but less than 180°. **Reflex angles** are greater than 180° but less than 360°.	Acute Right Obtuse Reflex
2. Angle Notation	Can use **one lower-case** letters, eg. or x Can use **three upper-case** letters, eg. BAC	
3. Angles at a Point	**Angles around a point add up to 360°.**	$a+b+c+d=360^o$
4. Angles on a Straight Line	**Angles around a point on a straight line add up to 180°.**	$x+y=180^o$
5. Opposite Angles	**Vertically opposite angles are equal.**	
6. Angles in a Triangle	**Angles in a triangle add up to 180°.**	

Percentages

Topic/Skill	Definition/Tips	Example
1. Percentage	**Number of parts per 100.**	31% means $\frac{31}{100}$

| 2. Finding 10% | To find **10%, divide by 10** | 10% of £36 = 36÷10=£3.60 |
| 3. Finding 1% | To find **1%, divide by 100** | 1% of £8 = 8÷100 = £0.08 |

Algebra Skills

Topic/Skill	Definition/Tips	Example
1. Expression	A mathematical statement written using **symbols**, **numbers** or **letters**,	$3x + 2$ or $5y^2$
2. Equation	A statement showing that **two expressions are equal**	$2y - 17 = 15$
3. Identity	An equation that is **true for all values** of the variables An identity uses the symbol:	$2x \equiv x+x$
4. Formula	Shows the **relationship** between **two or more variables**	Area of a rectangle = length x width or A= LxW
5. Simplifying Expressions	**Collect 'like terms'.** Be careful with negatives. x2 and x are not like terms.	2x+3y+4x-5y+3=6x-2y+3 3x+4-x2+2x-1=5x-x2+3
6. x times x	The answer is x2 not 2x.	Squaring is multiplying by itself, not by 2.
7. p×p×p	The answer is p3 not 3p	If p=2, then p^3=2x2x2=8, not 2x3=6
8. p+p+p	The answer is 3p not p3	If p=2, then 2+2+2=6, not 2^3=8
9. Expand	To expand a bracket, **multiply** each term **in the bracket** by the expression **outside** the bracket.	3(m+7)=3x+21

Sequences

Topic/Skill	Definition/Tips	Example
1. Linear Sequence	A number pattern with a **common difference**.	2, 5, 8, 11… is a linear sequence
2. Term	**Each value** in a sequence is called a term.	In the sequence 2, 5, 8, 11…, 8 is the third term of the sequence.
3. Term-to-term rule	A rule which allows you to **find the next term** in a sequence if you **know the previous term**.	First term is 2. Term-to-term rule is 'add 3' Sequence is: 2, 5, 8, 11…

4. nth term	A rule which allows you to **calculate the term** that is in the **nth position** of the sequence. Also known as the 'position-to-term' rule. **n** refers to the **position** of a term in a sequence.	nth term is 3n-1 The 100ᵗʰ term is $3\times100-1=299$

Fractions

Topic/Skill	Definition/Tips	Example
1. Multiplying Fractions	1. Multiply the top numbers (numerators) 2. Multiply the bottom numbers (denominators) 3. Simplify the fraction if needed.	$\frac{3}{5} \times \frac{5}{6} = \frac{15}{30}$ $= \frac{1}{2}$
2. Multiply a fraction by integer	Make the whole number a fraction, by putting it over 1. Then multiply as above	$10 \times \frac{5}{6} = \frac{10}{1} \times$ $\frac{50}{6}$
3. Multiply mixed	Change them into improper fractions	
3. Multiplying mixed numbers	Convert numbers from mixed numbers to improper fractions Then multiply as above	5 ½ x 1 ¼ = $1\frac{1}{2} \times 2\frac{2}{3} = \frac{3}{2} \times$ $\frac{24}{6} = 4$ 11/2 x 5/4 = 55/8
4. Reciprocal	The reciprocal of a number is **1 /number**.	The reciprocal of 8 is 1/8
5. Dividing Fractions	Keep, flip, change.	$\frac{5}{6} \div \frac{2}{3} =$ $\frac{5}{6} \times \frac{3}{2} = \frac{15}{12}$

6. Adding and subtracting	Step 1:Find a common denominator. Step 2: "Whatever you do to the denominator, you do to the numerator". Step 3: Add or subtract the numerator.	$\frac{3}{8} + \frac{1}{6} = \frac{9}{24} +$ $= \frac{13}{24}$