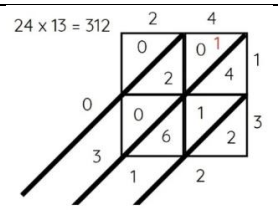
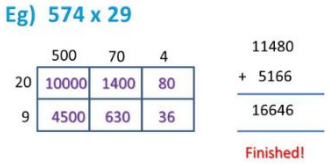
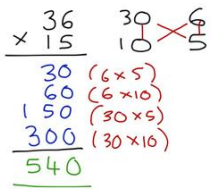
Year 7 Mathematics Extending HT 1

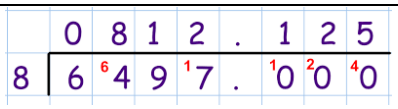
Number Skills

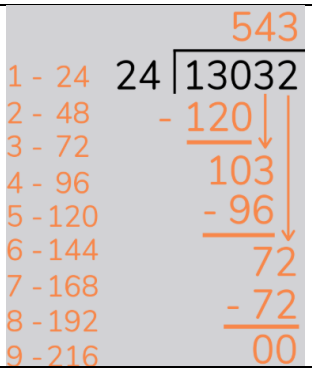
1.	Addition	To find the sum or total of two or more numbers.
2.	Subtraction	To find the difference between two numbers.
3.	Multiplication	Repeated addition of a number. Also called 'product'
4.	Division	The process of calculating the number of times one number is contained in another.
5.	Divisible	Can be divided by a number without a remainder.

Multiplication methods

6.	Lattice	
7.	Grid	
8.	Column	

Division Methods

9.	Short	e.g. 6497 ÷ 8 

10.	Long	e.g. 13032 ÷ 24	

Times Tables

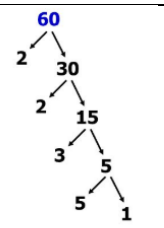
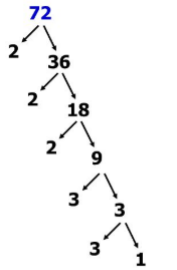
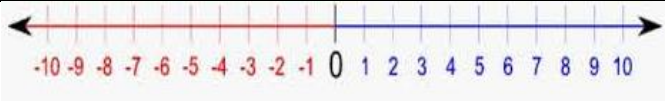
×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

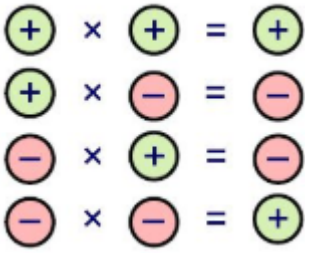
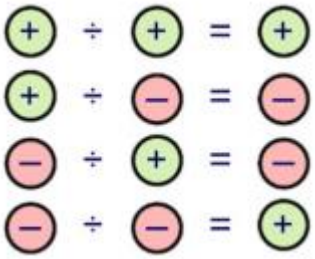
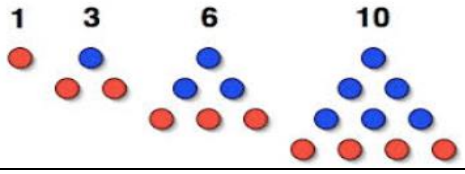
Divisibility Rules

11.	A number is divisible	
	by:	if:
	2	The last digit is divisible by 2
	3	The sum of the digits is divisible by 3
	4	The number made by the last two digits is divisible by 4
	5	The last digit is 5 or 0
	6	The number is divisible by 2 and 3
	8	The number made by the last 3 digits is divisible by 8
	9	The sum of its digits is divisible by 9
	10	The last digit is 0.

12.	Operations	Symbols and words to show how to combine numbers.			
		×	Multiply	+	Add
		÷	Divide	−	Subtract

13.	Inverse Operations	The operation used to reverse the original operation	
		+ and − are inverse	× and ÷ are inverse
		Finding the square root is the inverse of finding the square of a number.	
		Finding the cube root is the inverse of finding the cube of a number.	

14.	Order of operations	The order in which operations should be done.	B I DM AS	Brackets Indices Divide and Multiply Add and Subtract
15.	Integer	A whole number that is can be positive, negative or zero.		
16.	Decimal	A number with a decimal point in it, which can be negative or positive.		
17.	Rounding	Changing a number to a simpler, easy to use value.		
18.	Approximate	An easier figure to use close to the value.		
19.	Multiple	The result of multiplying a number by an integer.		
20.	Factor	A number that divides into another number without a remainder.		
21.	Prime number	A number with exactly two factors; 1 and itself.		
22.	Prime numbers	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.		
23.	Product	The answer when two or more numbers are multiplied together.		
24.	Prime factor decomposition	Writing a number as a product of its prime factors.		 $60 = 2 \times 2 \times 3 \times 5$ $60 = 2^2 \times 3 \times 5$  $72 = 2 \times 2 \times 2 \times 3 \times 3$ $72 = 2^3 \times 3^2$
25.	Highest common factor	HCF	The highest number that divides exactky into two or more numbers.	e.g. the HCF of 12 and 24 is 12
26.	Lowest common multiple	LCM	The smallest positive integer that is a multiple of two or more numbers.	e.g. the LCM of 12 and 24 is 24
27.	Negative number	A number that is less than zero.		

28.	Negative number rules	When multipllying or dividing with numbers that include negative numbers to following applies:		
29.	Ascending order	A set of numbers arranged from smallest to biggest.		
30.	Descending order	A set of numbers arranged from biggest to smallest.		
31.	Square numbers	The product of a number multiplied by itself.		
32.	Cube numbers	The product of multiplying a number by itself three times		
33.	Triangular numbers	Numbers that can make a triangular dot pattern.		

Analysing and displaying data

Definitions

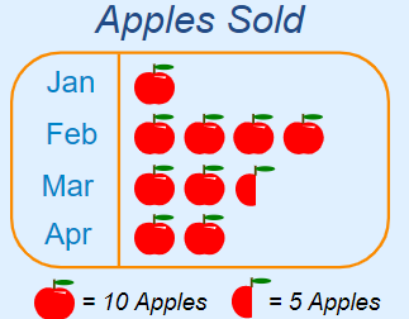
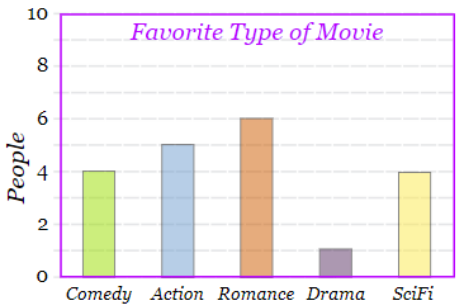
34.	Qualitative	Data decribed by words.
35.	Quantitative	Data that is in number form that can be discrete or continuous.
36.	Discrete	Data that can be counted and has a finite number of possible values.
37.	Continuous	Data that can be measured and has an infinite number of possible values within a range.

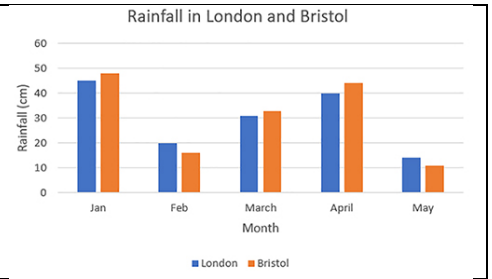
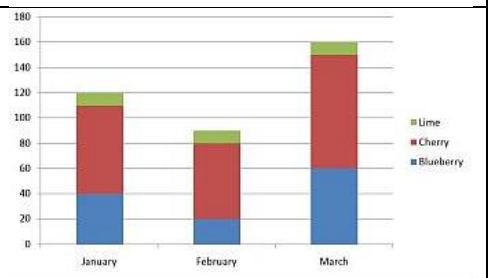
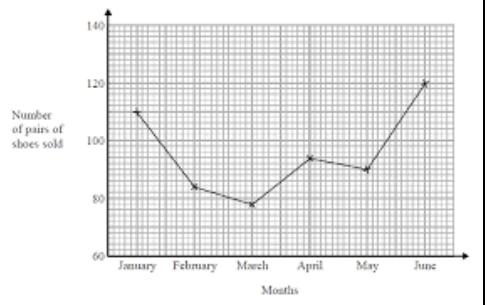
Averages and Measures of central tendency

38.	Mode	The value that occurs most often.
39.	Range	The largest value minus the smallest value.
40.	Median	The middle value when the numbers are in ascending order.
41.	Mean	Add up all the amount. Divide by how many values there are.

Averages from frequency tables

42.	Modal class	The class with the highest frequency

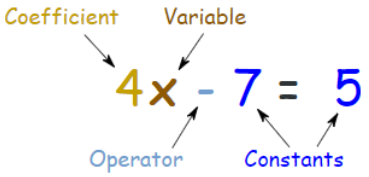
43.	Median	If the total frequency is n, then the median lies in the class with the $\frac{n+1}{2}$th value in it.	
44.	Mean from a frequency table Times → Add ↓↓ Divide ←	No of make-up items in handbags No of Items x / Freq f / f x x 1 / 7 / 1 x 7 = 7 2 / 2 / 2 x 2 = 4 3 / 1 / 3 x 1 = 3 4 / 4 / 4 x 4 = 16 5 / 2 / 5 x 2 = 10 16 / 40	Mean = $\frac{40}{16}$ = 2.5
45.	Estimated mean from a grouped frequency table Times → Add ↓↓ Divide ←	Class Interval / Mid-point / Frequency / Mid-point × Frequency $140 \le h < 150$ / 145 / 6 / 145 × 6 = 870 $150 \le h < 160$ / 155 / 16 / 155 × 16 = 2480 $160 \le h < 170$ / 165 / 21 / 165 × 21 = 3465 $170 \le h < 180$ / 175 / 8 / 175 × 8 = 1400 Totals / 51 / 8215	Mean = 8215 ÷ 51 =161.07843... = 161.08 (2dp)
46.	Estimate of range from grouped freqyuency table	The maxiumum possible value minus the smallest possible value.	
Displaying data			
47.	Two way table	A table that can be used to complare two discrete data sets.	What is your favorite sport to watch on television? Football / Basketball / Baseball Males: 40 / 22 / 15 Females: 12 / 16 / 45 Total: 52 / 38 / 60
48.	Pictogram	A chart that uses pictures to represent quantities. Must include a key.	
49.	Bar chart	A chart to display discrete data where the height of the bar shows the frequency.	

50.	Dual bar chart	A bar chart used to compare data sets where bars are drawn next to each other to compare heights.	
51.	Composite bar chart	A bar chart where bars are split to show the different quantities within each bar.	
52.	Times series graph	A line graph that has time plotted on the horizontal axis.	

Kettering science Academy Maths

Year 7 Mathematics Extending HT 2

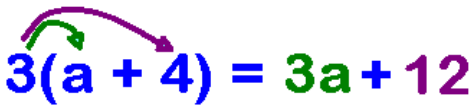
Algebra –definitions

1.	Variable	A letter representing a varying or unknown quantity.	
2.	Coefficient	A number which multiplies a variable e.g. 4 is the coefficient in 4a	
3.	Term	One part of an expression/equation/formula Can involve multiplying and dividing coefficients and variables Separated from other terms by addition and subtraction	e.g. $4c$ $\frac{w}{5}$
4.	Like terms	Terms that have the same variable but have different coefficients	e.g. c + 4c are like terms c^2 and c^3 are not like terms
5.	Constant	A fixed value. A number on its own or sometimes a letter such as a, b or c to represent a fixed number.	
6.	Expression	One or a group of terms. Can include variables, constants, operators and grouping symbols. No 'equals' sign	e.g. 3y -3 $3y^2 + y^3$
7.	Equation	Contains an 'equals' sign, = Has at least one variable	e.g. 3y – 3 = 12
8.	Formula	A special type of equation that shows the relationship between a set of variables	
9.	Formulae	Plural of 'formula'	
10.	Identity	An equation that is true no matter what values are chosen, ≡	e.g. 3y ≡ 2y – y for any value of y.
11.	Subject	The variable on its own on one side of the equals sign.	
12.	Substitute	Replace a variable with a number.	$a = 3, b = 2$ *and* $c = 5$. **Find:** 1. $2a = 2 \times 3 = 6$ 2. $3a - 2b = 3 \times 3 - 2 \times 2 = 5$ 3. $7b^2 - 5 = 7 \times 2^2 - 5 = 23$
13.	Simplify	Minimising the size of an expression	
14.	Factorise	Splitting an expression into a product of factors	

15.	Expand	Removing brackets by using multiplication	
16.	Solve	Find the value of an unknown	
Algebraic Notation			
17.	Adding like terms	Add the coefficients	$b + 2b = 3b$
18.	Subtracting like terms	Subtract the coefficients	$5b - 4b = b$
19.	Multiplying like terms	If the base is the same, add the powers	$b \times b = b^2$
20.	Dividing terms	If the base is the same, subtract the powers	$b^5 \div b^2 = b^3$
21.	Adding different terms	Cannot combine if the terms are different.	$b + 2c = b + 2c$
22.	Subtracting different terms	Cannot combine if the terms are different.	$3c - 4 = 3c - 4$
23.	Multiplying different terms	Combine with no '×' sign	$d \times e = de$
24.	Multiplying different terms with coefficients	Combine with no '×' sign, multiply the coefficients	$2d \times 3e = d6e$
25.	Dividing different terms	Write as fractions with no '÷' sign	$3d \div e = \frac{3d}{e}$
26.	Dividing different terms with coefficients	Write as fractions with no '÷' sign, simplify the coefficients where possible.	$14d \div 7e = \frac{2d}{e}$

Expanding (single brackets)

27. Multiply all the terms inside the bracket, by the term on the outside.

28. 

×	$2x$	-3
$2x$	$4x^2$	$-6x$

$4x^2 - 6x$

Factorising (single brackets)

29.
- Find the highest common factor of the terms
- This goes outside the bracket
- Divide each term by the factor to get the new terms inside the bracket
- Always check by expanding your bracket

$2x + 4y$ **2(x + 2y)**

$5x^2y - 10xy$ **5xy(x - 2)**

Expressions

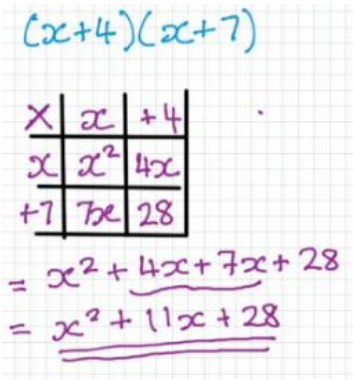
30.	Linear	Can be represented by a straight line No indices above 1	**e.g.** $2x + 2$
31.	Quadratic	An expression where the highest index is 2	**e.g.** $2x^2 + 2x + 2$

Expanding double brackets

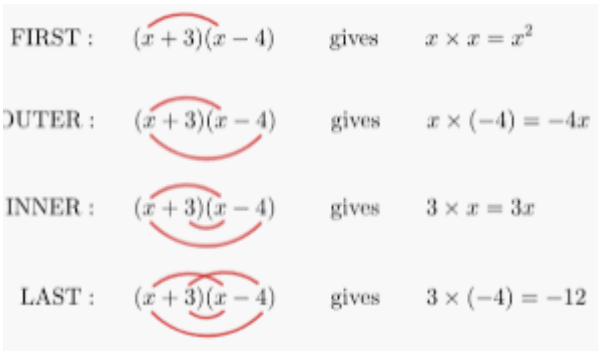
32. Everything in the first bracket must be multiplied by everything in the second

33.

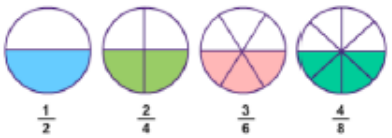
Grid method



FOIL method



Fractions

34.	Fraction	Part of a whole	
35.	Numerator	The number on the top of the fraction	$\frac{numerator}{denominator}$
36.	Denominator	The number on the bottom of the fraction	
37.	Equivalent fractions	Fractions that have the same value but look different.	
38.	Improper fraction	A fraction where the numerator is larger than the denominator.	e.g. $\frac{4}{3}$
39.	Mixed number	A number made from integer and fraction parts.	e.g. $2\frac{2}{3}$
40.	Unit fraction	A fraction that has a numerator of 1	
41.	Reciprocal	The reciprocal of a number is 1 divided by the number.	e.g. the reciprocal of 3 is $\frac{1}{3}$
		Dividing by a number is the same as multiplying by its reciprocal	e.g. $\times$ by $\frac{1}{3}$ is the same as $\div$ by 3

Fractions - processes

42.	Simplifying fractions	Divide the numerator and denominator by the HCF.	$\frac{24}{30} = \frac{4}{5}$
43.	Finding equivalent fractions	Multiply the numerator and denominator by the same number	$\frac{4}{8}$ $\times 2 = 8$ $\times 2 = 16$
44.	Comparing fractions	Write them with a common denominator	
45.	Fraction of an amount	Amount divided by the denominator then multiplied by the numerator	e.g. $\frac{5}{7}$ of 42 $42 \div 7 \times 5 = 30$
46.	Multiply fractions	Multiply the numerators and multiply the denominators	$\frac{6}{7} \times \frac{4}{5} = \frac{6 \times 4}{7 \times 5} = \frac{24}{35}$
47.	Divide fractions	• Flip the second fraction (find the reciprocal). • Change the divide to multiply. • Multiply the fractions.	$\frac{4}{7} \div \frac{5}{6} = \frac{4}{7} \times \frac{6}{5} = \frac{4 \times 6}{7 \times 5} = \frac{24}{35}$
48.	Add or subtract fractions	• Write as fractions with a common denominator. • Add or subtract the numerators	$\frac{2}{8} + \frac{1}{6} = \frac{6}{24} + \frac{4}{24} = \frac{10}{24} = \frac{5}{12}$
49.	Convert improper fractions to mixed numbers	• Divide the numerator by the denominator • The answer gives the whole number part.	$\frac{43}{6} = 7\frac{1}{6}$

		• The remainder becomes the numerator of the fraction part with the same denominator.	
50.	Convert mixed numbers to improper fractions	• Multiply the denominator by the whole number part. • Add the numerator to this. • Put the answer to this back over the denominator	$7\frac{1}{6} = \frac{6 \times 7 + 1}{6} = \frac{43}{6}$
51.	Adding and subtracting mixed numbers	• Convert mixed numbers to improper fractions • Transform both fractions so they have the same denominator • Add or subtract the numerators Convert back to mixed number if applicable	
52.	Multiplying mixed numbers	• Convert mixed numbers to improper fractions • Multiply numerators and multiply the denominators Convert back to mixed number if applicable	
53.	Dividing mixed numbers	• Convert mixed numbers to improper fractions • Flip the second fraction (find the reciprocal) • Change the divide sign to a multiply • Multiply the fractions Convert back to mixed number if applicable	

FDP Conversions

54.	Percentage to decimal	Divide by 100
55.	Decimal to percentage	Multiply by 100
56.	Fraction to percentage	Find an equivalent fraction with 100 as the denominator
57.	Percentage to fraction	Write as a fraction over 100 then simplify
58.	Fraction to decimal	Carry out division or convert to a percentage first
59.	Decimal to fraction	Use place value to find the denominator and simplify or convert to a percentage first

Basics to memorise

60.										
	Fraction	$\frac{1}{100}$	$\frac{1}{10}$	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{4}$
	Decimal	**0.01**	**0.1**	**0.125**	**0.2**	**0.25**	**$0.\dot{3}$**	**0.5**	**$0.\dot{6}$**	**0.75**
	Percentage	1%	10%	12.5%	20%	25%	$33.\dot{3}\%$	50%	$66.\dot{7}\%$	75%