



Calculation Policy

Sedgeberrow C of E First School

Updated September 2021

Calculation Policy

- This policy has been devised to give children a consistent and smooth progression of learning in calculations.
- The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014, **however, it is vital that pupils are taught according to the stage that they are currently working at,** being moved onto the next level or building their confidence by working at a lower age stage. There is also the opportunity to add steps to suit the children's needs.
- It is important that any type of calculation is given a real life context or problem solving approach to enhance their understanding of the purpose of the calculation.

Year 1

Addition and Subtraction

From NC Programme of Study (specific):

Number – addition and subtraction

Statutory requirements

Pupils should be taught to:

- read, write and interpret mathematical statements involving addition (+), subtraction (−) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- add and subtract one-digit and two-digit numbers to 20, including zero
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$.

Use number lines to add by counting on in ones. Encourage children to start with the larger number and count on.



Children should:

- Have access to a wide range of counting equipment, everyday objects, number tracks and number lines and be shown numbers in different contexts.
- Understand that addition can be done in any order.
- Read and write the addition (+) and equals (=) signs within number sentences.
- Strengthen their understanding of the = sign.
- Interpret addition number sentences and solve missing box problems, using concrete objects and number line addition to solve them.

$$8 + 3 = \square \quad 15 + 4 = \square \quad 5 + 3 + 1 = \square \quad \square + \square = 6$$

This builds on from prior learning of adding by combining two sets of objects into one group (5 cubes and 3 cubes) in Early Years.



Bead strings can be used to illustrate addition including bridging through ten by counting on 2 then counting on 3.

Key Vocabulary:
Add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line.

From NC Programme of Study (other):

Number – number and place value

Statutory requirements

Pupils should be taught to:

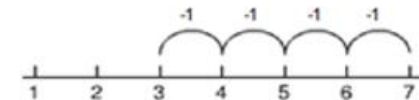
- count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
- count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens
- given a number, identify one more and one less
- identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least
- read and write numbers from 1 to 20 in numerals and words.

Children consolidate understanding of subtraction practically, showing subtraction on bead strings, using cubes etc. and in familiar contexts. Children are introduced to more formal recording using number lines.

Subtracting by taking away

Count back in ones on a numbered number line to take away, with numbers up to 20:

$$7 - 4 = 3$$



Finding the difference

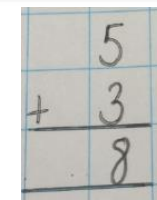
This will be introduced practically with the language 'find the difference' and 'how many more?' in a range of contexts.



Mental Subtraction

Children should start recalling subtraction facts up to and within 10 and 20 and should be able to subtract zero.

By the end of Year 1 introduce the column method with 1 digit numbers.



Key Vocabulary:
Equal to, take, take away, less, minus, subtract, leaves, difference, how many more / less, most, least, count back, how many left?

From NC Programme of Study (specific):

Number – addition and subtraction

Statutory requirements

Pupils should be taught to:

- solve problems with addition and subtraction:
 - using concrete objects and pictorial representations, including those involving numbers, quantities and measures
 - applying their increasing knowledge of mental and written methods
- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
 - a two-digit number and ones
 - a two-digit number and tens
 - two two-digit numbers
 - adding three one-digit numbers
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

From NC Programme of Study (other):

Number – number and place value

Statutory requirements

Pupils should be taught to:

- count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
- recognise the place value of each digit in a two-digit number (tens, ones)
- identify, represent and estimate numbers using different representations, including the number line
- compare and order numbers from 0 up to 100; use $<$, $>$ and $=$ signs
- read and write numbers to at least 100 in numerals and in words
- use place value and number facts to solve problems.

Year 2 Addition and Subtraction

Addition

2 digit and 1 digit numbers

Children develop mental fluency with addition and place value. When adding a 1 digit number to a 2 digit number they count on in their head.

$$32 + 4 =$$

32 in your head and count on 4.

Children also have quick recall of number facts and know $2 + 4 = 6$ so it is 36.

2 digit numbers

The compact column methods are taught. Step 1 - with no exchanging:

$$\begin{array}{r} 26 \\ + 12 \\ \hline 38 \end{array}$$

Step 2 - introduce exchanging when the children are secure in place value:

$$\begin{array}{r} 54 \\ + 17 \\ \hline 71 \end{array}$$

Key Vocabulary:
add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, partition, addition, tens boundary.

Subtraction

2 digit and 1 digit numbers

When subtracting a 1 digit number from a 2 digit they count back. $48 - 5 =$, 48 in your head and count back 5.

2 digit numbers

The compact column methods are taught. Step 1 – with no exchanging:

$$\begin{array}{r} 58 \\ - 24 \\ \hline 36 \end{array}$$

Step 2 – Introduce exchanging when the children are secure:

$$\begin{array}{r} 28 \\ - 14 \\ \hline 18 \end{array}$$

Key Vocabulary:
equal to, take, take away, less, minus, subtract, leaves, difference between, how many more/less, most, least, count back, how many left, difference, count on, strategy, partition, tens, ones.

Year 3

Addition and Subtraction

From NC Programme of Study (specific):

Number – addition and subtraction

Statutory requirements

Pupils should be taught to:

- add and subtract numbers mentally, including:
 - a three-digit number and ones
 - a three-digit number and tens
 - a three-digit number and hundreds
- add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

Addition

Continue to develop column addition.

Step 1 - Move to 3 digit numbers.

$$\begin{array}{r} \text{H T U} \\ 236 \\ + \quad 73 \\ \hline 309 \end{array}$$

Step 2 – Add money where only one exchange is required.

$$\begin{array}{r} 1.27 \\ + 0.34 \\ \hline \text{£} 1.61 \end{array}$$

Key Vocabulary:
Add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, partition, plus, addition, column, increase, vertical, expanded, compact, exchange.

From NC Programme of Study (other):

Number – number and place value

Statutory requirements

Pupils should be taught to:

- count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
- recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- compare and order numbers up to 1000
- identify, represent and estimate numbers using different representations
- read and write numbers up to 1000 in numerals and in words
- solve number problems and practical problems involving these ideas.

Subtraction

Continue to develop the column method. When subtracting involving exchanging explore partitioning in different ways so the children understand the value is the same. For example, $57 = 50 + 7 = 40 + 17 = 30 + 27$ etc.

Once children are secure with subtracting requiring one exchange extend to more than one exchange:

$$\begin{array}{r} \text{H T U} \\ 238 \\ - 146 \\ \hline 092 \end{array}$$

Key vocabulary:
equal to, take, take away, less, minus, subtract, leaves, distance between, how many less, least, count back, difference, count on, partition, tens, hundreds, ones, exchange, decrease, value, digit.

Year 4

Addition and Subtraction

From NC Programme of Study (specific):

Number – addition and subtraction

Statutory requirements

Pupils should be taught to:

- add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- estimate and use inverse operations to check answers to a calculation
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

From NC Programme of Study (other):

Number – number and place value

Statutory requirements

Pupils should be taught to

- count in multiples of 6, 7, 9, 25 and 1000
- find 1000 more or less than a given number
- count backwards through zero to include negative numbers
- recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- order and compare numbers beyond 1000
- identify, represent and estimate numbers using different representations
- round any number to the nearest 10, 100 or 1000
- solve number and practical problems that involve all of the above and with increasingly large positive numbers
- read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value.

Addition

Continue to develop the column method using larger numbers and also ensure that the children are given questions involving money and measures.

$$\begin{array}{r} 3517 \\ + \quad 396 \\ \hline 3913 \\ \quad 11 \end{array}$$

$$\begin{array}{r} 4.57 \\ + 3.21 \\ \hline £7.78 \end{array}$$

Key vocabulary:
Add, more, plus, and, make, altogether,
total, equal to, equals, double, most,
count on, number line, sum, tens, ones,
partition, plus, addition, column, tens /
hundreds boundary, increase, vertical,
exchange, compact, thousands,
hundreds, digits, inverse.

Subtraction

Reinforce the column method but move towards more complex numbers which involve more exchanging. Ensure that questions involve different contexts to include money and measure.

$$\begin{array}{r} 26754 \\ - 1562 \\ \hline 11192 \end{array}$$

Key vocabulary:
Equal to, take, take away, less,
minus, subtract, leaves, how many
fewer, less than, most, least, count
back, difference, count on,
strategy, partition, tens, ones,
exchange, decrease, hundreds,
value, digit, inverse.

Year 5

Addition and Subtraction

From NC Programme of Study (specific):

Number – addition and subtraction

Statutory requirements

Pupils should be taught to:

- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
- add and subtract numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Addition

Children will add using numbers exceeding 4 digits.

Children will add using money, measure and decimals. They will carefully align the place value columns.

$$\begin{array}{r} 23481 \\ + \quad 1362 \\ \hline 24843 \end{array}$$

$$\begin{array}{r} 19.01 \\ + \quad 3.65 \\ \hline 22.66 \end{array}$$

$$\begin{array}{r} 23.59 \\ + \quad 7.55 \\ \hline \pounds 31.14 \end{array}$$

Key vocabulary:
Add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, less, ones, partition, plus, addition, column, tens / hundreds boundary, increase, vertical, exchange, compact, thousands, hundreds, digits, inverse, decimal place, decimal point, tenths, hundredths, thousandths.

From NC Programme of Study (other):

Number – number and place value

Statutory requirements

Pupils should be taught to:

- read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
- round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- solve number problems and practical problems that involve all of the above
- read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

Subtraction

Column subtraction with larger numbers and where multiple exchanges are required.

$$\begin{array}{r} 2310456 \\ - \quad 2128 \\ \hline 28928 \end{array}$$

Subtract with decimal values, including mixtures of integers and decimals, aligning the decimal point.

$$\begin{array}{r} 2310456 \\ - \quad 372.5 \\ \hline 6796.5 \end{array}$$

Key vocabulary:
Equal to, take, take away, less, minus, subtract, leaves, how many fewer, less than, most, least, count back, difference, count on, strategy, partition, tens, ones, exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, decimal point, decimal.

Year 1

From NC Programme of Study (specific): Multiplication and Division

Number – multiplication and division

Statutory requirements

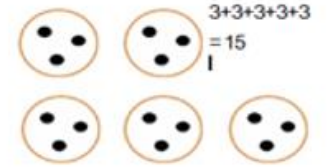
Pupils should be taught to:

- solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

How many legs will 3 teddies have?



There are 3 sweets in one bag. How many sweets are in 5 bags altogether?



- Give children experience of counting equal groups of objects in 2s, 5s and 10s.
- Present practical problem solving activities involving counting equal sets or groups as above.

Key vocabulary:
groups of, lots of,
times, array,
altogether,
multiply, count,
repeated addition.

From NC Programme of Study (other):

Number – number and place value

Statutory requirements

Pupils should be taught to:

- count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
- count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens
- given a number, identify one more and one less
- identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least
- read and write numbers from 1 to 20 in numerals and words.

Using objects, diagrams and pictorial representations to solve problems involving both grouping and sharing.

Give the children division problems in a familiar context e.g. There are 6 children on this table and there are 18 pieces of fruit to share between us. If we share them equally, how many will we get? – can they work it out and give a division statement?

Pupils should:

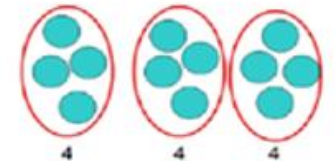
- Use lots of practical apparatus, arrays and picture representations.
- Be taught the difference between grouping and sharing.
- Count in multiples of 2s, 5s and 10s.
- Find half of a group of objects by sharing into 2 equal groups.

How many groups of 4 can be made with 12 stars? = 3

Grouping:



Sharing:



12 shared between 3 is 4

Key vocabulary:
Share, share equally,
one each, two
each..., group,
groups of, lots of,
array, divide.

Year 2

From NC Programme of Study (specific): Multiplication and Division

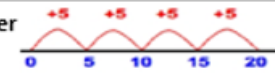
Number – multiplication and division

Statutory requirements

Pupils should be taught to:

- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals ($=$) signs
- show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
- solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Use repeated addition on a number line:



Start from zero, make equal jumps to work out multiplication facts.

Use arrays:



$$5 \times 3 = 15$$

$$3 \times 5 = 15$$

Use arrays to help teach children to understand the commutative law of multiplication e.g. $5 \times 3 = 15$, $3 \times 5 = 15$, $15 = 3 \times 5$, $15 = 5 \times 3$. Also show the repeated addition $5 \times 3 = 3 + 3 + 3 + 3 + 3 = 15$.

Use practical apparatus:



Use mental recall: children should begin to recall multiplication facts for 2, 5 and 10 times tables through practice in counting and understanding of the operation.

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times, as big as, once, twice, three times...

From NC Programme of Study (other):

Number – number and place value

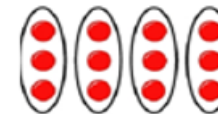
Statutory requirements

Pupils should be taught to:

- count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
- recognise the place value of each digit in a two-digit number (tens, ones)
- identify, represent and estimate numbers using different representations, including the number line
- compare and order numbers from 0 up to 100; use $<$, $>$ and $=$ signs
- read and write numbers to at least 100 in numerals and in words
- use place value and number facts to solve problems.

Use objects, arrays, diagrams, pictorial representations and grouping on a number line.

Arrays:



This represents $12 \div 3$, posed as how many groups of 3 are in 12?

Pupils should also show that $12 \div 4 = 3$.

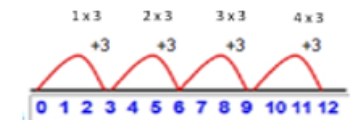
Know and understand sharing and grouping:

6 sweets shared between 2 people, how many do they each get?
There are 6 sweets, how many people can have 2 sweets each?

Grouping using a number line:

Group from zero in equal jumps of the divisor to find out how many groups of _ in _?

Also use practical apparatus to reinforce understanding.



$$12 \div 3 = 4$$

Key vocabulary: Share, share equally, or each, two each..., group groups of, lots of, array divide, divided by, divided into, division, grouping number line, left, left over

Once children are confident move to quick recall of the multiplication and division facts.

Year 3

From NC Programme of Study (specific): Multiplication and Division

Number – multiplication and division

Statutory requirements

Pupils should be taught to:

- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Multiplication

Children become fluent working out multiplication facts using mental strategies and arrays if needed. Focus is on learning the multiplication facts.

Children are introduced to the short method of multiplication when multiplying by a 1 digit number.

$$\begin{array}{r} 26 \\ \times 3 \\ \hline 78 \end{array}$$

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times, as big as, once, twice, three times, partition, grid method, multiple, product, tens, units, value.

From NC Programme of Study (other):

Number – number and place value

Statutory requirements

Pupils should be taught to:

- count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
- recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- compare and order numbers up to 1000
- identify, represent and estimate numbers using different representations
- read and write numbers up to 1000 in numerals and in words
- solve number problems and practical problems involving these ideas.

Division

Children are now also taught remainders.

Step 1 - Children are introduced to the short method of division.

$$\begin{array}{r} 32 \\ 3 \overline{) 96} \end{array}$$

Step 2 – Children are then taught how to carry the remainder onto the next digit.

$$\begin{array}{r} 18 \\ 4 \overline{) 72} \end{array}$$

Key vocabulary: Share, share equally, one each, two each..., group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, exchange, remainder, multiple.

All children given opportunities to apply these to real life contexts.

Year 4

From NC Programme of Study (specific): Multiplication and Division

Number – multiplication and division

Statutory requirements

Pupils should be taught to:

- recall multiplication and division facts for multiplication tables up to 12×12
- use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- recognise and use factor pairs and commutativity in mental calculations
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

Multiplication

Children are taught to multiply 2 and 3 digits by a single digit.

They continue to use the short column multiplication method.

$$\begin{array}{r} 327 \\ \times 4 \\ \hline 1308 \end{array}$$

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times, as big as, once, twice, three times, partition, grid method, multiple, product, tens, ones, value, inverse.

From NC Programme of Study (other):

Number – number and place value

Statutory requirements

Pupils should be taught to

- count in multiples of 6, 7, 9, 25 and 1000
- find 1000 more or less than a given number
- count backwards through zero to include negative numbers
- recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- order and compare numbers beyond 1000
- identify, represent and estimate numbers using different representations
- round any number to the nearest 10, 100 or 1000
- solve number and practical problems that involve all of the above and with increasingly large positive numbers
- read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value.

Division

Children continue to use the short division method.

They continue to calculate divisions with remainders.

$$\begin{array}{r} 4 \overline{) 18} \\ 4 \end{array}$$

Next step – divide numbers with up to 3 digits by 1 digit.

$$\begin{array}{r} 4 \overline{) 218} \\ 4 \end{array}$$

Key vocabulary: Share, share equally, one each, two each..., group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, carry, remainder, multiple, divisible by, factor.

From NC Programme of Study (specific):

Number – multiplication and division

Statutory requirements

Pupils should be taught to:

- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
- establish whether a number up to 100 is prime and recall prime numbers up to 19
- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- multiply and divide numbers mentally drawing upon known facts
- divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

From NC Programme of Study (other):

Number – number and place value

Statutory requirements

Pupils should be taught to:

- read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
- round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- solve number problems and practical problems that involve all of the above
- read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

Year 5

Multiplication and Division

Multiplication

Children are taught to multiply up to 4 digits by 1 and 2 digits.

$$\begin{array}{r} 3652 \\ \times 8 \\ \hline 29216 \end{array}$$

Short multiplication for multiplying by a single digit.

Long multiplication for multiplying by 2-digits.

$$\begin{array}{r} 18 \\ \times 13 \\ \hline 54 \\ 180 \\ \hline 234 \end{array}$$

$$\begin{array}{r} 1234 \\ \times 16 \\ \hline 7404 \\ 12340 \\ \hline 19744 \end{array}$$

Key vocabulary: groups of, lots of, times, area, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times, as big as, once, twice, three times, partition, grid method, multiple, product, tens, ones, value, inverse, square, factor, integer, decimal, short/long multiplication, carry.

Division

Children are taught to divide using remainders and can express the remainder in the correct context of the question.

Short division is used for dividing by a single digit.

$$\begin{array}{r} 66 \text{ r}2 \\ 8 \overline{) 530} \end{array}$$

Long division is used for dividing by 2 digits.

$$\begin{array}{r} 121 \text{ r}5 \\ 39 \overline{) 4745} \end{array}$$

Key vocabulary: Share, share equally, one each, two each, groups, groups of, lots of, area, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, exchange, remainder, multiple, divisible by, factor, quotient, prime number, prime factor, composite, number(non-prime).