

Year 5

PROPERTIES OF NUMBERS AND NUMBER SEQUENCES

number, count, how many...?
 odd, even
 every other
 how many times?
 multiple of
 digit
 next, consecutive
 sequence
 continue
 predict
 pattern, pair, rule
 relationship
 sort, classify, property
 formula
 divisible (by), divisibility, factor
 square number
 one squared, two squared... (1², 2²...)

PLACE VALUE, ORDERING AND ROUNDING

units, ones
 tens, hundreds, thousands
 ten thousand, hundred thousand, million
 digit, one-, two-, three- or four-digit number
 numeral
 'teens' number
 place, place value
 stands for, represents
 exchange
 the same number as, as many as
 equal to
 Of two objects/amounts:
 >, greater than, more than, larger than, bigger than
 <, less than, fewer than, smaller than
 ≥, greater than or equal to
 ≤, less than or equal to
 Of three or more objects/amounts:
 greatest, most, largest, biggest
 least, fewest, smallest
 one... ten... one hundred... one thousand more/less
 compare, order, size
 ascending/descending order
 first... tenth... twentieth
 last, last but one
 before, after, next
 between, half-way between
 guess how many, estimate
 nearly, roughly, close to, about the same as
 approximate, approximately
 , is approximately equal to
 just over, just under
 exact, exactly
 too many, too few, enough, not enough
 round (up or down), nearest
 round to the nearest ten/hundred
 round to the nearest thousand
 integer
 positive, negative
 above/below zero, minus

MAKING DECISIONS AND REASONING

pattern, puzzle
 calculate, calculation
 mental calculation
 method, strategy
 jotting
 answer
 right, correct, wrong
 what could we try next?
 how did you work it out?
 number sentence
 sign, operation, symbol, equation

USING A CALCULATOR

calculator
 display, key, enter, clear
 constant

ADDITION AND SUBTRACTION

add, addition, more, plus, increase
 sum, total, altogether
 score
 double, near double
 how many more to make...?
 subtract, subtraction, take (away), minus, decrease
 leave, how many are left/left over?
 difference between
 half, halve
 how many more/fewer is... than...?
 how much more/less is...?
 equals, sign, is the same as
 tens boundary, hundreds boundary units boundary,
 tenths boundary
 inverse

MULTIPLICATION AND DIVISION

lots of, groups of
 times, multiply, multiplication, multiplied by
 multiple of, product
 once, twice, three times... ten times...
 times as (big, long, wide... and so on)
 repeated addition
 array
 row, column
 double, halve
 share, share equally

General

same, different
 missing number/s
 number facts, number pairs, number bonds
 greatest value, least value
 number line, number track
 number square, hundred square
 number cards, number grid
 abacus
 counters, cubes, blocks, rods
 die, dice, spinner
 dominoes
 pegs, peg board, pin board
 geo-strips
 same way, different way
 best way, another way
 in order, in a different order
 not
 all, every, each

Year 5 Programme of Study

Number - number and place value

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.

Number - addition and subtraction

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.

Number - multiplication and division

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.

Number - fractions (including decimals and percentages)

Pupils should be taught to:

- compare and order fractions whose denominators are all multiples of the same number
- identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
- recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$]
- add and subtract fractions with the same denominator and denominators that are multiples of the same number
- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- read and write decimal numbers as fractions [for example, $0.71 = \frac{71}{100}$]

- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- round decimals with two decimal places to the nearest whole number and to one decimal place
- read, write, order and compare numbers with up to three decimal places
- solve problems involving number up to three decimal places
- recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal
- solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25.

Measurement

Pupils should be taught to:

- convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
- understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints
- measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres

- calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes
- estimate volume [for example, using 1 cm³ blocks to build cuboids (including cubes)] and capacity [for example, using water]
- solve problems involving converting between units of time
- use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.

Geometry – properties of shapes

Pupils should be taught to:

- identify 3-D shapes, including cubes and other cuboids, from 2-D representations
- know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles
- draw given angles, and measure them in degrees (°)

- identify:
 - angles at a point and one whole turn (total 360°)
 - angles at a point on a straight line and 2 in a turn (total 180°)
 - other multiples of 90°
- use the properties of rectangles to deduce related facts and find missing lengths and angles
- distinguish between regular and irregular polygons based on reasoning about equal sides and angles.

Geometry – position and direction

Pupils should be taught to:

- identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.

Statistics

Pupils should be taught to:

- solve comparison, sum and difference problems using information presented in a line graph

- complete, read and interpret information in tables, including timetables.



In order to encourage children to work mentally, calculations should always be presented horizontally so children can make decisions about how to tackle them. Encourage children to choose to use the most efficient method for the numbers and the context. Teach operations together to emphasise the importance of inverse.

Addition

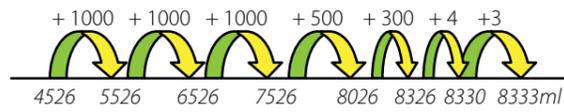
to be taught alongside each other

Subtraction

Children should be taught to **add more than four digits, including decimals.**

Number lines using efficient counting on

$$4526\text{ml} + 3807\text{ml} = 8333\text{ml} = 8.333 \text{ litres}$$



$$4526\text{ml} + 3000\text{ml} + 800\text{ml} + 7 \text{ ml}$$

Compact Method

$$\begin{array}{r} 3587 \\ + 675 \\ \hline 4262 \end{array} \quad \begin{array}{r} 6584 \\ + 5848 \\ \hline 12432 \end{array} \quad \begin{array}{r} 49.5 \\ + 637.06 \\ \hline 686.56 \end{array}$$

✓ know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. $3.2 \text{ m} - 280 \text{ cm}$

Compensation

Children need to round and adjust to the nearest 10/100/1000 especially in the context of **money** mentally.

$$£4.95 + £6.80 + £9.14 =$$

$$£5.00 - 5\text{p} + £7.00 - 20\text{p} + £9.00 + 14\text{p} =$$

$$£5.00 + £7.00 + £9.00 = £21.00$$

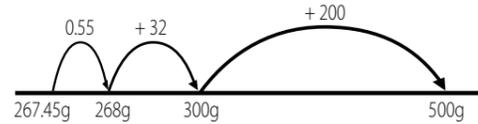
$$+ 14\text{p} - 25\text{p} = - 11\text{p}$$

$$= £21.00 - 11\text{p} = £20.89$$

Children should be taught to subtract using **more than four digits, including decimals.**

Number lines using efficient counting on

$$0.5\text{Kg} - 267.45\text{g} =$$



Subtraction using inverse operation (links to counting on)

$$\begin{array}{r} 267.45\text{g} \\ + \quad \quad \quad ? \\ \hline = 500.00\text{g} \end{array}$$

Partitioning and Decomposition

$$\begin{array}{r} £4236 \\ - £2827 \\ \hline \end{array}$$

$$\begin{array}{r} 3000 \quad 1200 \quad 20 \quad 16 \\ \hline 4000 \quad 200 \quad 20 \quad 6 \\ - 2000 \quad 800 \quad 20 \quad 7 \\ \hline 1000 \quad 400 \quad 0 \quad 9 \end{array} \quad \begin{array}{r} 3 \quad 12 \quad 2 \quad 16 \\ \hline 4 \quad 2 \quad 2 \quad 6 \\ - 2 \quad 8 \quad 2 \quad 7 \\ \hline 1 \quad 4 \quad 0 \quad 9 \end{array}$$

Multiplication

to be taught alongside each other

Division

Children should calculate up to 4 digit x1 and x2 digit numbers.

Short multiplication (multiplication by a single digit)

Children will **approximate first** using Grid Method.

$$346 \times 9 \text{ is approximately } 350 \times 10 = 3500$$

$$\begin{array}{r} \times 300 \quad 40 \quad 6 \\ 9 \overline{) 2700 \quad 360 \quad 54} \\ \hline 2700 \\ + 360 \\ + 54 \\ \hline 3114 \end{array}$$

Long multiplication (multiplication by more than a single digit)

Children will **approximate first**

$$72 \times 38 \text{ is approximately } 70 \times 40 = 2800$$

$$\begin{array}{r} \times 70 \quad 2 \\ 30 \overline{) 2100 \quad 60} \\ 8 \overline{) 560 \quad 16} \\ \hline 2100 \\ + 560 \\ + 60 \\ + 16 \\ \hline 2736 \end{array}$$

When solving problems involving decimals children should know that the decimal points line up under each other and should **approximate first.**

$$4.9 \times 3 \text{ is approximately } 5 \times 3 = 15$$

$$\begin{array}{r} \times 4 \quad 0.9 \\ 3 \overline{) 12 \quad 2.7} \\ \hline 12 \\ + 2.7 \\ \hline 14.7 \end{array}$$

Factorise to multiply by larger numbers

$$\begin{array}{l} 35 \times 14 \\ = 35 \times 2 \times 7 \\ = 70 \times 7 = 490 \end{array} \quad \begin{array}{l} 3 \times 270 \\ = 3 \times 3 \times 9 \times 10 \\ = 9^2 \times 10 \end{array}$$

Children should calculate up to 4 digits \div 1 digit numbers.

Short division

Children can start to subtract larger multiples of the divisor, by x multiples of 10.

$$196 \div 6$$

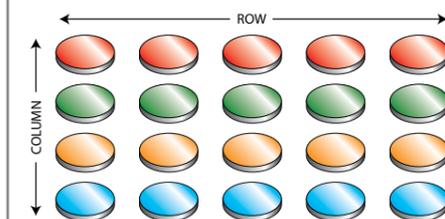
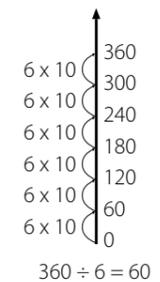
$$\begin{array}{r} 32 \text{ r } 4 \\ 6 \overline{) 196} \\ - 180 \\ \hline 16 \\ - 12 \\ \hline 4 \end{array}$$

Answer: 32 remainder 4 or $32 \text{ r } 4$
or $32 \text{ and } \frac{4}{6}$ or $32 \text{ and } \frac{2}{3}$

Solve division by **chunking** into known multiples of the divisor and illustrate on a **vertical number line.**

Any remainders should be shown as integers, then as fractions or decimals, i.e. if the children were dividing 32 by 10, the answer should be shown as $3 \frac{2}{10}$ (which could then be written as $3 \frac{1}{5}$ in it's lowest terms).

Children need to make sensible decisions about **rounding up or down after division** according to the problem.



2000 \div 400
2000 \div 4
2000 \div 500
2000 \div 5
400 \times 5
500 \times 4
1/4 of 2000
1/5 of 2000
Known Facts

