Maths Facts Progression Document

Maths facts refer to basic addition, subtraction, multiplication and division calculations that children learn to recall instantly with no working out. In other words, they need to learn them off by heart. Fluency in these areas underpins much of what else is done in mathematics. The main initial focus is on number bonds, also known as number pairs. They are simply the pairs of numbers that make up a given number. Knowledge of number bonds is essential when it comes to harder calculations involving addition and subtraction, so it is vital children get a firm grounding in this from Years 1 to 3.

How children are taught maths facts at school

We begin with concrete representations of numbers (actual objects or pictures of objects) when introducing the concept of addition and subtraction. Then move onto pictorial representation (for example, dots) Finally, we progress to abstract symbols (digits). The CPA approach is fluid and children can move between the different concepts regularly, depending on their confidence and ability.

Once they are familiar with the concept of addition, subtraction, multiplication and division children begin to memorise the number facts and practice quick recall. Methods such as flash cards, fact triangles, fact families, games, ICT games are used to improve quick recall in a fun way. Number facts need to be practised regularly so some schools may also do weekly timetables tests/challenges.

How to practice at home

- Encourage children to say the whole calculation and answer aloud, not just the answer (for example 8 x 7 = 56 if you are practising times tables verbally).
- Practise regularly but for short periods at a time.
- Make it fun by playing games!
- Help your child design their own number facts poster and display it in their room or on the fridge.
- Take advantage of real-life contexts such as shopping, laying the table, planting seeds in rows, organising and sharing out toys or snacks, etc. to help you introduce number facts into everyday life.
- Give your child ten counters (Lego bricks, past shapes, buttons, sweets) and ask them questions such as: What do you add to 3 to make 10? What do you add to 2 to make 10? Encourage them to use the counters to work it out.
- Create or print out number cards and ask your child to match them up into number pairs or number bonds (this can be done as a game of Snap).
- Write a list of ten numbers then time your child to see how long it takes them to write down the other number that makes up each pair (2 and 18; 5 and 15; 4 and 16).

Foundation Stage:

Children start to learn about number bonds in the Foundation stage, when they might be given a number, such as 5, and then asked to select two groups of objects that will add up to that number.

Year 1:

In Y1 children learn and use the addition and subtraction facts to 20 (this includes number bonds to 20). This means they will become familiar with and practise all the different combinations of adding and subtracting numbers to a total of 20 (for example, 2 + 16 = 18, 17 – 5 = 12, 5 + 3 = 8, 6 + 7 = 13, 20 – 9 = 11, etc). They will also learn to count in 2s, 5s and 10s from zero.

Year 2:

In Y2 children consolidate their knowledge of number facts to 20 and develop fluency when recalling the facts (learn them off by heart).

Children also learn to use the number bonds to 20 to derive related facts up to 100; for example, if they know 2 + 3 = 5 then they understand that 20 + 30 = 50.

Multiplication and related division facts for the 2, 5 and 10 times tables are also learned in Year 2. For example, for the 2x table:

1 x 2 = 2 and 2 ÷ 2 = 1

2 x 2 = 4 and 4 ÷ 2 = 2

3 x 2 = 6 and 6 ÷ 2 = 3

4 x 2 = 8 and 8 ÷ 2 = 4

5 x 2 = 10 and 10 ÷ 2 = 5

6 x 2 = 12 and 12 ÷ 2 = 6

7 x 2 = 14 and 14 ÷ 2 = 7

8 x 2 = 16 and 16 ÷ 2 = 8

9 x 2 = 18 and 18 ÷ 2 = 20

10 x 2 = 20 and 20 ÷ 2 = 10

11 x 2 = 22 and 22 ÷ 2 = 11

12 x 2 = 24 and 24 ÷ 2 = 12

Extension: Year 3

In Y3 children learn multiplication and related division facts for the 3, 4 and 8 times tables. Children will also be taught the connection between the 2, 4 and 8 times tables through doubling and halving (so if 2 x 3 = 6 then 4 x 3 = 12).

Mathematical Language and Vocabulary

Children need to have concrete and visual experiences of mathematical words and their meanings. They need to have opportunities to:

• Listen to adults and other children using the words correctly.

• Acquire confidence and fluency in speaking, using complete sentences that include the new words and phrases, sometimes in chorus with others and sometimes individually.

• Describe, define and compare mathematical properties, positions, methods, patterns, relationships, rules.

• Discuss ways of tackling a problem, collecting data, organising their work.

• Hypothesise or make predictions about possible results.

• Present, explain and justify their methods, results, solutions or reasoning, to the whole class or to a group or partner.

• Generalise, or describe examples that match a general statement.

Read:

• Numbers, signs and symbols, expressions and equations in blackboard presentations

• Instructions and explanations in workbooks, textbooks, video clips

• Texts with mathematical references in fiction and non-fiction books and books of rhymes during the literacy hour as well as mathematics lessons

• Labels and captions on classroom displays, in diagrams, graphs, charts and tables.

• Definitions in illustrated dictionaries, including dictionaries that they themselves have made, in order to discover synonyms, origins of words, words that start with the same group of letters (such as triangle, tricycle, triplet, trisect…).

Write:

• Writing prose in order to describe, compare, predict, interpret, explain, justify etc.

• Writing formulae, first using words, then symbols.

• Sketching and labelling diagrams in order to clarify their meaning.

• Drawing and labelling graphs, charts or tables, and interpreting and making prediction from the data in them, in mathematics and other subjects.

Questioning

Children cannot learn the meanings of words in isolation. The use of questions is crucial in helping them to understand mathematical ideas and use mathematical terms correctly. It is important to ask questions in different ways so that children who do not understand the first time may pick up the meaning subsequently.

- Can you describe the problem in your own words?
- Can you talk me through what you have done so far?
- What did you do last time? What is different this time?
- Is there something that you already know that might help?
- Could you try it with simpler numbers… fewer numbers… using a number line…?
- What about putting things in order?
- Would a table help, or a picture/diagram/graph?
- Why not make a guess and check if it works?
- Have you compared your work with anyone else's?
- Can you explain what you have done so far? What else is there to do?
- Why did you decide to use this method or do it this way?
- Can you think of another method that might have worked?
- Could there be a quicker way of doing this?
- What do you mean by…?
- What did you notice when…?
- Are you beginning to see a pattern or a rule?
- Do you think that this would work with other numbers?
- Have you thought of all the possibilities? How can you be sure?
- How did you get your answer?
- Can you describe your method/pattern/rule to us all? Can you explain why it works?
- What could you try next?
- Would it work with different numbers?
- What if you had started with… rather than…? What if you could only use…?
- Is it a reasonable answer/result? What makes you say so?
- How did you check it?
- What have you learned or found out today?
- If you were doing it again, what would you do differently?
- Having done this, when could you use this method/information/idea again?

The following pictures are from Rising Stars (2014) vocabulary booklet, written in accordance with the current 2014 National Curriculum, and demonstrates progression from EYFS to Year 2 mathematical language and vocabulary.

EARLY YEARS FOUNDATION STAGE

NUMBER

Number and place value

Number

zero

number

one, two, three … to twenty and beyond

teens numbers, eleven, twelve … twenty

how many …?

count, count (up) to, count on (from, to), count back (from, to)

count in ones, twos, fives, tens

is the same as

more, less

odd, even

few

pattern

pair

Place value

ones

tens

digit

the same number as, as many as

more, larger, bigger, greater

fewer, smaller, less

fewest, smallest, least

most, biggest, largest, greatest

one more, ten more

one less, ten less

compare

order

size

first, second, third… twentieth

last, last but one

before, after

next

between

Estimating

guess

how many …?

estimate

nearly

close to

about the same as

just over, just under

too many, too few

enough, not enough

Addition and subtraction

add, more, and

make, sum, total

altogether

double

one more, two more … ten more

how many more to make …?

how many more is … than …?

how much more is …?

take away

how many are left/left over?

how many have gone?

one less, two less, ten less …

how many fewer is … than …?

how much less is …?

difference between

Multiplication and division

sharing

doubling

halving

number patterns

Fractions

parts of a whole

half

quarter

MEASUREMENT

measure

size

compare

guess, estimate

enough, not enough

too much, too little

too many, too few

nearly, close to, about the same as

just over, just under

Length

metre

length, height, width, depth

long, short, tall

high, low

wide, narrow

thick, thin

longer, shorter, taller, higher … and so on

longest, shortest, tallest, highest … and so on

far, near, close

Weight

weigh, weighs, balances

heavy, light

heavier than, lighter than

heaviest, lightest

scales

Capacity and volume

full

empty

half full

holds

container

Time

time

days of the week, Monday, Tuesday …

day, week

birthday, holiday

morning, afternoon, evening, night

bedtime, dinner time, playtime

today, yesterday, tomorrow

before, after

next, last

now, soon, early, late

quick, quicker, quickest, quickly

slow, slower, slowest, slowly

old, older, oldest

new, newer, newest

takes longer, takes less time

hour, o'clock

clock, watch, hands

Money

money

coin

penny, pence, pound

price, cost

buy, sell

spend, spent

pay

GEOMETRY

Properties of shape

shape, pattern

flat

curved, straight

round

hollow, solid

sort

make, build, draw

size

bigger, larger, smaller
symmetrical
pattern, repeating pattern
match

2-D shape
corner, side
rectangle (including square)
circle
triangle

3-D shape
face, edge, vertex, vertices
cube
pyramid
sphere
cone

Position and direction
position
over, under
above, below
top, bottom, side
on, in
outside, inside
around
in front, behind
front, back
beside, next to
opposite
apart
between
middle, edge
corner
direction
left, right
up, down
forwards, backwards, sideways

across
next to, close, near, far
along
through
to, from, towards, away from
movement
slide
roll
turn
stretch, bend
whole turn, half turn

STATISTICS
count, sort
group, set
list

GENERAL
pattern
puzzle
what could we try next?
how did you work it out?
recognise
describe
draw
compare
sort

YEAR 1

NUMBER

Number and place value

Number

number

numeral

zero

one, two, three … twenty

teens numbers, eleven, twelve … twenty

twenty-one, twenty-two … one hundred

how many …?

count, count (up) to, count on (from, to), count back (from, to)

forwards

backwards

count in ones, twos, fives, tens

equal to

equivalent to

is the same as

more, less

most, least

many

odd, even

multiple of

few

pattern

pair

Place value

ones

tens

digit

the same number as, as many as

more, larger, bigger, greater

fewer, smaller, less

fewest, smallest, least

most, biggest, largest, greatest

one more, ten more

one less, ten less

equal to

one more, ten more

one less, ten less

compare

order

size

first, second, third… twentieth

last, last but one

before, after

next

between

half-way between

above, below

Estimating

guess

how many ...?

estimate

nearly

roughly

close to

about the same as

just over, just under

too many, too few

enough, not enough

Addition and subtraction

addition

add, more, and

make, sum, total

altogether

double

near double

half, halve

one more, two more … ten more

how many more to make …?

how many more is … than …?

how much more is …?

subtract
take away
how many are left/left over?
how many have gone?
one less, two less, ten less …
how many fewer is … than …?
how much less is …?
difference between
equals
is the same as
number bonds/pairs
missing number

Multiplication and division

multiplication
multiply
multiplied by
multiple
division
dividing
grouping
sharing
doubling
halving
array
number patterns

Fractions

fraction
equal part
equal grouping
equal sharing
parts of a whole
half
one of two equal parts
quarter
one of four equal parts

MEASUREMENT

measure
measurement
size
compare
guess, estimate
enough, not enough
too much, too little
too many, too few
nearly, close to, about the same as
roughly
just over, just under

Length

centimetre, metre
length, height, width, depth
long, short, tall
high, low
wide, narrow
thick, thin
longer, shorter, taller, higher … and so on
longest, shortest, tallest, highest … and so on
far, near, close
ruler
metre stick

Weight

kilogram, half kilogram
weigh, weighs, balances
heavy, light
heavier than, lighter than
heaviest, lightest
scales

Capacity and volume

litre, half litre

capacity

volume

full

empty

more than

less than

half full

quarter full

holds

container

Time

time

days of the week, Monday, Tuesday …

months of the year (January, February ...)

seasons: spring, summer, autumn, winter

day, week, weekend, month, year

birthday, holiday

morning, afternoon, evening, night

bedtime, dinner time, playtime

today, yesterday, tomorrow

before, after

earlier, later

next, first, last

midnight

date

now, soon, early, late

quick, quicker, quickest, quickly

slow, slower, slowest, slowly

old, older, oldest

new, newer, newest

takes longer, takes less time

how long ago?

how long will it be to …?

how long will it take to …?

how often?

always, never, often, sometimes

usually

once, twice

hour, o'clock, half past, quarter past, quarter to

clock, clock face, watch, hands

hour hand, minute hand

hours, minutes

Money

money

coin

penny, pence, pound

price, cost

buy, sell

spend, spent

pay

change

dear, costs more

cheap, costs less, cheaper

costs the same as

how much …?

how many …?

total

GEOMETRY

Properties of shape

shape, pattern

flat

curved, straight

round

hollow, solid

sort

make, build, draw

size

bigger, larger, smaller

symmetry, symmetrical, symmetrical pattern

pattern, repeating pattern

match

2-D shape
corner, side
point, pointed
rectangle (including square)
circle
triangle

3-D shape
face, edge, vertex, vertices
cube, cuboid
pyramid
sphere
cone
cylinder

Position and direction
position
over, under, underneath
above, below
top, bottom, side
on, in
outside, inside
around
in front, behind
front, back
beside, next to
opposite
apart
between
middle, edge
centre
corner
direction
journey
left, right
up, down
forwards, backwards, sideways
across

next to, close, near, far
along
through
to, from, towards, away from
movement
slide
roll
turn
stretch, bend
whole turn, half turn, quarter turn, three-quarter turn

STATISTICS
count, sort, vote
group, set
list, table

GENERAL
pattern
puzzle
problem, problem solving
mental, mentally
what could we try next?
how did you work it out?
explain your thinking
recognise
describe
draw
compare
sort

YEAR 2

NUMBER

Number and place value

Number

number

numeral

zero

one, two, three … twenty

teens numbers, eleven, twelve … twenty

twenty-one, twenty-two … one hundred, two hundred … one thousand

how many …?

count, count (up) to, count on (from, to), count back (from, to)

forwards

backwards

count in ones, twos, fives, tens, threes, fours and so on

equal to

equivalent to

is the same as

more, less

most, least

tally

many

odd, even

multiple of

sequence

continue

predict

few

pattern

pair, rule

> greater than

< less than

Place value

ones

tens, hundreds

digit

one-, two- or three-digit number

place, place value

stands for, represents

exchange

the same number as, as many as

more, larger, bigger, greater

fewer, smaller, less

fewest, smallest, least

most, biggest, largest, greatest

one more, ten more

one less, ten less

equal to

compare

order

size

first, second, third … twentieth

twenty-first, twenty-second …

last, last but one

before, after

next

between

halfway between

above, below

Estimating

guess

how many …?

estimate

nearly

roughly

close to

about the same as

just over, just under

exact, exactly

too many, too few
enough, not enough

Addition and subtraction
addition
add, more, and
make, sum, total
altogether
double
near double
half, halve
one more, two more … ten more … one hundred more
how many more to make …?
how many more is … than …?
how much more is …?
subtract
take away
how many are left/left over?
how many have gone?
one less, two less, ten less … one hundred less
how many fewer is … than …?
how much less is …?
difference between
equals
is the same as
number bonds/pairs/facts
tens boundary

Multiplication and division
multiplication
multiply
multiplied by
multiple
groups of
times
once, twice, three times … ten times
repeated addition

division
dividing, divide, divided by, divided into
grouping
sharing, share, share equally
left, left over
one each, two each, three each … ten each
group in pairs, threes … tens
equal groups of
doubling
halving
array
row, column
number patterns
multiplication table
multiplication fact, division fact

Fractions
fraction
equivalent fraction
mixed number
numerator, denominator
equal part
equal grouping
equal sharing
parts of a whole
half, two halves
one of two equal parts
quarter, two quarters, three quarters
one of four equal parts
one third, two thirds
one of three equal parts

MEASUREMENT
measure
measurement
size
compare
measuring scale

guess, estimate

enough, not enough

too much, too little

too many, too few

nearly, close to, about the same as

roughly

just over, just under

Length

centimetre, metre

length, height, width, depth

long, short, tall

high, low

wide, narrow

thick, thin

longer, shorter, taller, higher … and so on

longest, shortest, tallest, highest … and so on

far, further, furthest, near, close

ruler

metre stick, tape measure

Weight

kilogram, half kilogram, gram

weigh, weighs, balances

heavy, light

heavier than, lighter than

heaviest, lightest

scales

Capacity and volume

litre, half litre, millilitre

capacity

volume

full

empty

more than

less than

half full

quarter full

holds, contains

container

Temperature

temperature
degree

Time

time

days of the week, Monday, Tuesday …

months of the year (January, February ...)

seasons: spring, summer, autumn, winter

day, week, weekend, fortnight, month, year

birthday, holiday

morning, afternoon, evening, night

bedtime, dinnertime, playtime

today, yesterday, tomorrow

before, after

earlier, later

next, first, last

midnight

date

now, soon, early, late

quick, quicker, quickest, quickly

slow, slower, slowest, slowly

old, older, oldest

new, newer, newest

takes longer, takes less time

how long ago?

how long will it be to …?

how long will it take to …?

how often?

always, never, often, sometimes

usually

once, twice

hour, o'clock, half past, quarter past, quarter to

5, 10, 15 … minutes past

clock, clock face, watch, hands
digital/analogue clock/watch, timer
hour hand, minute hand
hours, minutes, seconds

Money
money
coin
penny, pence, pound
price, cost
buy, bought, sell, sold
spend, spent
pay
change
dear, costs more
cheap, costs less, cheaper
costs the same as
how much …?
how many …?
total

GEOMETRY
Properties of shape
shape, pattern
flat
curved, straight
round
hollow, solid
sort
make, build, draw
surface
size
bigger, larger, smaller
symmetry, symmetrical, symmetrical pattern
line symmetry
pattern, repeating pattern
match

2-D shape
corner, side
point, pointed
rectangle (including square), rectangular
circle, circular
triangle, triangular
pentagon
hexagon
octagon

3-D shape
face, edge, vertex, vertices
cube, cuboid
pyramid
sphere
cone
cylinder

Position and direction
position
over, under, underneath
above, below
top, bottom, side
on, in
outside, inside
around
in front, behind
front, back
beside, next to
opposite
apart
between
middle, edge
centre
corner
direction
journey, route
left, right

up, down
higher, lower
forwards, backwards, sideways
across
next to, close, near, far
along
through
to, from, towards, away from
clockwise, anticlockwise
movement
slide
roll
turn
stretch, bend
whole turn, half turn, quarter turn, three-quarter turn
right angle
straight line

explain your method
describe the pattern
describe the rule
investigate
recognise
describe
draw
compare
sort
mental calculation
written calculation

STATISTICS

count, tally, sort, vote
graph, block graph, pictogram
represent
group, set
list, table
label, title
most popular, most common
least popular, least common

GENERAL

pattern
puzzle
problem, problem solving
mental, mentally
what could we try next?
how did you work it out?
show how you …
explain your thinking