



YEAR 5/6 MATHS
WORKSHOP



Aims of the session

- To share exactly what your child should know by the end of their current academic year
- To learn how the 4 operations are taught at BPSP
- To explore common misconceptions encountered when teaching children of this age
- To see what the government's push for 'greater depth' means in real terms
- To unravel the post-level assessment system

Why do the children need to know their tables?

(some examples – there are many more)

- ✓ 256×67
- ✓ $567 \div 9$
- ✓ Calculate $\frac{5}{6}$ of 5400
- ✓ Simplify $\frac{42}{49}$
- ✓ Grey paint was mixed in a ratio of 1:7 black to white. If 6 litres of black were used, how much white is needed?
- ✓ What is the area of a pitch with sides of 30m and 60m?
- ✓ The scale on a map is 1cm to 400m; how far apart in real life are two towns, which are 12cm apart on the map?
- ✓ What is the perimeter of a regular nonagon with sides of 8cm?

What other mental skills are very useful to work on?

- Number bonds: tens/hundreds/thousands

$$3+7=10 \quad 20 + 80 = 100 \quad 0.4+0.6 = 1 \quad 27+73=100$$

$$1000 - 782 = 218 \quad 1.00 - 0.81 = 0.19 \text{ etc}$$

- Single digit addition (looking for tens $3 + 8 + 7 + 9 + 1$)
- Knowing doubles and corresponding halves of all numbers to 20 and also knowing important halves of numbers like 30, 50, 70 and 90
- Compensating: $299 + 178$ is effectively $300 + 177$,
and $272 - 59$ is easier if we subtract 60 and then add back 1
- Knowing all the square numbers and their roots
- Multiplying and dividing by powers of 10 e.g. 8.4×100 or $7.02 \div 1000$

Formal methods - subtraction

$$\begin{array}{r} 4027 \\ - \underline{2808} \end{array}$$

Formal methods: subtraction

$$\begin{array}{r} 3 1 \\ \cancel{4}^{10} \cancel{2}^{17} \\ - \underline{2808} \\ \underline{1219} \end{array}$$

Formal method: addition

$$\begin{array}{r} 7839 \\ + 1749 \\ \hline = \underline{\hspace{2cm}} \end{array}$$

Formal method: addition

$$\begin{array}{r} 7839 \\ + 1749 \\ \hline = 9588 \\ \hline \end{array}$$

1 1

Formal method: short multiplication

$$\begin{array}{r} 267 \\ \times \quad 8 \\ \hline \\ = \quad \hline \end{array}$$

Formal method: short multiplication

$$\begin{array}{r} 267 \\ \times \quad 8 \\ \hline 2136 \\ \quad 55 \\ \hline \end{array}$$

Formal method: short division

$$4 \overline{) 572}$$

Formal method: division

$$\begin{array}{r} 143 \\ 4 \overline{)5172} \end{array}$$

By end of year 6

Addition and Subtraction – as you were, just with more digits and with decimal points to line up.

Probably the hardest they will encounter is something like.....

- $237,804 + 9.89 + 46 + 0.7$
- $89.7 - 3.78$
- $37 - 2.076$

Key is to line up digits correctly, using decimal point as focal point when doing so; explain how it is always beneficial to fill in spaces at the ends with zeroes (place holders); typical mistake on number 2 is misaligning decimal or making first into 89.07 so that it fits; typical mistake with last one is not to put zeroes in above .076 and then assume that they just drop .076 down into the answer rather than realising that $0 - 6$ cannot be done and therefore there is a need to steal.

long multiplication

$$124 \times 26$$

	1	2	4
x		2	6
	7	4	4
	<small>1</small>	<small>2</small>	
2	4	8	0
3	2	2	4
1	1		

What to do with decimals

$$3.08 \times 4.7$$

Recommend doing it as 308×47 and then replacing the decimal point. Count how many digits there are behind the decimal point (in this case 3) and then putting the decimal point that number of places in from the right 14.476

Long division

$$432 \div 15$$

Creating an unfamiliar times table for long division

Fill in the easy ones; start with 1 x 10 x and (half way) 5 x. Don't waste time filling all of them in as you may not need them all; 2 x 3 x 6 x and 9 x are usually easy once you have this scaffold in place. Just add 23 or take 23 away mentally to pop them in quickly. You can always fill in the rest should you need them.

23

46

69

115

138

207

230

Top ten misconceptions

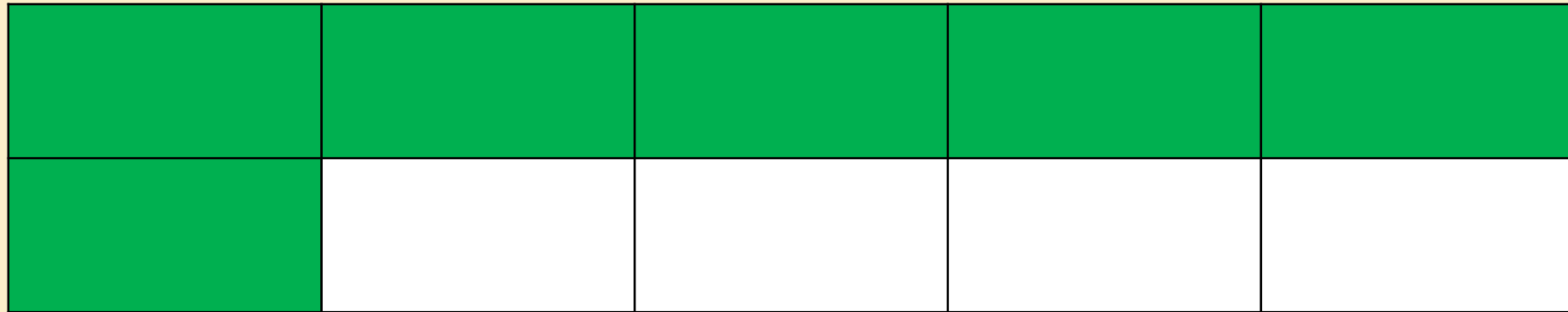
Keep an eye out for errors connected to these misunderstandings:

10 Nasty noughts

$$\begin{array}{r} 309 \\ - 182 \\ \hline = 187 \end{array}$$

Zeros cause all sorts of problems: from $0 \times 4 = 4$ to $4 \times 1 = 0$ and from $4 - 0 = 0$ to $4 \div 4 = 4$ We see it all!

9 A fraction confused



What fraction is shaded in?

Answer: 6/4

Referring to the line between numerator and denominator as 'out of' helps the children cement this

Or $3/5 + 2/5 = 5/10$

Denominator must not be added. Obvious mistake to make. It is helpful to illustrate what is happening when adding fractions through pictures of tenths in circles (or pizza slices)

8 division dilemma

$$6 \overline{)3642}$$

Children carry the divisor, rather than the amount that was not shared out.

$$121$$

Or $7 \overline{)8407}$

If it 'doesn't go', you still have to put a zero as a place holder

7 Poor percentages

calculate 15% of 4000

Typical error is

10% is 400

5% is 20

So 15% is 420

Once the children have divided by ten to work 10% of 4000 out to be 400, they start to work out 5% of 400 rather than 5% of the original 4000.

6 when equals doesn't add up

$$9 + 4 = 20 - \square$$

Common answer is 13.

Think of the = sign as a set of scales that must amount to the same. If they are heavier on one side, they will tilt and become > or <

5 Thrustrating

Q: What is $3/100$ as a decimal?

A: 0.003

Children are used to the third whole number column being for hundreds and therefore they assume the third of the decimal columns will be for *hundredths*

4 Double Dutch

Misunderstanding the meaning of the ² or ³ when used to indicate squared/cubed numbers

e.g. We often see wrong answers such as

$$4^2 = 8 \quad (4 + 4)$$

$$2^3 = 6 \text{ or even } 12 \text{ (done erroneously as } 2 \times 3 \text{ or as } 2 \times 2 \times 3)$$

3 A prime example

Find a pair of prime numbers that have a sum of 14.

✓ 3 and 11

X 1 and 13

One is not a prime number

2 Fractimal confusion

What is $1/5$ as a decimal?

1.5 0.15 0.2 1.05

Any fraction can be converted into a decimal by dividing the numerator by the denominator $1 \div 5$.

People who write test papers will always try to trick the children by choosing feasible-looking options in a multiple choice question

1 Out of order

Put these numbers in order from largest to smallest

-6 0.6 -0.6 6 0.666 0.066

Children often confuse the concepts of negative and decimal numbers. Placing these numbers on a positive/negative number line, like an imaginary thermometer, helps them understand the order of these values.

Greater depth

In 2014, a new curriculum was launched and teachers were told to deepen children's understanding rather than steam through the next year's objectives.

They also made the curriculum more challenging: in came division of fractions, cubed numbers, more complex algebra and BODMAS

Greater depth in action.

A case study of how much work there is within one statement, firstly in terms of skill progression, and then in terms of application.

Objective: add/subtract two fractions

Before getting on to applying and enriching,
there are many levels to work through

$$2/9 + 4/9$$

Before getting on to applying and enriching,
there are many levels to work through

$7/9 + 4/9$ (now convert to
mixed number)

Before getting on to applying and enriching,
there are many levels to work through

1 - 2/9

Before getting on to applying and enriching,
there are many levels to work through

$$2 \frac{1}{9} - \frac{3}{9}$$

Before getting on to applying and enriching,
there are many levels to work through

$$13/9 + 6$$

Before getting on to applying and enriching,
there are many levels to work through

$$2/9 + 2/3$$

Before getting on to applying and enriching,
there are many levels to work through

$$2/9 - 1/5$$

Before getting on to applying and enriching,
there are many levels to work through

$$6 \frac{5}{9} + 2 \frac{2}{7}$$

Before getting on to applying and enriching,
there are many levels to work through

$$\frac{2}{9} + \frac{2}{3} - \frac{1}{2}$$

Before getting on to applying and enriching,
there are many levels to work through

$$\frac{3}{4} + \frac{2}{3} \times \frac{1}{2}$$

Bringing in BODMAS

Ten ways to enrich, investigate and apply the same skill

$$1 - \square = 2/9$$

$$\square/9 + 1/3 = 1$$

$$\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$$

Write 3 related number sentences,
using these three amounts

Write a word problem for these
sentences

Find all of the ways of making 1
using only halves, fifths and
tenths

John claims he has finished his jigsaw by doing $\frac{2}{9}$ of it on day one; one third of it yesterday and a sixth today.

Prove whether his claim is true or not.

John said he added two different unit fractions and made a whole.

Prove whether he is telling the truth or not

Olivia was thinking of a fraction.
She added $\frac{2}{5}$ to it and got $\frac{2}{3}$.

What was her number?

Use these digits to make the sum work

2 4 7 8 1 3

$$\begin{array}{r} \square \\ \hline \square \end{array} + \begin{array}{r} \square \\ \hline \square \end{array} = \begin{array}{r} \square \\ \hline \square \end{array}$$

True or false: the answer is always at least 2

Choose a fraction e.g. $3/4$

Flip it and add the two fractions together

$$\text{e.g. } 3/4 + 4/3 = 9/12 + 16/12 = 25/12 = \mathbf{2} \ 1/12$$

Fill in the gaps in this sequence

____, _____, $1 \frac{1}{2}$, $2 \frac{1}{2}$, $3 \frac{3}{4}$, $5 \frac{1}{4}$, _____, _____

The difference between two numbers is $\frac{7}{8}$

One of the numbers is $6\frac{1}{2}$, what could the other numbers be?

Assessment round-up

- At the end of year 6, the children will be teacher-assessed in Writing, Reading and Maths; this year looks like being the last time that teacher assessment will be required for all but Writing (where there is no test)
- For writing there is a GDS award (greater depth); an EXS award (expected standard) also known as ARE (Age-Related Expectation), and a WTS award (working towards expected standard)
- There are also P awards where a child is still working at Key stage 1 objectives
- In Reading and Maths, the children are assessed as at ARE or not at ARE only.

Assessment continued

- The Key Stage 2 tests are sat in May and cover:
 - Spelling Punctuation and Grammar (commonly known as SPaG or GPS)
 - Reading
 - Maths

For these tests, the children are awarded a scaled score. If they achieve 100, they are considered at ARE (age-related expectations) and if they achieve 110, they are considered to be at Greater Depth or 'working at a higher standard'

- It seems likely that an online times table test will be introduced in Year 4 from 2019