Calculation Workshop

Contents / Agenda

Today is an opportunity to revise methods of calculation that we will be asking children to use through out the year and certainly during their SATS assessments in May.

Addition

In Year Six, children will be asked to add numbers together that have up to 6 digits. This may include numbers in the hundreds of thousands or a decimal number with an assortment of decimal places.

For example: 892,234 + 45,672 =

Or… 26.7 + 135.099 =

The secret to answering these questions correctly are all about positioning the numbers correctly before adding them together.

When arranging numbers into the column method, always check that the unit or decimal place sits in alignment with the other number.

$$\begin{array}{r} 892234 \\ +\ 45672 \\ \hline \\ = \end{array} \qquad \begin{array}{r} 135.099 \\ +\ 26.7 \\ \hline \\ = \end{array}$$

The most common errors come from students writing numbers in their wrong place value position. We urge students to write numbers beginning with their smallest 'place value' be it units, tenths or hundredths. With decimal numbers we ask them to check that the decimal points line up as well.

Carrying the One and not forgetting it!!

$$\begin{array}{r} 119.89 \\ +\ 89.89 \\ \hline \\ = \end{array}$$

Position the numbers, check the operation and don’t leave any ‘1’S behind!

Subtraction

In Year Six, children will be asked to subtract numbers which have up to 6 digits. This may include numbers in the hundreds of thousands or a decimal number with an assortment of decimal places.

125,689 – 45,782

45.679 – 32.0976

The secret to answering these questions correctly are all about positioning the numbers correctly before subtracting one from the other.

Borrowing

The most common errors to watch out for are from borrowing. Either children subtracting the top number instead of the bottom number, repeatedly borrowing from the same ‘place value’ position or confusing how to subtract decimals.

$$153 - 39.2 =$$

To solve this you must ensure the positioning of the numbers are correct. Add a decimal point and a zero to the top number to help the borrowing process.

$$6000 - 267 =$$

To solve this you must borrow from the 6000 and then move that amount down to the next place value position. Watch out for borrowing from the same place value position overly. So if you do borrow from the thousands then that goes to the hundreds column. Then you must borrow from the hundreds if you need to for the tens column.

Multiplication

In Year Six we will be focussed on using the column method otherwise known as long multiplication. Children will have to answer questions which go up to multiplying a 2 digit number by a 4 digit number.

		16				4326	
X		7		X		37	

Having a sound and quick recall of times table facts is essential for answering these questions quickly and accurately

Long Multiplication and Dropping an Egg

$$\begin{array}{r} 26 \\ \times\ 17 \\ \hline {}_{4}2 \end{array} \qquad \begin{array}{r} 26 \\ \times\ 17 \\ \hline 182 \end{array} \qquad \begin{array}{r} 26 \\ \times\ 17 \\ \hline 182 \\ 260 \\ \hline 442 \end{array}$$

The dropped Egg!

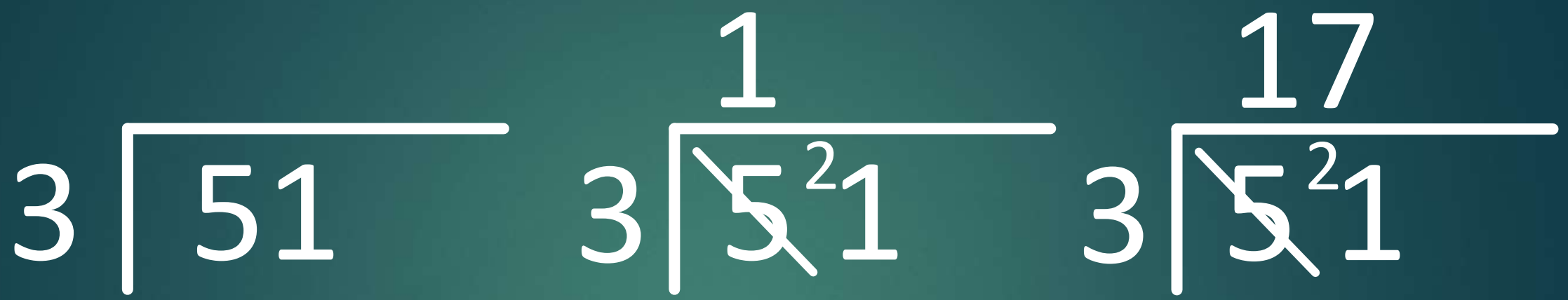
Start by multiplying the Top Unit by the bottom Unit – in this case 6 x 7. This gives you 42. The 2 goes in the units column beneath and we make a note of the 4 'tens' to add later. We then use the number in the top tens column and multiply it by the bottom unit number. In this case 2 x 7 which gives us 14 or 14 lots of ten. We add the four from earlier to give our first line an amount of 182. We will now be multiplying the bottom number in the tens column. Because we are multiplying tens, we write a 0 in the units position. We call this 'dropping an egg' we then multiply the top unit by the bottom ten (6 x 1) , and the top ten by the bottom ten (2x1) which gives us 260. We then add the two amounts together – 260 + 182 gives us an answer of 442.

Short Division
The Bus Stop Method

Short division, otherwise known as the bus stop method relies on a knowledge of times table facts to solve division problems. In year six these problem will range from fairly simple to dividing a four digit number by a 2 digit number.

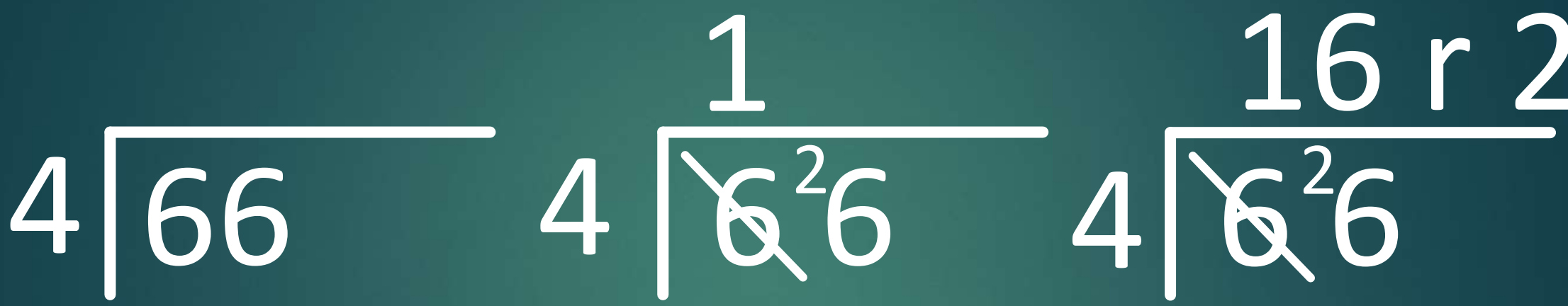
51 / 3 = ___ 8188 / 23 = ___

With a calculation like 51 divided by 3, you start by writing the number you are dividing in the ‘bus stop’ or calculation frame. Place the number you are dividing by to the left of the frame.



Start by seeing how many ‘3s’ go into 5. Write the result above the 5 and then place the remainder before the next number in the frame. Then see how many 3s go into 21.

In some instances, such as 66 divided by 4, there will be a remainder. Children will be expected to include this in their answer.



Once children are aware of what the remainder is, they might be asked to express the remainder in a few ways. A question might ask for the remainder to be expressed as a fraction, or as a fraction in its simplest form or in some cases as a decimal. This process all depends on the wording of the question.

16 r2 becomes 16 r 2/4 or 16 ½ or 16.5.

With a Remainder

As a fraction

As a simplified fraction

As a decimal

Calculating with Fractions and Mixed Numbers

Children will be asked to add, subtract, multiply and divide with both fractions and mixed numbers.
A mixed number is a combination of a whole number and a fraction, such as 1½.

Often with adding and subtracting this will require finding a common denominator.

When adding fractions such as thirds and quarters you must find a common denominator. This is the bottom number of the fraction. As both 3 and 4 can be multiplied to make 12. This becomes the common denominator. Often children are asked to find the lowest common denominator so using 12 makes more sense than using something like 24 or 36 which they also fit into.

$$\frac{1}{4} + \frac{2}{3} = \frac{3}{12} + \frac{8}{12}$$

When converting something like one quarter into twelfths we ask the children 'what do you have to multiply 4 by to get to 12?' If you have to multiply the denominator by 3 to get to 12, you must also multiply the top number (numerator) by the same amount. I.E If 4 x 3 = 12 you must then do 1 x 3 to give you the equivalent fraction. Its important to remember to just add the numerators!

$$\frac{3}{12} + \frac{8}{12} = \frac{11}{12}$$

Sometimes children will be asked to add fractions where the answer becomes top heavy or an Improper Fraction. Children might be asked to convert this either to a mixed number or if possible a decimal.

$$\frac{3}{4} + \frac{2}{3} = \overset{3 \times 3}{\underset{4 \times 3}{\frac{9}{12}}} + \overset{2 \times 4}{\underset{3 \times 4}{\frac{8}{12}}}$$

$$\frac{9}{12} + \frac{8}{12} = \frac{17}{12}$$

12 fits into 17 once with 5 left over so the answer can be shown to be....

$$1\frac{5}{12}$$

Multiplying Fractions

$$\frac{3}{4} \times \frac{2}{5}$$

Multiplying fractions is a simpler proposition. Simply times the numerator by the numerator (top numbers) and the denominator by the other denominator (bottom numbers.)

$$\frac{3}{4} \times \frac{2}{5} = \frac{3 \times 2}{4 \times 5} \frac{6}{20}$$

Dividing Fractions

Dividing fractions is slightly trickier but has a 'saying' to help remember what to do. To solve division questions you have to remember to flip and kiss. This means flipping the second fraction and then multiplying it by the first, so:

$$\frac{3}{4} \div \frac{2}{5} \quad \text{becomes} \quad \frac{3}{4} \times \frac{5}{2}$$

The second fraction is turned upside down and the symbol is changed to a multiplication 'x'. Then times numerator by numerator and denominator by denominator to get the answer.

Multiplying Fractions and whole numbers.

Sometimes questions will try and throw you by having a fraction be multiplied or divided by a whole number. The trick to answering these is making sure you turn the whole number into a fraction to help you!

$$\frac{3}{4} \times 5$$

Becomes...

$$\frac{3}{4} \times \frac{5}{1} = \frac{15}{4}$$

four goes into fifteen 3 times with 3 left over so you could express it as 3 and ¾ or 3.75!

Dividing Fractions and whole numbers.

Again the way through these problems is to turn the whole number into an improper fraction, then flip and then change the division symbol for a multiplication one, THE OLD FLIP AND KISS!

$$\frac{2}{5} \div 4$$

Becomes...

$$\frac{2}{5} \div \frac{4}{1}$$

And then becomes...

$$\frac{2}{5} \times \frac{1}{4} = \frac{2}{20}$$

FLIP!

KISS!

Percentages

We will try to solve any percentage questions by first finding 10% of a number.
From there we can derive other facts about a number to help us find a solution.

For example, when faced with a question like:

16% of 80 =

We would try to find 10% which would be 8.
Then we could find half of that to find 5% which would be 4.
Finally 1% of 80 would be ten times smaller than 8, that would give us 0.8

8 + 4 + 0.8 = 12.8

Order of Operations

Children also learn about the order of operations, sometimes this is referred to as BODMAS or BIDMAS. It refers to what order operations should be completed when faced with a number sentence with a mixture of operations such as 4 + 3 x (7 + 2).

The order is:

B: Brackets

O/I: Orders or Indices – Any squared, cubed numbers or numbers to the power of 4,5,6 e.t.c

D: Division – Has the same importance as Multiplication.

M: Multiplication: Has the same importance as Division.

A: Addition should be done after any multiplying or dividing but has the same importance as…

S: Subtraction. This is of the same importance as Addition but should be carried out after any Brackets, orders, multiplying and dividing.

Here are some examples

2 + 3 x 4 =

Following BODMAS, you should calculate 3 x 4 first and then add 2. The answer is 14.

3 x (4 + 2) – 5 =

Following BODMAS, calculate what is in the brackets first. 4 + 2 = 6. Next calculate 3 x 6 which equals 18 and finally take away 5 to give you 13.

$$4 + 3^2 \times (2 + 1) - 11 =$$

Calculate the brackets, then what 3 squared would be and then 9 x 3. Then add 4 and take away 11 to get an answer. Phew!

Useful Links

Our school calculation policy can be found here:

Addition, Subtraction, Multiplication and divsion

Mymaths:

https://www.mymaths.co.uk/

Maths is fun – a good website which has explanations and questions

https://www.mathsisfun.com/

Rising Stars – Booklets and online resources

https://www.risingstars-uk.com/

Bond books – Practise materials on a range of areas

Bond books on Amazon

Old SATS papers for practise –

Test papers