

DEAR – Drop everything and Reason

The **30 minute** session, following format:

1. Pupils complete the **pre-requisite skills** and answers are discussed as a group. Highlighting to the form tutor anyone that is going to require extra support.
2. Key information **recap**, linking to maths curriculum, followed by an opportunity to **practise** these skills.
3. **Problem solving** question is introduced to pupils and should be tackled using REEL:

Read
Explore
Exemplify
Link



- Pupils work in pairs or small groups to discuss their thought and **solve the problems** then feedback to the rest of the class on their thoughts.
4. Video with a **fully worked solution** to the problem to be shown to pupils to allow solutions to be checked.
 5. Class discussion regarding how the skills used here could be used in **real life situations and careers**.

Addition and Subtraction

Write out the question out as below:

$$\begin{array}{r} 410 \\ + 36 \\ \hline 446 \end{array} \quad \begin{array}{r} 202 \\ + 070 \\ \hline 272 \end{array}$$

$$\begin{array}{r} 624 \\ - 29 \\ \hline 605 \end{array} \quad \begin{array}{r} 343 \\ - 099 \\ \hline 244 \end{array}$$

Line up the decimal points. Zeros can be added after the last decimal place value without changing the value of the number, but making it easier to add and subtract.

When subtracting the largest number should be on the top of the calculation and if exchange (not borrowing) needs to happen then one from the place value column to the left should be exchanged for 10 of the units needed in order to carry out the subtraction.

Ratio

Pupils are briefly introduced to ratio in primary school. The bar model is a commonly used pictorial method used to represent ratio, and one that is still particularly useful in KS3 to provide scaffolding though a visual representation that can later be removed.

When simplifying a ratio there is a link to simplifying fractions. Find the highest common factor of the numbers in the ratio and divide by the numbers by that.

Simplify 35:15

$$\div 5 \quad 35:15 \div 5$$

$$7:3$$

Pupils should draw a bar model with the correct number of 'boxes'. They should then share the amount between each of the boxes equally. This allows ratio questions to be answered more easily.

Share £36 in the ratio 5:1

5	+	1	=	6
36	÷	6	=	6

Bar model: $5 \times 6 = 30$ $1 \times 6 = 6$

£30 : £6

Order of operations

Pupils will be taught the order of operations using the acronym BIDMAS.

- B** Brackets
I Indices (powers and roots)
D Division
M Multiplication
A Addition
S Subtraction

Pupils should underline the part of the calculation they are calculating then write the calculation out again underneath.

- Step 1:** There are no brackets, so the first part to deal with is indices (square)
- $$24 - 12 + 6^2 \div 2$$
- $$= 24 - 12 + 36 \div 2$$
- $$= 24 - 12 + 18$$
- $$= 12 + 18$$
- $$= 30$$
- Step 2:** division
- Step 3:** Subtraction as it is first when reading left to right

To avoid a common misconception it is important to note that multiplication and division hold equal weighting, as do addition and subtraction. For example, on step 3 in the calculation above pupils just read left to right so complete the subtraction first, followed by addition. A scientific calculator it will always automatically use BIDMAS.

Percentages

Pupils should be taught to find the following percentages in order to assist them in calculating other percentages - 1%, 5%, 10%, 25%, 50%. Pupils can be taught to find 1% then multiply by the percentage they need to calculate, or they can calculate the required percentages from the list above and add them together.

Find 62% of 200 = 124

50%	=	100
10%	=	20
1%	=	2
62%	=	124

Divide number by 2 50% = 100
Divide number by 10 10% = 20
Divide number by 100 1% = 2

When using calculators to find percentages pupils can either use a multiplier (decimal equivalent of the percentage required) or the % button on their calculators.

Multiplication

KS2 complete long multiplication using this method Pupils set out the multiplication and remember when multiplying by the number in the tens or hundreds place, always include a place value holder.

Carried forward

$$\begin{array}{r} 27 \\ \times 32 \\ \hline 54 \\ 864 \\ \hline 864 \end{array}$$

Place value holder as multiplying by 30

When multiplying decimals pupils need to multiply the decimal numbers by a power of 10, then complete the multiplication calculation with integers. They will then need to divide the answer by the combined power of 10 used to make the two numbers whole.

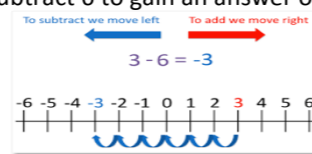
$$2.4 \times 0.3 = 0.72$$

$\times 10$ $\times 10$ Answer has been divided by 100

$$\begin{array}{r} 24 \\ \times 3 \\ \hline 72 \end{array}$$

Negative Numbers

Negative numbers have been introduced to pupils in primary school, as numbers which are less than zero. When adding and subtracting numbers which include negatives, pupils should think about their starting point and the direction they will take in order to gain an answer. For example, when calculating 3 - 6 pupils start at 3 then subtract 6 to gain an answer of -3.



When subtracting a negative number pupils will need to add that number.

For example, 2 - -4, pupils will start at 2, then add 4 on, making the answer 6.

When multiplying and dividing pupils should be encouraged to decide if the answer will be a positive number or a negative one. The simple rule is that if the numbers are the same the answer will be positive and if they are different they will be negative.



For example:
 5×-6 (negative) = -30
 -3×-6 (positive) = 18

The rules are the same for both division and multiplication.

Fractions

Pupils have been taught to calculate with fractions in primary school, including the use of equivalent fractions for ordering, adding and subtracting fractions. Fractions will have been introduced using pictorial representations, which some pupils may continue to use. Fractions can only be added when they have the same denominator. This may require the pupils to find a common denominator and then use equivalent fractions. In order to maintain equivalence whatever number you multiply the denominator by you have to multiply the numerator by

$\frac{2}{4} + \frac{2}{8}$	$\frac{5}{3} + \frac{3}{5}$	$\frac{5}{6} - \frac{1}{3}$	$\frac{3}{4} - \frac{1}{6}$
$= \frac{2}{8} + \frac{2}{8}$	$= \frac{10}{15} + \frac{9}{15}$	$= \frac{5}{6} - \frac{2}{6}$	$= \frac{9}{12} - \frac{2}{12}$
$= \frac{4}{8}$	$= \frac{19}{15}$	$= \frac{3}{6}$	$= \frac{7}{12}$
$= \frac{1}{2}$	$= 1\frac{4}{15}$	$= \frac{1}{2}$	

Pupils will be expected to multiply fractions by integers and other fractions. This builds upon their knowledge of finding fractions of amounts.

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

$$\frac{1}{4} \times \frac{2}{5} = \frac{2}{20} = \frac{1}{10}$$

Multiply the numerators Multiply the denominators

As pupils develop their work with fractions they will be able to divide fraction. When dividing by fractions they will learn about multiplying by the reciprocal.

Use the reciprocal of the whole number

$$\frac{1}{4} \div 2 = \frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$$

$$\frac{1}{4} \div \frac{2}{5} = \frac{1}{4} \times \frac{5}{2} = \frac{5}{8}$$

Division

KS3 have different methods of division, including short (sometimes referred to as the bus stop method) and long division. When setting out short division the dividend (number being divided) is required to be 'in the bus stop' and the divisor goes outside. Once at the end of the calculation, pupils may need to put a decimal point and add zeros into the empty place value

$$324 \div 6 = 54$$

Line up the decimal points. Zeros can be added after the last decimal place value without changing the value of the number, but making it easier to add and subtract.

When subtracting the largest number should be on the top of the calculation and if exchange (not borrowing) needs to happen then one from the place value column to the left should be exchanged for 10 of the units needed in order to carry out the subtraction.

$$74.3 \div 5 = 14.86$$

As there is a remainder a zero has been added to allow the calculation to be completed

$$25.2 \div 0.4 = 252 \div 4 = 63$$

Both numbers have been multiplied by 10 to make them whole