

Year 6 Arithmetic Guide

2016

$+$ $-$ \times \div

Addition - always start on the right of the sum

Short Column addition

$$\begin{array}{r} 1673 \\ + 1294 \\ \hline 2967 \\ 1 \end{array}$$

- Line up digits using place value.
- Add the ones and carry any ones underneath the sum.
- Add the tens and carry any hundreds underneath the sum.
- Add the hundreds and carry any thousands underneath the sum.
- Add the thousands.
- Remember to add any carried ones as you go along.

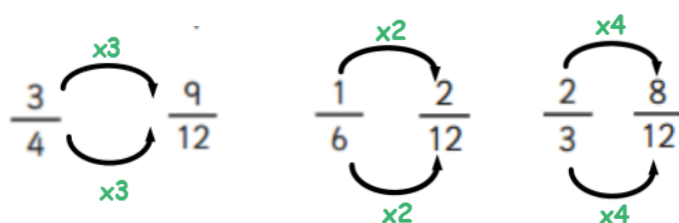
Short Column addition up to 3 decimal places

$$\begin{array}{r} 16.528 \\ 17.348 \\ \hline 33.876 \\ 1 \quad 1 \end{array}$$

- Line up digits using place value- make sure the decimal points are lined up.
- Add the thousandths and carry any hundredths underneath the sum.
- Add the hundredths and carry any tenths underneath the sum.
- Add the tenths and carry any ones underneath the sum.
- Put the decimal point in the answer.
- Add the ones and carry any tens underneath.
- Add the tens.
- Remember to add any carried ones as you go along.

Addition - fractions

$$\frac{3}{4} + \frac{5}{12} + \frac{1}{6} + \frac{2}{3} = 2$$



$$\frac{9}{12} + \frac{5}{12} + \frac{2}{12} + \frac{8}{12} = \frac{24}{12}$$

- Find a common denominator- a number that each number multiplies into. Here it is 12.
- TIP- if you multiply the 2 denominators you get a common denominator; although this is not always the smallest.
- To convert the fractions you must multiply the numerator and denominator by the same number.
- Now add the numerators together.

Short Column subtraction- always start on the right of the sum

1095-876

$$\begin{array}{r} \\ \\ - \\ \hline \end{array}$$

- Line up digits using place value.
- Subtract the ones. If the bottom number in the ones column is bigger than the top then 'exchange/borrow' from the tens before you subtract.
- Subtract the tens- exchanging/borrowing if necessary.
- Subtract the hundreds- exchanging/borrowing if necessary.
- Subtract the thousands.

Short Column subtraction with decimal places

24.95-16.87

$$\begin{array}{r} \\ \\ - \\ \hline \end{array}$$

- Line up digits using place value- make sure the decimal points are lined up.
- Subtract the hundredths. If the bottom number in the ones column is bigger than the top then 'exchange/borrow' from the tenths before you subtract.
- Subtract the tenths- exchanging/borrowing if necessary.
- Put the decimal point in the answer box.
- Subtract the ones- exchanging/borrowing if necessary.
- Subtract the tens.

Subtraction - fractions

$$\frac{5}{6} - \frac{1}{4} = \frac{7}{12}$$
$$\frac{10}{12} - \frac{3}{12} = \frac{7}{12}$$

- Find a common denominator- a number that each number multiplies into.
- To convert the fractions you must multiply the numerator and denominator by the same number.
- Now subtract the numerators.

Short Multiplication- always start on the right of the sum

$$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \\ 2 \end{array}$$

$$\begin{array}{r} 342 \\ \times 7 \\ \hline 2394 \\ 21 \end{array}$$

- Multiply the ones first by the multiple (e.g 7x2) Carry any tens underneath.
- Then multiply the multiple by the tens. Carry any tens underneath. Remembering to add any carried digits.
- Then multiply out the hundreds. Carry any tens underneath.
- Remember to add any carried digits as you go along.

Long Multiplication- always start on the right of the sum

$$\begin{array}{r} 24 \\ \times 16 \\ \hline 144 \\ 2 \\ \hline 240 \\ \hline 384 \end{array}$$

- Multiply the ones first by the multiple (e.g 6x4) Carry any tens underneath.
- Then multiply the multiple by the tens. Carry any tens underneath. Remembering to add any carried digits.
- Add a place holder (0) in the ones column as you are now multiplying by a ten.
- Now multiply by the ten (e.g. 1x4) Carry any tens underneath.
- Then multiply out the tens (e.g. 1x2)
- Remember to add any carried digits as you go along.
- Add the two answers together (e.g. 144+240)

Multiplication - fractions

$$\frac{2}{5} \times \frac{1}{3} = \frac{2}{15}$$

- Multiply the numerators together.
- Multiply the denominators together.

$$10 \times 1\frac{1}{5} = \frac{10}{1} \times \frac{6}{5} = \frac{60}{5}$$

- If multiplying by a whole number we always put it over 1.
- If the fraction is a mixed number then it needs to be turned into an improper fraction.
- Multiply the numerators together.
- Multiply the denominators together.

Short Division

		0	2	4	r	1	0
1	2	2	9	58			

- Put the divisor outside the 'bus stop'.
- How many 12s go into 2? Put the answer above. Carry any left over.
- How many 12s go into 29? Put the answer above. Carry any left over.
- How many 12s go into 58? Put the answer above.
- Any left over now becomes the remainder.

Long Division

			1	5	0	r2	1
2	4	3	6	2	1		
	-	2	4	↓	↓		
		1	2	2			
		1	2	0	↓		
				2	1		

Jottings

- 24
- 48
- 72
- 96
- 120

- Write down jottings of the times table you are using to help with the division.
- Put the divisor outside the 'bus stop'.
- 24 doesn't 'go into' 3 so look at the next digit.
- How many 24s go into 36? Put the answer above. Subtract the 24 away from the 36 to get your remainder.
- Next bring the 2 down to make 122.
- How many 24s go into 120? Put the answer above. Subtract the 120 away from the 36 to get your remainder.
- Next bring the 1 down to make 21.
- 24 doesn't 'go into' 21 so it becomes the remainder.

Division - fractions

$$\frac{5}{8} \div 4 = \frac{5}{8 \times 4} = \frac{5}{32}$$

- Keep the numerator the same.
- Multiply the denominator by the divisor.

Multiplying and dividing by 10, 100 and 100 using place value

x 10 move 1 place to the left

÷ 10 move 1 place to the right

x 100 move 2 places to the left

÷ 100 move 2 places to the right

x 1000 move 3 places to the left

÷ 1000 move 3 places to the right

$$94.3 \times 10 = 943$$

$$5360 \div 1000 = 5.360$$

hundred thousands	ten thousands	thousands	hundreds	tens	units	• decimal	tenths	hundredths	thousandths	ten thousandths
				9	4	.	3			
				↙	↙		↙			
			9	4	3					

Changing mixed numbers into improper fractions

Some methods require the children to change mixed numbers into improper fractions.

$$4 \frac{1}{3} = 4 \times 3 = \frac{12}{3} + \frac{1}{3} = \frac{13}{3}$$

- Multiply the whole number by the denominator.
- Then add the numerator.

BODMAS

B	Brackets	$10 \times (4 + 2) = 10 \times 6 = 6$
O	Order	$5 + 2^2 = 5 + 4 = 9$
D	Division	$10 + 6 \div 2 = 10 + 3 = 13$
M	Multiplication	$10 - 4 \times 2 = 10 - 8 = 2$
A	Addition	$10 \times 4 + 7 = 47$
S	Subtraction	$10 \div 2 - 3 = 2$

$$(5 + 11) \div 4 = 16 \div 4 = 4$$

$$10 - 12 \div 2 = 10 - 6 = 4$$

Finding a percentage

$$65\% \text{ of } 350 = 100\% = 350$$

$$50\% = 175$$

$$10\% = 35$$

$$\underline{5\% = 17.5}$$

$$\underline{65\% = 227.5}$$

- Find 100% of the amount.
- Use this to find 50%.
- Find 10%.
- Find 5%.
- Find 1% if necessary.
- Add up the chunks you need.

Finding a common denominator

The lowest common denominator is the smallest number that is exactly divisible by each denominator of a set of fractions

Sometimes, when we have to add or subtract two fractions, we cannot do this, because the denominators are different, for example:

$$\frac{1}{4} + \frac{3}{20}$$

To be able to add or subtract two fractions, both the denominators need to be the same.

To find the lowest common denominator, we see if the larger denominator (20) can be divided by the smaller denominator (4).

We then need to work out what we need to multiply the 4 by, to make 20 (this is 5): what we do to the top we have to do to the bottom.

$$\frac{1}{4} \quad \frac{5}{20}$$

$$\frac{5}{20} + \frac{3}{20} = \frac{8}{20}$$

