Year 3 Mathematics Knowledge Organiser

Addition and Subtraction

Key Concepts

- Add and subtract multiples of 100
- Add and subtract numbers mentally
- Add and subtract numbers using formal written methods

Key Vocabulary

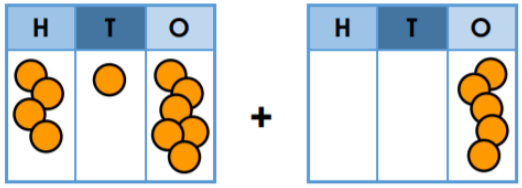
- add/addition
- subtract/subtraction
- calculate/calculation
- mental calculation
- written method
- operation
- total
- amount
- exchange
- regroup

Addition and Subtraction Vocabulary

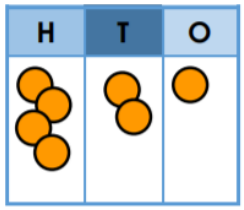
add total combined more increase plus altogether sum +

minus take away reduce less than difference decrease fewer than −

Addition

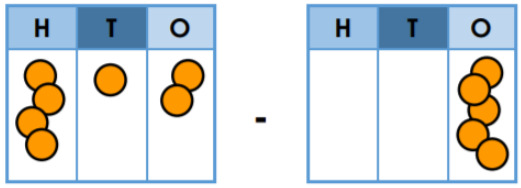


The counters in these place value charts show the calculation **416 + 5**. If we just add both sets of ones counters together, we will have 11 ones counters. 11 ones is then exchanged into a ten and a one.

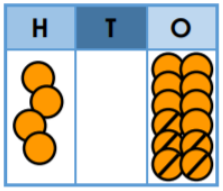


416 + 5 = 421

Subtraction



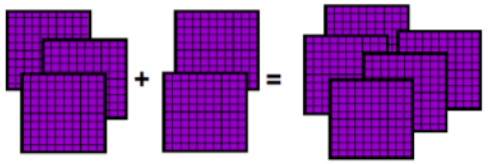
The counters in these place value charts show the calculation **412 - 5**. In the ones columns, we can not take 5 away from 2 so we exchange the tens counter for ten ones. 400 + 10 + 2 is the same as 400 + 12.



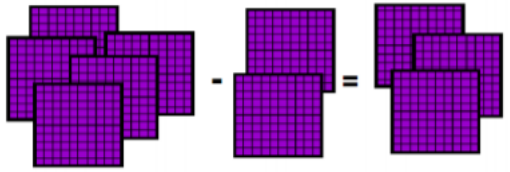
412 - 5 = 407

Adding and Subtracting Multiples of 100

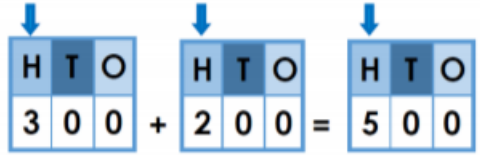
We can use the fact 3 + 2 = 5 to help us calculate that 300 + 200 = 500.



We can then use the inverse to calculate that 500 - 200 = 300.

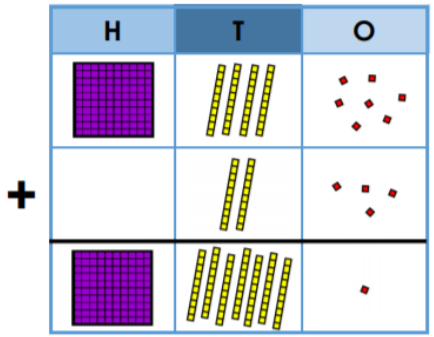


When you add or subtract a multiple of 100, it is the digit in the hundreds place that changes. The tens and ones digits do not change.



Addition - Formal Written Methods

Using equipment to show column addition:



Year 3 Mathematics Knowledge Organiser

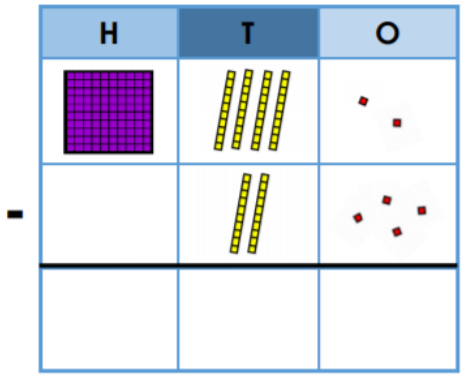
Addition and Subtraction

	1	4	7
+		2	4
	1	7	1
	1		

With column addition and subtraction, you must always start the calculation with the column on the right. 7 + 4 is 11. We can not put 11 in the ones column so a ten is placed under the tens column and the one is placed in the ones column. We then add the extra ten when we add that column.

Subtraction - Formal Written Methods

Using equipment to show column subtraction:



	1	4	2
-		2	4

There aren't enough ones to subtract 4 from 2 so we need to exchange a ten for ten ones.

	1	~~4~~ 3	12
-		2	4
	1	1	8

To show this, the 4 is changed to a 3 because we now have 3 tens. The 2 ones becomes 12 ones.

42 is the same as 30 + 12. We still have the same amount, but it has been regrouped.

Now, we can answer the subtraction.

Multiplication and Division

Key Concepts

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers using mental and progressing to formal written methods.
- Solve problems, including missing number problems.

Key Vocabulary

- multiply
- times
- groups of
- lots of
- array
- divide
- share
- divide
- commutatively

Multiplication Facts

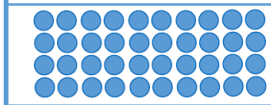
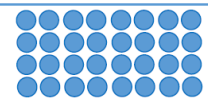
Pupils continue to practice their mental recall of multiplication tables.

3x Table	4x Table	8x Table
0 x 3 = 0	0 x 4 = 0	0 x 8 = 0
1 x 3 = 3	1 x 4 = 4	1 x 8 = 8
2 x 3 = 6	2 x 4 = 8	2 x 8 = 16
3 x 3 = 9	3 x 4 = 12	3 x 8 = 24
4 x 3 = 12	4 x 4 = 16	4 x 8 = 32
5 x 3 = 15	5 x 4 = 20	5 x 8 = 40
6 x 3 = 18	6 x 4 = 24	6 x 8 = 48
7 x 3 = 21	7 x 4 = 28	7 x 8 = 56
8 x 3 = 24	8 x 4 = 32	8 x 8 = 64
9 x 3 = 27	9 x 4 = 36	9 x 8 = 72
10 x 3 = 30	10 x 4 = 40	10 x 8 = 80
11 x 3 = 33	11 x 4 = 44	11 x 8 = 88
12 x 3 = 36	12 x 4 = 48	12 x 8 = 96

Two by One-Digit Multiplication

Pupils build on their knowledge of arrays from YR2 and apply this to multiplying larger numbers.

"To multiply 18 x 4, I first I partition 18 into 10 and 8 then multiply both numbers by 4. Finally, I find the total of both arrays, 72."

T	O
10 x 4	8 x 4
	

10 x 4 = 40

8 x 4 = 32

Year 3 Mathematics Knowledge Organiser

Multiplication and Division

Written Methods

Pupils then move towards a written method using a grid to set out the calculation.

14 x 8 = 112

×	10	4
8	80	32

Formal Written Methods

Pupils progress onto formal written method:

	3	7
×		5
1	8	5

3

Multiply both digits from the 2-digit number by the 1 digit number, starting with the ones. 5 x 7 = 35. 35 ones cannot go in the ones column so exchange 30 ones for 3 tens. Keep the 5 ones in the ones column. Then, multiply the tens digit by 5. When you add the 3 tens from the previous calculation, there are 18 tens. 10 tens are exchanged for 1 hundred and the 8 tens remain in the tens column. The answer is 185.

Efficient Methods

Pupils understand that multiplication is commutative (can be performed in any order) and use this to calculate efficiently.

4 x 12 x 5
can be rearranged into
4 x 5 x 12

4 x 5 = 20.

Then, calculate 20 x 12 = 240

Doubling

2 x 4 = 8 **4 x 4 = 16** **8 x 4 = 32**

2 x 6 = 12 **4 x 6 = 24** **8 x 6 = 48**

Pupils use their understanding of doubling to connect the 2, 4 and 8 multiplication tables.

Division Facts

Pupils continue to practice their mental recall of division facts linked to multiplication tables.

3x Table	4x Table	8x Table
0 ÷ 3 = 0	0 ÷ 4 = 0	0 ÷ 8 = 0
3 ÷ 3 = 1	4 ÷ 4 = 1	8 ÷ 8 = 1
6 ÷ 3 = 2	8 ÷ 4 = 2	16 ÷ 8 = 2
9 ÷ 3 = 3	12 ÷ 4 = 3	24 ÷ 8 = 3
12 ÷ 3 = 4	16 ÷ 4 = 4	32 ÷ 8 = 4
15 ÷ 3 = 5	20 ÷ 4 = 5	40 ÷ 8 = 5
18 ÷ 3 = 6	24 ÷ 4 = 6	48 ÷ 8 = 6
21 ÷ 3 = 7	28 ÷ 4 = 7	56 ÷ 8 = 7
24 ÷ 3 = 8	32 ÷ 4 = 8	64 ÷ 8 = 8
27 ÷ 3 = 9	36 ÷ 4 = 9	72 ÷ 8 = 9
30 ÷ 3 = 10	40 ÷ 4 = 10	80 ÷ 8 = 10
33 ÷ 3 = 11	44 ÷ 4 = 11	88 ÷ 8 = 11
36 ÷ 3 = 12	48 ÷ 4 = 12	96 ÷ 8 = 12

Known Facts and Missing Digits

Sometimes, you need to use your known table facts and manipulation to find missing values.

? × 3 = 21

The missing value equals 21 ÷ 3. The answer is 7.

8 = ? ÷ 4

The missing value equals 8 x 4. The answer is 32.

Written Methods (Division)

Pupils use place value counters to calculate larger division statements.

When calculating 93 ÷ 3 = 31, the tens and ones are divided into groups of 3.

T	O
90 ÷ 3 = 30	3 ÷ 3 = 1
10 10 10 10 10 10 10 10 10	1 1 1

Formal Written Methods (Division)

Pupils progress onto formal written method:

	2	4
4	9	1 6

Year 3 Mathematics Knowledge Organiser

Multiplication and Division

Start by looking at the tens digit (9). If you split 9 tens into four equal groups, how many will be in each group? There will be 2 tens, which makes 20 so a 2 goes in the tens column. However, there is a remainder of 1 ten. This gets exchanged for 10 ones. Now, look at the new ones value (16). If you split 16 ones into four equal groups, how many will be in each group? There will be 4 ones in each group so write this as the ones digit. The answer is 24.

Place Value

Key Concepts

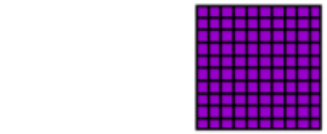
- Recognising the place value of each digit in a three digit number
- 100s, 10s and 1s
- Read and write numbers up to 1000 in numerals and in words
- Number line to 1000
- Finding 10 and 100 more or less
- Compare and order objects and numbers up to 1000
- Count in 50s

Key Vocabulary

- compare
- greater than >
- less than <
- numeral
- place value
- ones, tens, hundreds
- digit
- count in fifties
- represent
- increase
- decrease

Numbers to 1000 - Base 10

A three-digit number is made up of hundreds, tens and ones. Base 10 can be used to represent numbers:

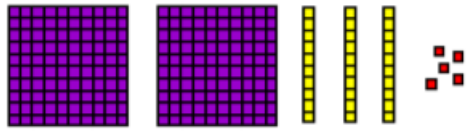


represents a hundred

represents a ten

represents a one

This represents the number 235. It is made up of 2 hundreds, 3 tens and 5 ones



Numbers to 1000 - Place Value Counters

Numbers can also be represented with place value counters:

These counters are representing the number 312. It is made up of 3 hundreds, 1 ten and 2 ones.

Numbers to 1000 - Arrow Cards

Numbers can also be represented with place value arrow cards. These cards represent the number 638. It is made up of 6 hundreds, 3 tens and 8 ones

In this second example, we only have a hundreds card and a ones card.

If we write 68, the 6 would not represent the 600 anymore. We need to have a place holder digit in the tens place and we use a zero for this. The number is written like this - 608.

Place Value of Digits

Place value helps us know the value of a digit, depending on its place in the number.

H	T	O
8	2	5

In the number above, the 8 digit is in the hundreds place so it really means 800.

The 2 digit is in the tens place so it really means 20.

The 5 digit is in the ones place so it means 5.

Number Line to 1000

Numbers can be placed on a number line. A number line can start and finish with any number e.g.

When estimating where to place 200 on this number line, you need to look at the numbers that are already labelled. I know that 200 is halfway between 100 and 300 therefore I need to label 200 halfway along the number line .

Year 3 Mathematics Knowledge Organiser

Place Value

Counting in 50s

50, 100, 150, 200, 250, 300, 350

I have noticed there are 2 lots of 50 in a hundred.

I have noticed I can use my 5 times table to help me count in 50s.

10 and 100 More or Less

To find 10 more or less than a number, you first need to find the digit in the tens place.

H	T	O
6	3	9

Finding 10 more will increase the tens digit by 1. So, in this example, the 3 will become a 4. 10 more than 639 will be 649.

Finding 10 less will decrease the tens digit by 1. So in this example, the 3 will become a 2. 10 less than 639 is 629.

I've noticed that the hundreds and ones digits didn't change.

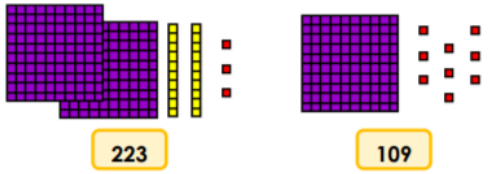
H	T	O
6	9	4

Finding 10 more when the number has a 9 in the tens place is slightly different. Adding 1 to the tens place would give 10, so to show that, the hundreds increases by 1 and a 0 is put in the tens place. 10 more than 694 is 704.

Finding 100 more or less is very similar to finding 10 more or less. Instead of changing the tens number, you change the hundreds numbers.

Ordering and Comparing Numbers

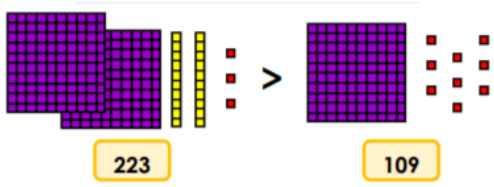
When we put numbers in order, we need to compare the value of their digits.



First, look at the hundreds digits in each number. 1 is the smaller hundred digit so 109 is the smaller number.

We can compare numbers and objects using the < and > symbols.

< = less than > = greater than.



Read and Write Numbers in Numerals and Words

Numbers can be written in both numerals and words. When writing a number in words, it is useful to think about the place value of the digits.

H	T	O
7	2	5

This would be written as seven hundred and twenty five.

H	T	O
4	0	3

When there is a zero, we don't need to write anything for that column. This is four hundred and three.

Fractions

Key Concepts

- Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10.
- Recognise, find and write fractions of a discrete set of objects.
- Recognise and use fractions as numbers.
- Recognise and show, using diagrams, equivalent fractions with small denominators.
- Add and subtract fractions with the same denominator within one whole.
- Compare and order unit fractions, and fractions with the same denominators.

Key Vocabulary

- fraction
- numerator
- denominator
- equivalent
- unit fraction
- tenths

Year 3 Mathematics Knowledge Organiser

Fractions

Tenths `

There are 10 tenths in 1 whole.

1/10	2/10	3/10	4/10	5/10	6/10	7/10	8/10	9/10	10/10

One whole

Tenths are 10 times smaller than 1 whole.

Their place on the place value chart is to the right of the ones column. A decimal point separates the ones and tenths columns.

H	T	O	•	t
		0	•	1

Tenths can be written as a fraction and as a decimal number.

$$\frac{1}{10} = 0.1$$

Tenths can be found by dividing 1-digit numbers by 10.

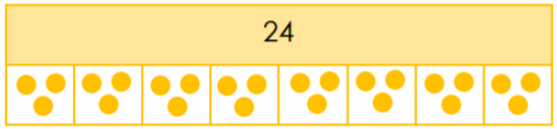
6 ÷ 10 = 0.6 or 6 tenths

6									
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6

Finding Fractions

A bar model and counters can be used to find fractions of amounts.

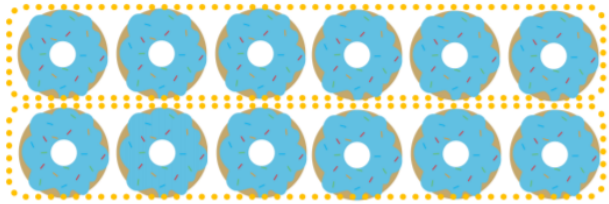
$$\frac{1}{8} \text{ of } 24 = 3$$



If $\frac{1}{8}$ of 24 = 3 then $\frac{3}{8}$ of 24 = 9

To find a fraction of a set of objects, divide the objects into groups of the denominator.

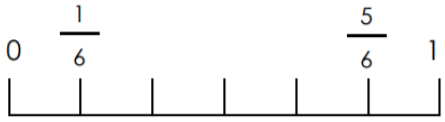
$$\frac{1}{6} \text{ of } 12 = 2$$



$\frac{1}{6}$ of 12 = 2 is the same as 12 ÷ 6 = 2

Fractions as Numbers

Fractions are numbers that are part of a whole. This can be shown on a number line.

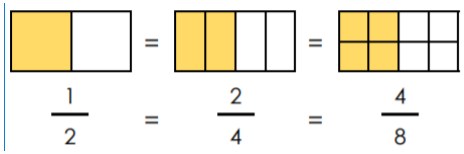


The number at the bottom is the denominator and shows how many parts the whole is divided into.

The number at the top is the numerator and shows the number of parts of the whole.

Equivalent Fractions

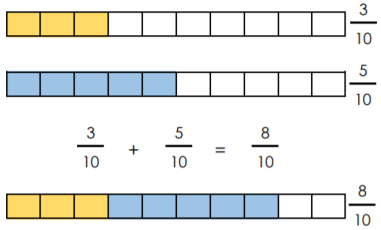
Equivalent fractions have different numerators and denominators but share the same value.



If you multiply or divide the numerator and denominator of a fraction by the same number, the new fraction will be equivalent.

Add Fractions

When adding fractions with the same denominator, the denominator does not change. The numerators only are added.



Subtract Fractions

When subtracting fractions with the same denominator, the denominator does not change. The numerators only are subtracted.