Year 4 Mathematics Knowledge Organiser

Addition and Subtraction

Key Concepts

- Add and subtract 1s, 10s, 100s and 1,000s
- Add and subtract numbers mentally
- Add and subtract numbers using formal written methods
- Estimate answers

Key Vocabulary

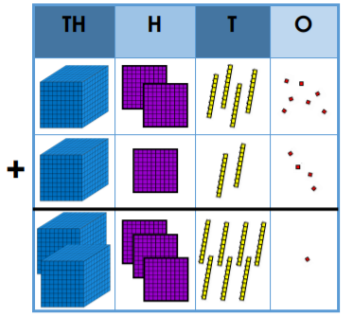
- add/addition
- subtract/subtraction
- calculate/calculation
- mental calculation
- written method
- operation
- total
- amount
- exchange
- regroup

Addition and Subtraction Vocabulary

add total combined more increase plus altogether sum

minus take away reduce less than difference decrease fewer than

Addition - Formal Written Methods Using counters to show column addition:



	1	2	4	7
+	1	1	2	4
	2	3	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. Then, we add the extra ten when we add that column.

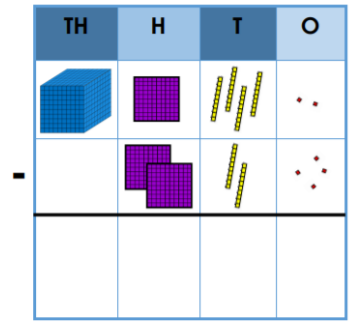
Add and Subtract 1s, 10s, 100s, and 1,000s

If I add ones to a number, I need to add it to the digit in the ones column.

The same applies if you are adding tens, hundreds or thousands - you add to the digit in that place value column.

If I add a multiple of 100 to the number above, the tens and ones will not change. The thousands will only change when the hundreds totals more than 9.

Subtraction - Formal Written Methods



	1	1	4	2
-		2	2	4

In the ones column, we don't have enough ones to subtract 4 from 2. To complete the calculation, we need to exchange a ten for ten ones.

To show this, the 4 is changed to a 3 because we now have 3 tens. The 2 becomes a 12. 42 is the same as 30 + 12. We still have the same amount, but it has been regrouped. Now, we can start subtracting.

12 - 4 = 8 so 8 is written in the ones column.

In the tens column, 3 - 2 = 1 so 1 is written in the tens column.

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

Looking at the hundreds column, we do not have enough to subtract 2 from 1. We need to exchange the thousand for ten hundreds. To show this, the 1 (thousand) is changed to a 0 as we now have 0 thousands. The 1 (hundreds) becomes an 11. 11 hundreds is the same as 1 thousand and 1 hundred. Now, we can finish the subtraction. 11 - 2 = 9.

	0	11	3	
	~~1~~	1	~~4~~	12
-		2	2	4
		9	1	8

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Addition and Subtraction

Estimate Answers

Estimating means to get a rough idea of an answer . We can use estimation to help us check if an answer to a calculation is correct.

I am calculating 3,478 + 2,983.

I think the answer is 4,461.

I am also calculating 3,478 + 2,983. I think the answer is 6,461.

Dexter and Ash could check their answers by doing the calculation again. However, if they have made a mistake, they may just make the same mistake again.

Instead, they could use **rounding** to check if their answer is correct.

We can round the numbers to the nearest hundred.

So 3,478 + 2,983 becomes 3,500 + 3,000.

3,500 + 3,000 = 6,500.

Now we compare our estimate to the actual answers given. The answer 6,461 is very close to the estimate of 6,500 so that tells us it is more likely to be correct.

Multiplication and Division

Key Concepts

- Recall multiplication and division facts for multiplication tables up to 12 × 12.
- Multiply together three numbers.
- Multiply two-digit and three-digit numbers by a one-digit number using formal written layout.
- Divide two-digit and three-digit numbers by a one-digit number.

Key Vocabulary

- multiply/multiplication
- divide/division
- calculate/calculation
- mental calculation
- written method
- operation
- remainder
- factor/factor pairs
- efficient

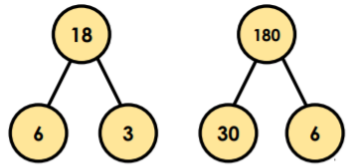
Multiplication Tables

1 x 6 = 6	2 x 6 = 12	3 x 6 = 18	4 x 6 = 24	5 x 6 = 30	6 x 6 = 36
7 x 6 = 42	8 x 6 = 48	9 x 6 = 54	10 x 6 = 60	11 x 6 = 66	12 x 6 = 72
1 x 7 = 7	2 x 7 = 14	3 x 7 = 21	4 x 7 = 28	5 x 7 = 35	6 x 7 = 42
7 x 7 = 49	8 x 7 = 56	9 x 7 = 63	10 x 7 = 70	11 x 7 = 77	12 x 7 = 84
1 x 9 = 9	2 x 9 = 18	3 x 9 = 27	4 x 9 = 36	5 x 9 = 45	6 x 9 = 54
7 x 9 = 63	8 x 9 = 72	9 x 9 = 81	10 x 9 = 90	11 x 9 = 99	12 x 9 = 108
1 x 11 = 11	2 x 11 = 22	3 x 11 = 33	4 x 11 = 44	5 x 11 = 55	6 x 11 = 66
7 x 11 = 77	8 x 11 = 88	9 x 11 = 99	10 x 11 = 110	11 x 11 = 121	12 x 11 = 132
1 x 12 = 12	2 x 12 = 24	3 x 12 = 36	4 x 12 = 48	5 x 12 = 60	6 x 12 = 72
7 x 12 = 84	8 x 12 = 96	9 x 12 = 108	10 x 12 = 120	11 x 12 = 132	12 x 12 = 144

Division Facts

6 ÷ 6 = 1	12 ÷ 6 = 2	18 ÷ 6 = 3	24 ÷ 6 = 4	30 ÷ 6 = 5	36 ÷ 6 = 6
42 ÷ 6 = 7	48 ÷ 6 = 8	54 ÷ 6 = 9	60 ÷ 6 = 10	66 ÷ 6 = 11	72 ÷ 6 = 12
7 ÷ 7 = 1	14 ÷ 7 = 2	21 ÷ 7 = 3	28 ÷ 7 = 4	25 ÷ 7 = 5	42 ÷ 7 = 6
49 ÷ 7 = 7	56 ÷ 7 = 8	63 ÷ 7 = 9	70 ÷ 7 = 10	77 ÷ 7 = 11	84 ÷ 7 = 12
9 ÷ 9 = 1	18 ÷ 9 = 2	27 ÷ 9 = 3	36 ÷ 9 = 4	45 ÷ 9 = 5	54 ÷ 9 = 6
63 ÷ 9 = 7	72 ÷ 9 = 8	81 ÷ 9 = 9	90 ÷ 9 = 10	99 ÷ 9 = 11	108 ÷ 9 = 12
11 ÷ 11 = 1	22 ÷ 11 = 2	33 ÷ 11 = 3	44 ÷ 11 = 4	55 ÷ 11 = 5	66 ÷ 11 = 6
77 ÷ 11 = 7	88 ÷ 11 = 8	99 ÷ 11 = 9	110 ÷ 11 = 10	121 ÷ 11 = 11	132 ÷ 11 = 12
12 ÷ 12 = 1	24 ÷ 12 = 2	36 ÷ 12 = 3	48 ÷ 12 = 4	60 ÷ 12 = 5	72 ÷ 12 = 6
84 ÷ 12 = 7	96 ÷ 12 = 8	108 ÷ 12 = 9	120 ÷ 12 = 10	132 ÷ 12 = 11	144 ÷ 12 = 12

Related Facts from Times Tables



3 x 6 = 18	6 x 3 = 18
18 ÷ 3 = 6	18 ÷ 6 = 3
30 x 6 = 180	60 x 3 = 180
180 ÷ 30 = 6	180 ÷ 60 = 3

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Multiplication and Division

Multiply Three Numbers

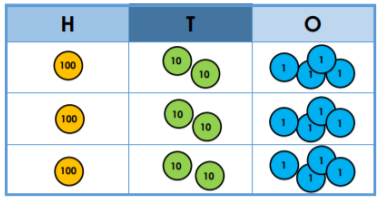
"I would solve this by multiplying 4 by 3, which is 12. Then, I multiply 12 by 6, which is 72."

"Because multiplication is commutative, you can multiply the numbers in any order and you will get the same answer."

4 x 3 x 6 = 72	3 x 6 x 4 = 72
4 x 6 x 3 = 72	6 x 4 x 3 = 72
3 x 4 x 6 = 72	6 x 3 x 4 = 72

Multiplication - Formal Written Method

Pupils begin by using place value counters to understand written multiplication:



	1	2	4
x			3
	3	7	2

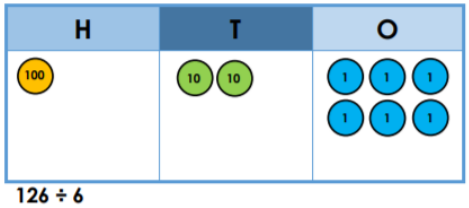
1

Pupils transfer this understanding to a formal written method.

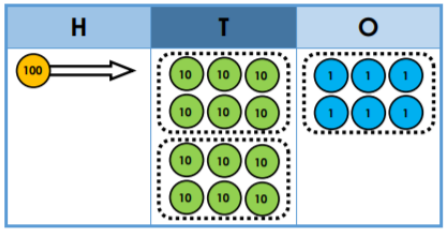
Multiply each digit from the 3 digit number by the 1 digit number, starting with the ones. 4 x 3 = 12. Twelve ones cannot go in the ones column so exchange ten ones for one ten and place it into the tens column. Keep the 2 ones in the ones column. Then, multiply the tens digit by 3. The extra ten must be added; there are now 7 tens altogether. Finally, multiply the hundreds digit by 3 and put the answer in the hundreds column - 3 hundreds. The answer is 372.

Division - Formal Written Method

Pupils begin by using place value counters to understand written division:



Start with the hundreds column. As the 100 counter cannot be split into groups of 6, exchange it for 10 lots of 10 and put these counters into the tens column.



Then, put the 10s counters into as many equal groups of 6 as possible. We can now see that there are two groups of 6 tens. Next, put the ones counters into groups of 6. There is 1 group of 6 in total, making the answer 21.

Pupils transfer this understanding to a formal written method.

	0		
6	1	1 2	6

Start by looking at how many groups of 6 you can make with 1 hundred. You cannot make any complete groups of 6 so place a zero in the hundreds column. Then, exchange the 1 hundred for 10 tens so there are now 12 tens.

You can make two groups of 6 tens using 12 tens. Therefore, place 2 in the tens column.

	0	2	
6	1	1 2	7

Finally, look at the ones digit. With 6 ones, you can make 1 group of 6 ones. This means that a 1 is placed in the ones column. The answer is 21.

	0	2	1
6	1	1 2	6

Place Value

Key Concepts

- Roman Numerals to 100
- Rounding to the nearest 10, 100 and 1000
- Counting in 25s and 1000s
- Recognising the place value of each digit in a four digit number
- Partitioning
- Comparing and ordering numbers
- 1000 more or less
- Negative numbers

Key Vocabulary

- increase/decrease
- rounding
- nearest
- negative number
- compare
- order
- digit
- sequence
- place value
- ones, tens, hundreds, thousands

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Place Value

Rounding

Rounding to the nearest 10 To round a number to the nearest 10, you should look at the ones digit. If the ones digit is 5 or more, round up. If the ones digit is 4 or less, round down.

In the number 427, the ones digit is the 7. 7 rounds up so 427 rounds up to 430.

Rounding to the nearest 100

To round a number to the nearest 100, you should look at the tens digit. If the tens digit is 5 or more, round up. If the tens digit is 4 or less, round down.

In the number 328, the tens digit is the 2. 2 rounds down so 328 rounds down to 300.

Rounding to the nearest 1000

To round a number to the nearest 1000, you should look at the hundreds digit. If the hundreds digit is 5 or more, round up. If the hundreds digit is 4 or less, round down.

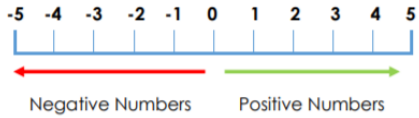
In the number 1532, the hundreds digit is the 5. 5 rounds up so 1532 rounds up to 2000.

Negative Numbers

If you count backwards from zero, you reach negative numbers.

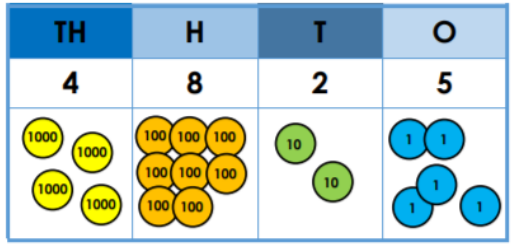
Positive numbers are any numbers **more than zero** e.g. 1, 2, 3, 4, 5.

Negative numbers are any numbers **less than zero** e.g. –1, -2, -3, -4, -5.



Place Value of Digits

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



In the number above, the 4 digit is in the thousands place so it really means 4000.

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.

Ordering and Comparing Numbers

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

3518 3736 2845

First, look at the thousands digits in each number. 2 is the smallest thousand digit so 2845 is the smallest number. The other two numbers both have a 3 in the thousands place so we then need to compare the hundreds digit. 5 is smaller than 7 therefore 3518 is smaller than 3736.

We can compare numbers using symbols:

< = less than and > = greater than

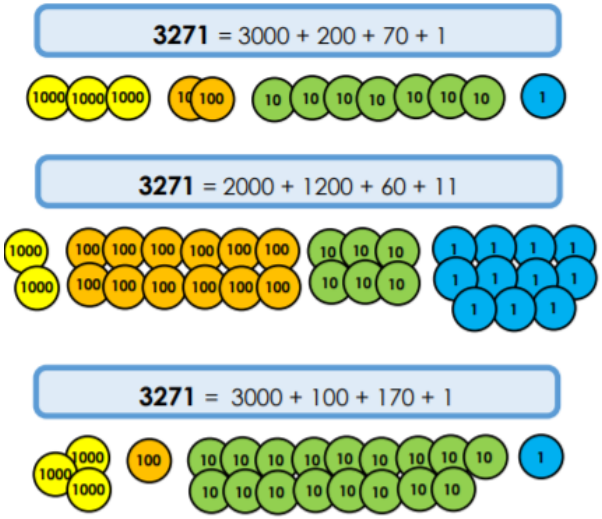
2845 < 3518 3736 > 3518

Roman Numerals

I = 1	X = 10
II = 2	XX = 20
III = 3	XXX = 30
IV = 4	XL = 40
V = 5	L = 50
VI = 6	LX = 60
VII = 7	LXX = 70
VIII = 8	LXXX = 80
IX = 9	XC = 90
X = 10	C = 100

Partitioning

Numbers can be partitioned (broken apart) in more than one way...



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Place Value

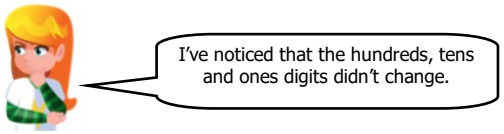
1000 More or 1000 Less

To find 1000 more or less than a number, you first need to find the digit in the thousands place.

TH	H	T	O
5	6	3	9

Finding 1000 more will increase the thousands digit by 1. So in this example, the 5 will become a 6. **1000 more than 5639 is 6639.**

Finding 1000 less will decrease the thousands digit by 1. So in this example, the 5 will become a 4. **1000 less than 5639 is 4639.**



TTH	TH	H	T	O
0	9	6	3	9

Finding 1000 more when the number has a 9 in the thousands place is slightly different. Adding 1 to the thousands place would give 10, so to show that, the ten thousands increases by 1 and a 0 is put in the thousands place. **1000 more than 9639 is 10, 639.**

Fractions

Key Concepts

- Count up and down in hundredths; recognise that hundredths arise from dividing an object into 100 equal parts and in dividing tenths by 10.
- Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number.
- Recognise and show, using diagrams, equivalent fractions with small denominators.
- Add and subtract fractions with the same denominator.

Key Vocabulary

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

Hundredths

Hundredths are 10 times smaller than tenths. Their place on the place value chart is to the right of the tenths column. A zero is used as a place holder to show there are no tenths.

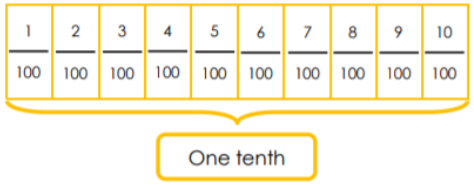
H	T	O	•	t	h
		0	•	0	1

Hundredths can be found by dividing 1-digit numbers by 100.

8 ÷ 100 = 0.08 or 8 hundredths

H	T	O	•	t	h
		8	•		
		0	•	0	8

There are 10 hundredths in 1 tenth.

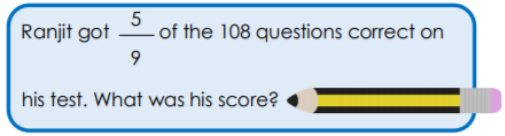


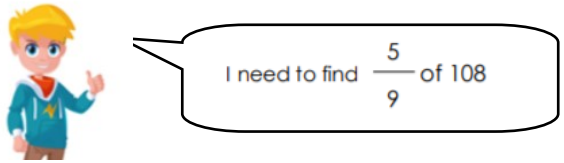
Hundredths can be written as a fraction and as a decimal number.

$\frac{1}{100} = 0.01$

Solve Problems Involving Fractions

When finding a fraction of a quantity or number; First divide by the denominator then, multiply the answer by the numerator

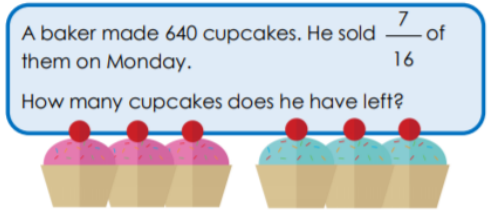




Divide by the denominator: 108 ÷ 9 = 12

Multiply by the numerator: 12 x 5 = 60.

Ranjit scored 60 on his test.

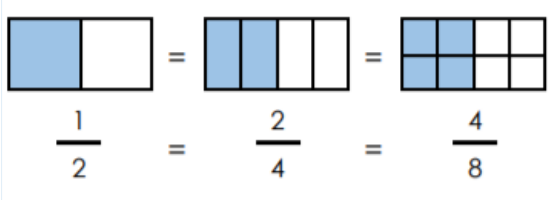


640 ÷ 16 = 40 40 x 7 = 280.

640 - 280 = 360 cupcakes

Equivalent Fractions

Equivalent fractions have different denominators and numerators but are the same amount.



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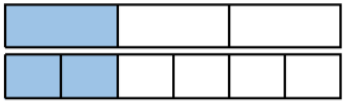
Fractions

Equivalent fractions can be found by multiplying the numerator and the denominator by the same number.

$\frac{1}{3} \times \frac{2}{2} = \frac{2}{6}$



$\frac{1}{3} \times \frac{2}{2} = \frac{3}{9}$

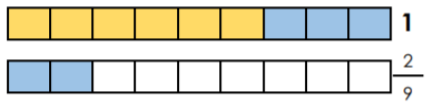
Add Fractions

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

$\frac{5}{10} + \frac{4}{10} = \frac{9}{10}$

Sometimes when adding two fractions, the answer will be greater than one whole.

$\frac{6}{9} + \frac{5}{9} = \frac{11}{9} = 1\frac{2}{9}$



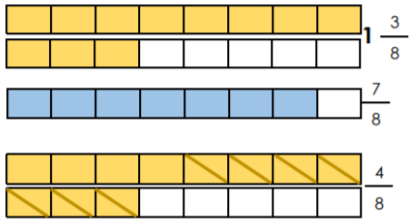
Subtract Fractions

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

$\frac{8}{10} - \frac{5}{10} = \frac{3}{10}$

When subtracting from more than one whole, the whole will need to be divided into the number of parts shown by the denominator.

$1\frac{3}{8} - \frac{7}{8} = \frac{4}{8}$



Area

Key Concepts

- find the area of rectilinear shapes by counting squares

Key Vocabulary

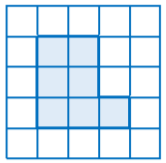
- area
- rectilinear
- shapes
- Space
- surface
- compare
- equal to
- greater than
- less than
- order

What is Area?

Area is the amount of space taken up by a 2D shape or surface.

Counting Squares

We can **count squares** to help us find the **area of rectilinear shapes.**



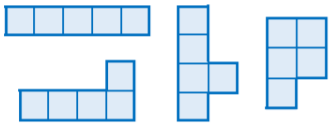
The area of the shape is 7 squares.

Remember to only count the squares inside the shape!

Making Shapes

We can use our knowledge of area to **make rectilinear shapes** using a given number of squares.

We can make a variety of shapes with an area of 5 squares. For example...



Comparing and Ordering Area

We can use the symbols and = to compare the area of rectilinear shapes.