

Addition and subtraction – formal methods

Adding and subtracting whole numbers

Addition: Add each column, starting with the ones.
Regroup as needed if a column exceeds 9.

$$62,376 + 29,813 =$$

	6	2	3	7	6
+	2	9	8	1	3
<hr/>					
	9	2	1	8	9
<hr/>					
	1	1			

Subtraction: Subtract each column, starting with the ones.
Exchange as needed.

$$73,514 - 24,123 =$$

	6 ¹	3	4 ¹	1	4
-	2	4	1	2	3
<hr/>					
	4	9	3	9	1
<hr/>					

Adding and subtracting decimals

Check that the **decimal points** are lined up.
Use place holders to fill empty place value columns.

Addition: Add each column, starting with the lowest place value.
Regroup as needed if a column exceeds 9.

$$48.5 + 6.742 =$$

	4	8	.	5	0	0
+	0	6	.	7	4	2
<hr/>						
	5	5	.	2	4	2
<hr/>						
	1	1				

Subtraction: Subtract each column, starting with the lowest place value.
Exchange as needed.

$$24.64 - 9.124 =$$

	1 ¹	2 ¹	4	.	6	3 ¹	4 ¹	0
-	0	9	.	1	2	4		
<hr/>								
	1	5	.	5	1	6		
<hr/>								

Adding and subtracting whole numbers and decimals

The **decimal point** goes **at the end** of the **whole number**.
Check that the **decimal points** are lined up.
Use place holders to fill empty place value columns.

Addition: Add each column, starting with the lowest place value.
Regroup as needed if a column exceeds 9.

$$63 + 8.235 =$$

	6	3	.	0	0	0
+	0	8	.	2	3	5
<hr/>						
	7	1	.	2	3	5
<hr/>						
	1					

Subtraction: Subtract each column, starting with the lowest place value.
Exchange as needed.

$$72 - 4.814 =$$

	6 ¹	1 ¹	2 ⁹	.	0 ⁹	0 ¹	0
-	0	4	.	8	1	4	
<hr/>							
	6	7	.	1	8	6	
<hr/>							

Addition and subtraction – informal

Addition and subtracting using place value

Addition multiples of 10

Use place value headings to add mentally.

$$70 + 3,000 =$$

$$70 + 3,000 =$$

Th	H	T	O
3	0	7	0

$$50,000 + 300 + 80 + 4 =$$

$$50,000 + 300 + 80 + 4 =$$

TTh	Th	H	T	O
5	0	3	8	4

$$5,000 + 12 =$$

$$5,000 + 12 =$$

Th	H	T	O
5	0	1	2

$$7,403 + 50 =$$

$$7,403 + 50 =$$

Th	H	T	O
7	4	5	3

Missing numbers in partitioned questions

Label place value headings to find missing value.

$$405,008 = 400,000 + 5,000 + 8 =$$

HTh	TTh	Th	H	T	O
4	0	5	0	0	8

Addition and subtracting multiples of 10

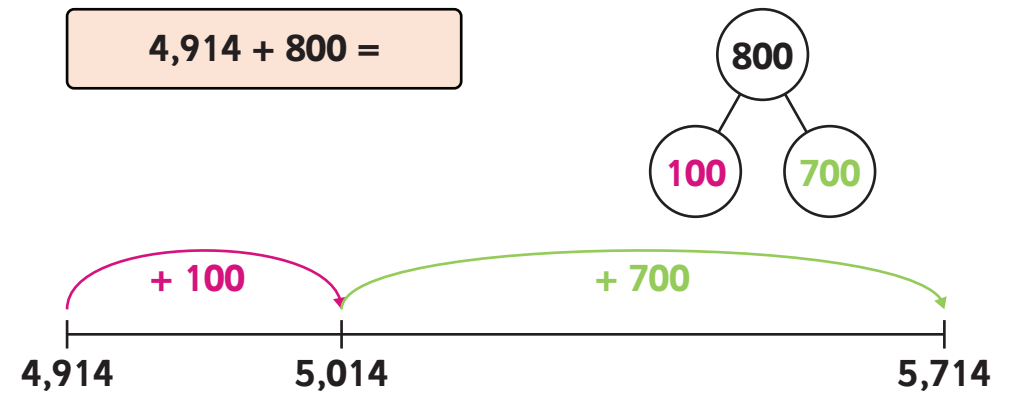
Addition multiples of 10

Add to the nearest multiple of 10, 100 or 1,000.

Partition the added number.

Add the second part.

$$4,914 + 800 =$$



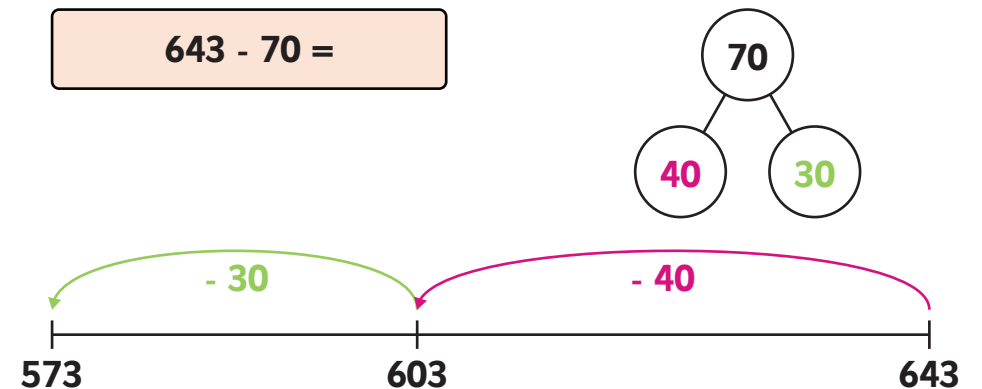
Subtracting multiples of 10

Subtract to the nearest multiple of 10, 100 or 1,000.

Partition the subtracted number.

Subtract the second part.

$$643 - 70 =$$



Addition and subtraction

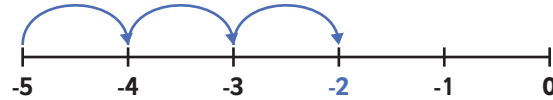
Addition and subtracting with negative numbers

We can use a number line to add and subtract with negative numbers.

Addition to a negative number (below zero)

Use number line to add.

$$-5 + 3 = -2$$



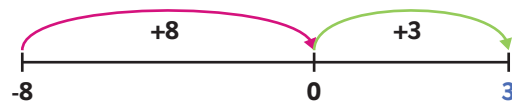
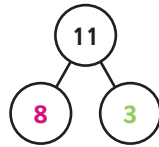
Addition to a negative number (crossing zero)

Add to zero.

Partition added number.

Add the second part.

$$-8 + 11 = 3$$



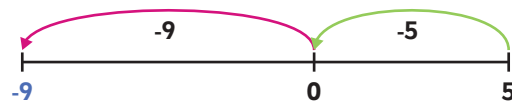
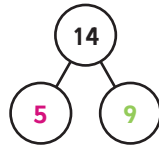
Subtracting (crossing zero)

Subtract to zero.

Partition subtracted number.

Subtract the second part.

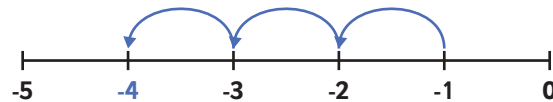
$$5 - 14 = -9$$



Subtracting from a negative number

Use a number line to subtract.

$$-1 - 3 = -4$$



Addition and subtracting with missing numbers

Highlight which number should be the largest.

Work out what to do with the other numbers to make the number sentence correct.

Use the inverse to check your answer.

$$409 + 64 = 473$$

	4	6	1	3
-		6	4	
	4	0	9	

	4	0	9
+		6	4
	4	7	3
		1	

$$23 + 518 = 541$$

	5	3	1	1
-		2	3	
	5	1	8	

	5	1	8
+		2	3
	5	4	1
		1	

$$293 - 78 = 215$$

	2	1	5
+		7	8
	2	9	3
		1	

	2	8	1	3
-		7	8	
	2	1	5	

$$874 - 616 = 258$$

	8	6	1	4
-	2	5	8	
	6	1	6	

	8	6	1	4
-	6	1	6	
	2	5	8	

NOTE: If the missing number is the result, then add or subtract as normal!

Multiplication and division – formal methods

Multiplying by a 2-digit number

Line the digits up in the correct place value columns.

Multiply by the **ones**.
Then multiply by the **tens**.

Remember: As you are multiplying by **tens**, there is a place holder.

Add to find the total.

$$348 \times 23 =$$

			3	4	8	
		x		2	3	
		1	0	4	4	$348 \times 3 =$
		6	9	6	0	$348 \times 20 =$
		8	0	0	4	
		1	1			

Multiplying decimals by integers

Count the decimal places in the question.

Remove the decimal point.
Multiply by the **ones**.

If the multiplier has 2-digits, multiply by the **tens**.
Remember: if you are multiplying by **tens**, there will be a place holder.
Add to find the total.

Add the decimal point back in, making sure you have the **same number of decimal places as the question**.

$$35.7 \times 6 =$$

			3	5	7
		x			6
		2	1	4	2

$$4.1 \times 1.8 =$$

			4	1
		x	1	8
		3	2	8
		4	1	0
		7	3	8

$4.1 \times 8 =$

$4.1 \times 10 =$

Multiplication and division – working with 0 and 1

Multiplying by 0

When multiplying a number by **0**, the answer is always **0**.

$$724 \times 0 = 0$$

Multiplying and dividing by 1

When multiplying or dividing a number by **1**, the answer is always **itself**.

$$4,167 \times 1 = 4,167$$

$$819 \div 1 = 819$$

Multiplication and division – informal methods

Multiplying and dividing by 10, 100 and 1,000

Bigger or smaller?

When you are **multiplying**, the result will be **bigger**.

The digits will move to the **left**.

When you are **dividing**, the result will be **smaller**.

The digits will move to the **right**.

How many digits?

Use the number of **0** s to tell you how many places to move.

10 – one place

100 – two places

1,000 – three places

Line up the decimal points.

Bigger or smaller?

How many spaces?

Move the digits

Use placeholders to fill empty columns as needed.

$$5.23 \times 100 = 523$$

			5	.	2	3	
	5	2	3	.			

$$28 \div 1,000 = 0.028$$

	2	8	.				
		0	.	0	2	8	

Multiplying multiples of 10

Find factor pairs for both numbers.

$$40 \times 800 =$$

4 10 8 100

Use known times tables facts.

Multiply by multiples of 10.

$$4 \times 10 \times 8 \times 100 =$$

$$(4 \times 8) \times (10 \times 100) =$$

$$32 \times 1,000 = 32,000$$

Dividing multiples of 10

Find a factor pair of the first number (dividend).

$$720 \div 8 =$$

72 10

Use known times table facts to divide.

Multiply by multiples of 10.

$$72 \times 10 \div 8 =$$

$$(72 \div 8) \times 10 =$$

$$9 \times 10 = 90$$

Dividing using factors

Find a factor pair of the divisor.

Divide by each part.

$$360 \div 40 =$$

10 4

$$(360 \div 10) \div 4 =$$

$$36 \div 4 = 9$$

$$255 \div 15 =$$

5 3

$$(255 \div 5) \div 3 =$$

$$51 \div 3 = 17$$

Division methods

Short division

Lay out the division.
Starting from the left, divide each digit by the divisor.
Carry over any remainders to the next column.

$$3,145 \div 5 =$$

		0	6	2	9		
5		3	³ 1	¹ 4	⁴ 5		

Long division

Lay out the division.
List multiples of 10 and multiples of 4 and then add.
Work out how many times your divisor goes into your thousands, hundreds, tens and ones.
Remember to pull down your tens and ones.

$$4,788 \div 14 =$$

$$\begin{aligned} 10 + 4 &= 14 \\ 20 + 8 &= 28 \\ 30 + 12 &= 42 \\ 40 + 16 &= 56 \\ 50 + 20 &= 70 \end{aligned}$$

		0	3	4	2		
14		4	7	8	8		
		4	2				
		—					
			5	8			
			5	6			
			—				
				2	8		
				2	8		
				—			
					0		

Divide decimals by integers

Lay out the division.
Starting from the left, divide each digit by the divisor.
Carry over any remainders to the next column.

$$8.68 \div 4 =$$

		2	.	1	7		
4		8	.	6	² 8		

Remember to include the **decimal point** in your answer.
Be careful to line it up accurately.

Multiplying three numbers

Multiply two of the numbers.
Then multiply the result by the last number.

$$4 \times 6 \times 5 =$$

Remember, multiplication is commutative –
you can multiply in any order.

$$(4 \times 5) \times 6 =$$

$$20 \times 6 = 120$$

Fractions

Add and subtract fractions (same denominator)

When fractions have the same denominator, **add the numerators.**
The denominator stays the same.

$$\frac{2}{7} + \frac{4}{7} = \frac{6}{7}$$

Add and subtract fractions (different denominators)

When fractions have different denominators, convert to the same denominator.

When one denominator is a multiple of the other denominator:

$$\overset{\times 3}{\frac{1}{3}} + \overset{\times 1}{\frac{4}{9}} = \frac{3}{9} + \frac{4}{9} = \frac{7}{9}$$

$$\frac{3}{9} + \frac{4}{9} = \frac{7}{9}$$

When one denominator is not a multiple of the other denominator:

$$\left(\overset{\times 5}{\frac{1}{4}} + \overset{\times 4}{\frac{2}{5}} \right) = \frac{5}{20} + \frac{8}{20} = \frac{13}{20}$$

Add and subtract fractions (mixed numbers)

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

Convert to improper fractions. $\frac{5}{2} + \frac{5}{4} =$

Convert to the same denominator.

Solve. $\frac{10}{4} + \frac{5}{4} = \frac{15}{4} = 3\frac{3}{4}$

Convert back to a mixed number.

or

Add wholes. $2 + 1 = 3$

Convert to the same denominator.

Add fractions. $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$

Recombine whole and fraction.

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

Dividing fractions by integers

When the numerator is divisible by the divisor:

Divide the numerator by the divisor.

The denominator stays the same.

$$\frac{4}{7} \div 2 = \frac{2}{7}$$

When the numerator is not divisible by the divisor:

Divide by the Denominator.

The numerator stays the same.

$$\frac{4}{5} \div 3 = \frac{4}{15}$$

Multiplying fractions by fractions

Multiply the numerators.

Multiply the denominators.

$$\frac{1}{4} \times \frac{2}{3} = \frac{2}{12}$$

Mixed numbers

Convert to improper fractions.

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

Multiply the numerators.

Multiply the denominators.

$$\frac{7}{3} \times \frac{2}{5} = \frac{14}{15}$$

Multiplying fractions by integers

Times look at the Top.

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

$$\frac{2}{3} \times 4 = \frac{8}{3} = 2\frac{2}{3}$$

Mixed numbers

Convert to improper fractions.

Times look at the Top.

$$1\frac{2}{5} \times 4 = 1\frac{2}{5} = \frac{7}{5}$$

$$\frac{7}{5} \times 4 = \frac{28}{5} = 5\frac{3}{5}$$

Fractions, percentages and number

Fractions of amounts

Divide the amount by the denominator.
Multiply by the numerator.

$$\frac{3}{5} \text{ of } 465 = 279$$

		0	9	3		
	5	4	4	6	1	5

	9	3
x		3
2	7	9

Calculate percentages

Multiply the two numbers } (Choose the most appropriate order)
Divide by 100

$$28\% \text{ of } 1,500 = 420$$

		2	8	
x		1	5	
	1	4	0	$28 \times 5 =$
	2	8	0	$28 \times 10 =$
	4	2	0	
	1			

$$1,500 \div 100 = 15$$

$$16\% \text{ of } 1,650 = 264$$

		1	6	5	0	
x				1	6	
		9	3	9	0	$1,650 \times 6 =$
	1	6	5	3	0	$1,650 \times 10 =$
	2	6	4	0	0	
	1	1				

$$26,400 \div 100 = 264$$

Convert mixed number to improper fraction

Multiply whole by denominator.
Add the numerator.
The denominator stays the same.

$$2\frac{+1}{2} = \frac{5}{2}$$

$$2 \times 2 = 4$$

$$4 + 1 = 5$$

Convert improper fraction to mixed number

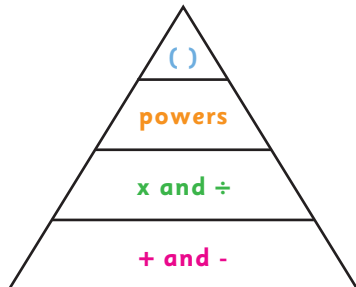
Divide numerator by denominator.
The result is the whole number.
The remainder is the numerator.
The denominator stays the same.

$$\frac{15}{4} = 3\frac{3}{4}$$

$$15 \div 4 = 3 \text{ r}3$$

BIDMAS / BODMAS

B	Brackets
O	Order
D	Division
M	Multiplication
A	Addition
S	Subtraction



$$(5 + 3) \div 2 =$$

Brackets first: $5 + 3 = 8$
No order
Division: $8 \div 2 = 4$

$$4 + 8 \div 2 =$$

No brackets
No order
Division: $8 \div 2 = 4$
Addition: $4 + 4 = 8$

Square and cube numbers

A **square number** is the result of multiplying a number by itself.

$$6^2 = 6 \times 6 = 36$$

A **cube number** is the result of multiplying a number by itself, then by itself again.

$$3^3 = 3 \times 3 \times 3 = 27$$