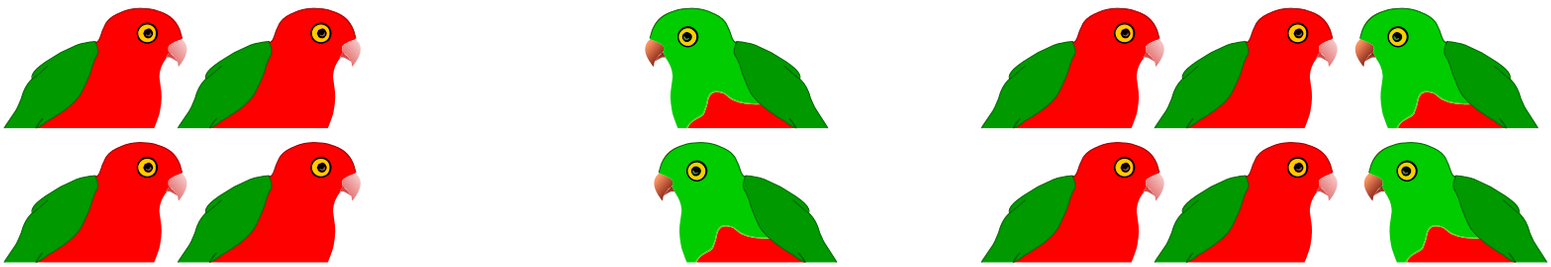
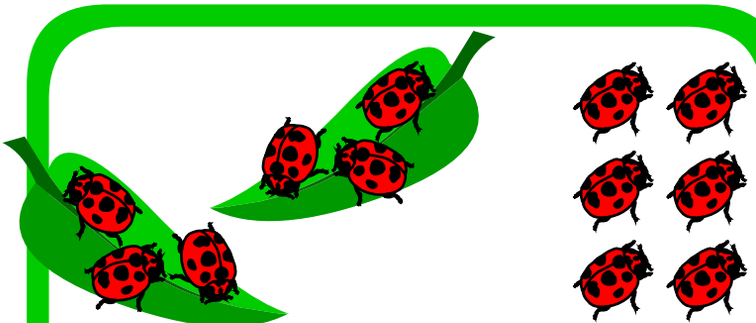
Addition 1

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

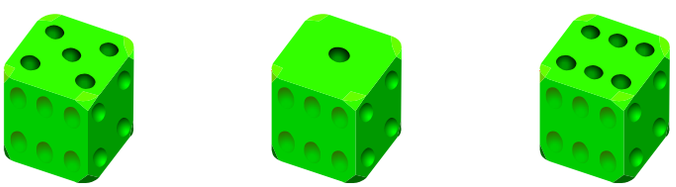


4 + 2 = 6

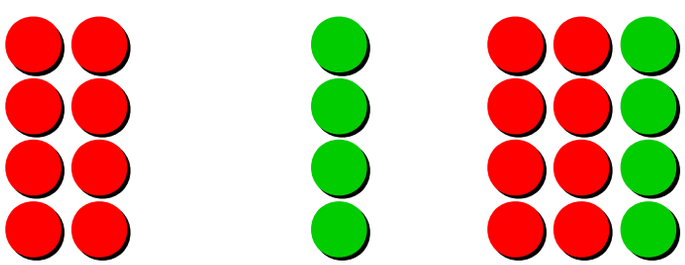
four plus two equals six



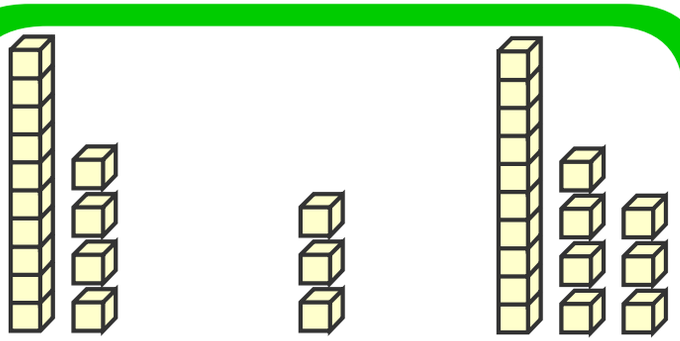
3 + 3 = 6



5 + 1 = 6



8 + 4 = 12



14 + 3 = 17

In addition, two or more numbers are joined to get one number called the sum or total.

Addition 2

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

132 + **63** = **195**
addend addend sum

The numbers to be added together are called addends.
Addition Key Words: plus, add, sum, total.

To add larger numbers vertical or column addition can be used.
Numbers are written underneath each other according their place value.
The numbers are added vertically, starting with the ones column
then moving left column by column.

Adding vertically without trading (carrying, regrouping)

132 + 63 =

	H	T	O
	1	3	2
+		6	3
	1	9	5

3564 + 2305 =

	Th	H	T	O
	3	5	6	4
+	2	3	0	5
	5	8	6	9

Adding vertically with trading (carrying, regrouping)

175 + 48 =

	H	T	O
	1	7	5
+		4	8
	2	2	3

1 1

7586 + 1945 =

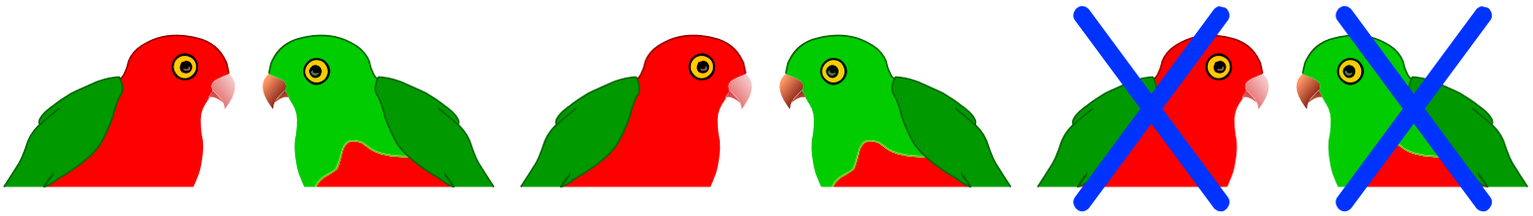
1 1 1

	Th	H	T	O
	7	5	8	6
+	1	9	4	5
	9	5	3	1

When a column adds up to more than ten, the **tens** go into the next column left and the **ones** stay in their own column.

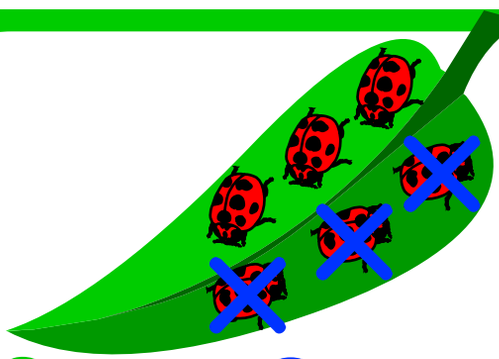
Subtraction 1

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

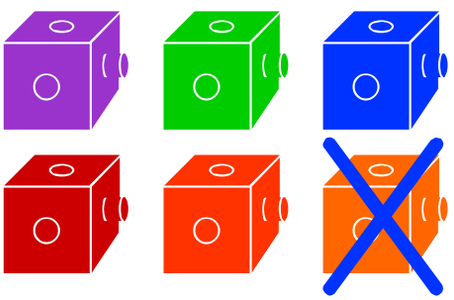


6 - **2** = **4**

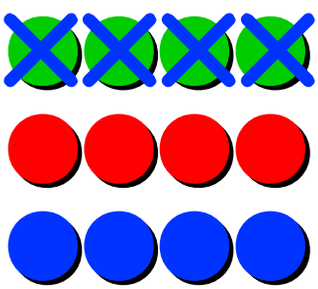
six minus two equals four



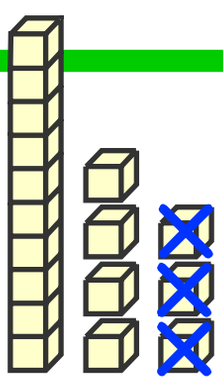
6 - 3 = 3



6 - 1 = 5



12 - 4 = 8



17 - 3 = 14

In subtraction, one quantity is taken away from another to find the difference.

Subtraction 2

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

178 - 32 = 146

minuend subtrahend difference

Subtraction Key Words: minus, subtract, deduct, take away, less, difference, decrease, fewer than, reduce.

To subtract larger numbers vertical or column subtraction can be used. Numbers are written underneath each other according their place value. The numbers are subtracted vertically, starting with the ones column then moving left column by column.

Subtracting vertically without trading (regrouping, borrowing)

178 - 32 =

	H	T	O
	1	7	8
-		3	2
	1	4	6

3564 - 2301 =

	Th	H	T	O
	3	5	6	4
-	2	3	0	1
	1	2	6	3

Subtracting vertically with trading (regrouping, borrowing)

345 - 68 =

	H	T	O
	~~3~~ 2 (13)	~~4~~ 3 (15)	5
-		6	8
	2	7	7

7523 - 2945 =

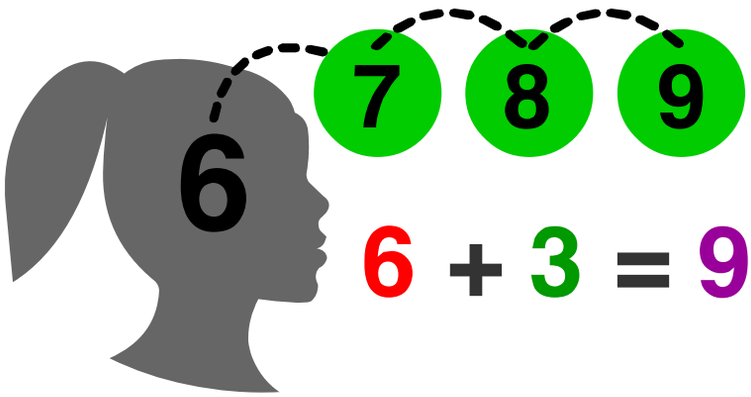
	Th	H	T	O
	~~7~~ 6 (14)	~~5~~ 4 (11)	~~2~~ 1 (13)	3
-	2	9	4	5
	4	5	7	8

When the bottom digit is greater than the top digit, trade (borrow) a ten from the next column left and / mark it down by one.

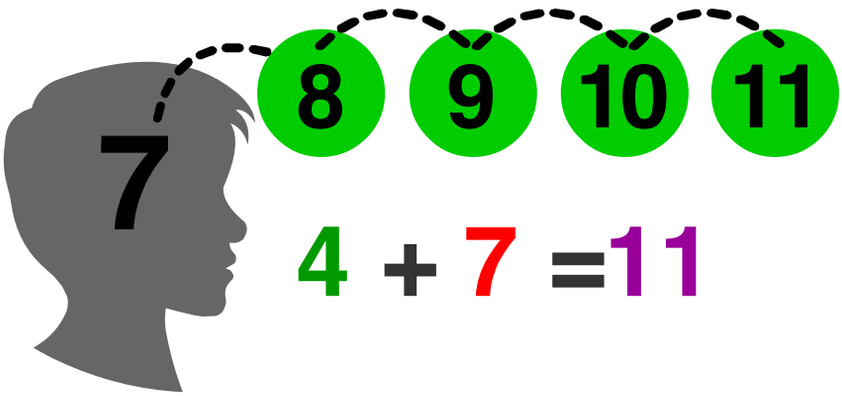
Count on, count back

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

Addition - count on.



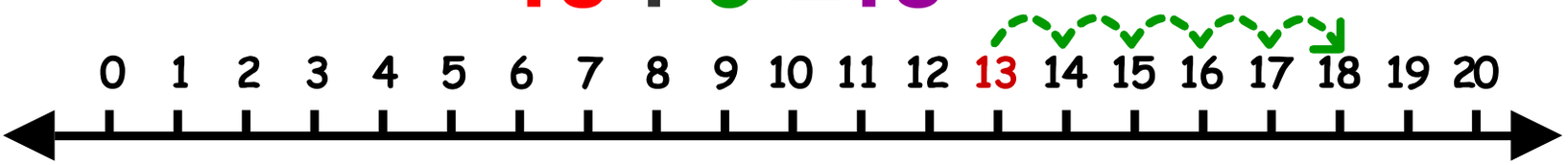
6 + 3 = 9



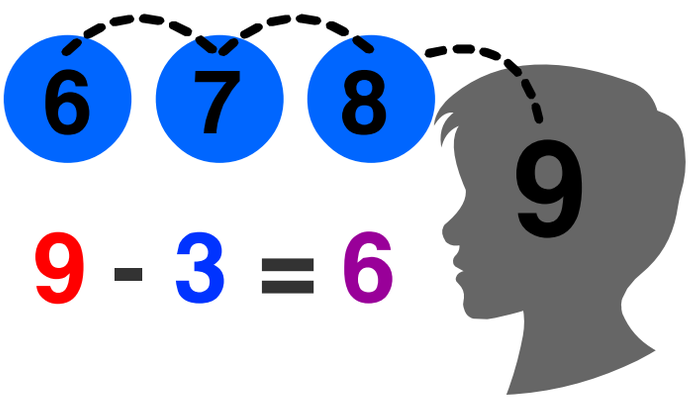
4 + 7 =11

In addition, you don't need to count the larger number, just count on.

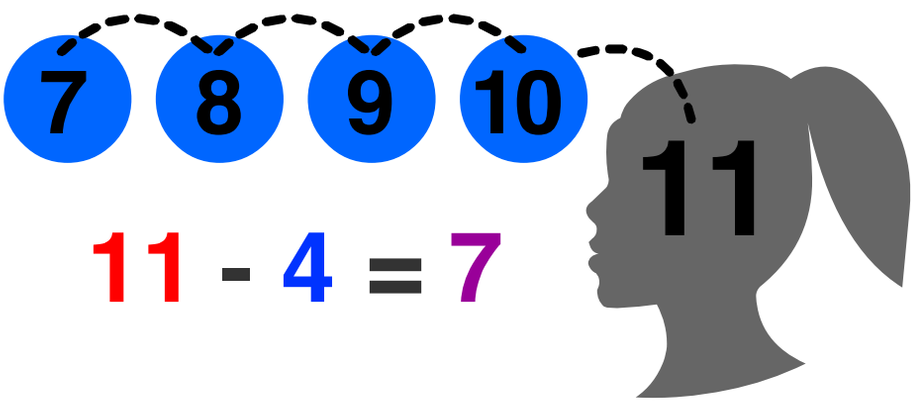
13 + 5 =18



Subtraction - count back.



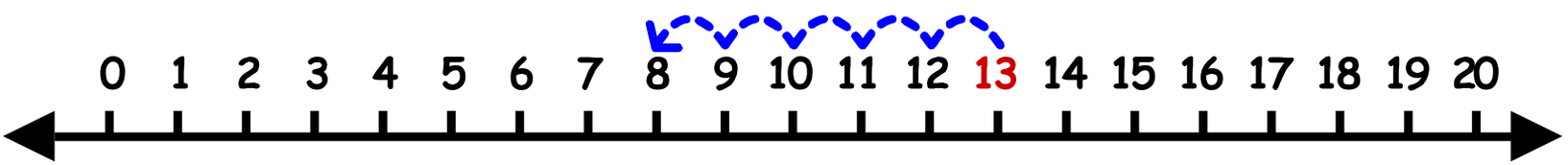
9 - 3 = 6



11 - 4 = 7

In subtraction, count back.

13 - 5 = 8

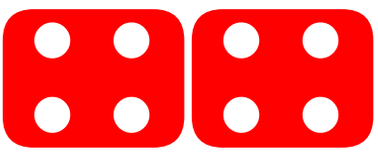
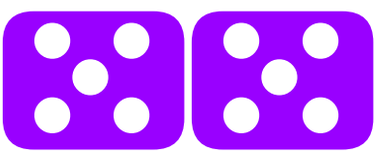
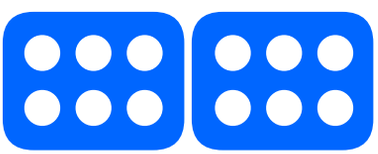
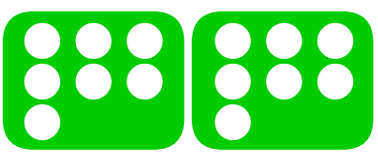
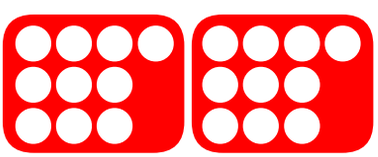


A strategy for addition and subtraction.

Doubles and near doubles

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

A strategy that uses doubles facts to make addition easier.

doubles		near doubles
1 + 1 = 2		1 + 2 = 3
2 + 2 = 4		2 + 3 = 5
3 + 3 = 6		3 + 4 = 7
4 + 4 = 8		4 + 5 = 9
5 + 5 = 10		5 + 6 = 11
6 + 6 = 12		6 + 7 = 13
7 + 7 = 14		7 + 8 = 15
8 + 8 = 16		8 + 9 = 17
9 + 9 = 18		9 + 10 = 19
10 + 10 = 20		10 + 11 = 21

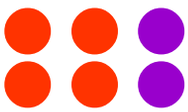
Look for the patterns going down.

Extensions

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

A strategy to extend easy number facts to larger numbers using multiplying by 10.

Addition

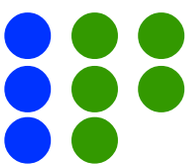


$4 + 2 = 6$

$40 + 20 = 60$

$400 + 200 = 600$

$4000 + 2000 = 6000$

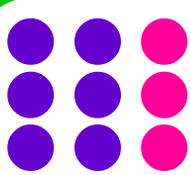


$3 + 5 = 8$

$30 + 50 = 80$

$300 + 500 = 800$

$3000 + 5000 = 8000$



$6 + 3 = 9$

$60 + 30 = 90$

$600 + 300 = 900$

$6000 + 3000 = 9000$

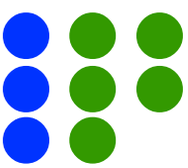
Subtraction

$6 - 4 = 2$

$60 - 40 = 20$

$600 - 400 = 200$

$6000 - 4000 = 2000$

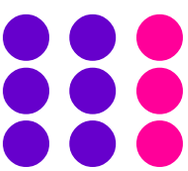


$8 - 3 = 5$

$80 - 30 = 50$

$800 - 300 = 500$

$8000 - 3000 = 5000$



$9 - 6 = 3$

$90 - 60 = 30$

$900 - 600 = 300$

$9000 - 6000 = 3000$

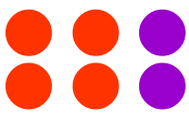
Look for the patterns.

Inverse operations

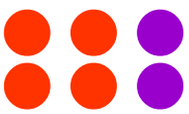
From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

Inverse operations are opposite or reverse operations.
Addition and subtraction are inverse operations.
An addition fact will give a subtraction fact and vice versa.

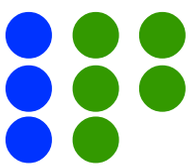
Addition ⟷ **inverse** ⟷ **Subtraction**



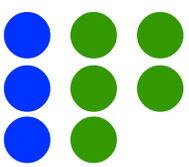
$4 + 2 = 6$
$2 + 4 = 6$



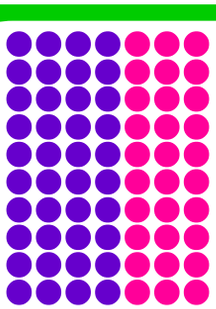
$6 - 4 = 2$
$6 - 2 = 4$



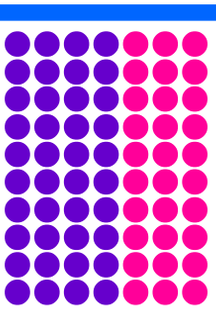
$3 + 5 = 8$
$5 + 3 = 8$



$8 - 3 = 5$
$8 - 5 = 3$



$40 + 30 = 70$
$30 + 40 = 70$



$70 - 40 = 30$
$70 - 30 = 40$

$$\begin{array}{r} 256 \\ +\ 423 \\ \hline 679 \end{array}$$

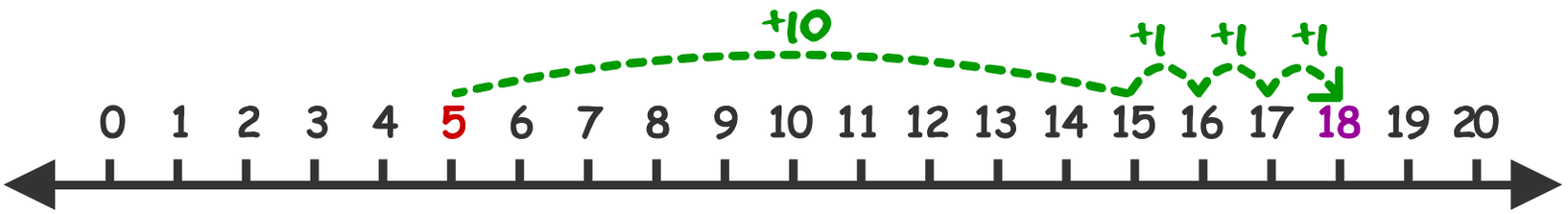
$$\begin{array}{r} 679 \\ -\ 423 \\ \hline 256 \end{array}$$

You can use addition facts to check subtraction, or use subtraction facts to check addition.

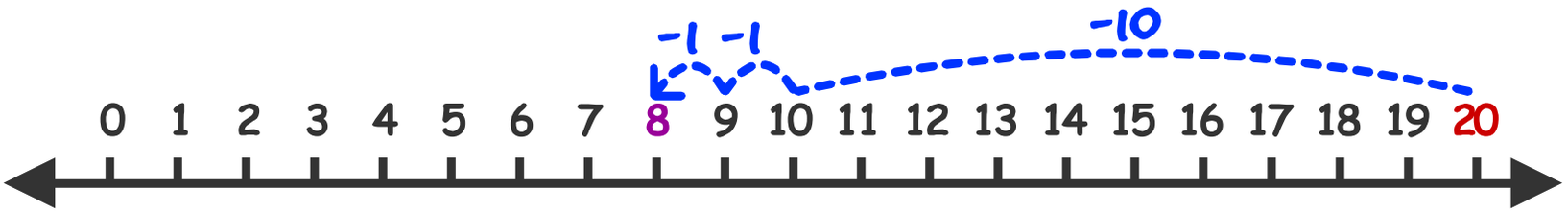
Jump strategy

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

A strategy that adds or subtracts a number in jumps according to place value.



5 + 13 in jumps = 5 + 10 + 1 + 1 + 1 = 18



20 - 12 in jumps = 20 - 10 - 1 - 1 = 8

The jump strategy on a hundreds chart.

53 + 35 = 88

In addition:

- to add 10s, go down the rows.
- to add 1s, go right across the columns.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

In subtraction:

- to subtract 10s, go up the rows.
- to subtract 1s, go left across the columns.

39 - 34 = 5

Split strategy (partitioning)

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

A strategy that splits (partitions) numbers into their place values to make calculations easier.

May be written in different ways.

Addition

45 + 33

= 40 + 5 + 30 + 3

= 70 + 8

= 78

Subtraction

78 - 45

= 70 + 8 - 40 + 5

= 30 + 3

= 33

245 + 633

= 800 + 70 + 8

= 878

878 - 245

= 600 + 30 + 3

= 633

```
  245
+ 633
  800
   70
    8
  878
```

```
  878
- 245
  600
   30
    3
  633
```

Start with the largest place value.

Reordering

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

An addition strategy that changes the order of addends to make calculations easier.

$$\underset{\text{addend}}{132} + \underset{\text{addend}}{63} = \underset{\text{sum}}{195}$$

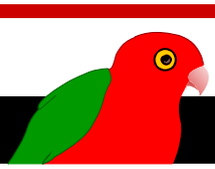
This strategy is based on the commutative law, rule or property.
That is, in addition the sum will remain the same regardless of the order of the addends.

$$2 + 17 = 17 + 2$$
$$= 19$$

$$20 + 32 + 843 = 843 + 32 + 20$$
$$= 895$$

$$\begin{array}{r} 433 \\ 12 \\ +\ 554 \\ \hline \\ \hline \end{array} \qquad \begin{array}{r} 554 \\ 433 \\ +\ 12 \\ \hline 999 \\ \hline \end{array}$$

Start with the larger numbers.



Compensation, change methods

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

In compensation, one number is rounded to ten or a hundred then the answer is adjusted to compensate for the change.

Round

$56 + 38 = 56 + 40 - 2$

$= 96 - 2$

Adjust

$= 94$

Round

$94 - 38 = 94 - 40 + 2$

$= 54 + 2$

Adjust

$= 56$

Round

$623 + 198 = 623 + 200 - 2$

$= 823 - 2$

Adjust

$= 821$

Round

$786 - 298 = 786 - 300 + 2$

$= 486 + 2$

Adjust

$= 488$

Change methods are similar but the second number (not the answer) is adjusted to compensate for the change.

56	-2 →	54
+ 38	+2 →	+ 40
		94

94	+2 →	96
- 38	+2 →	- 40
		56

726	-3 →	723
+ 197	+3 →	+ 200
		923

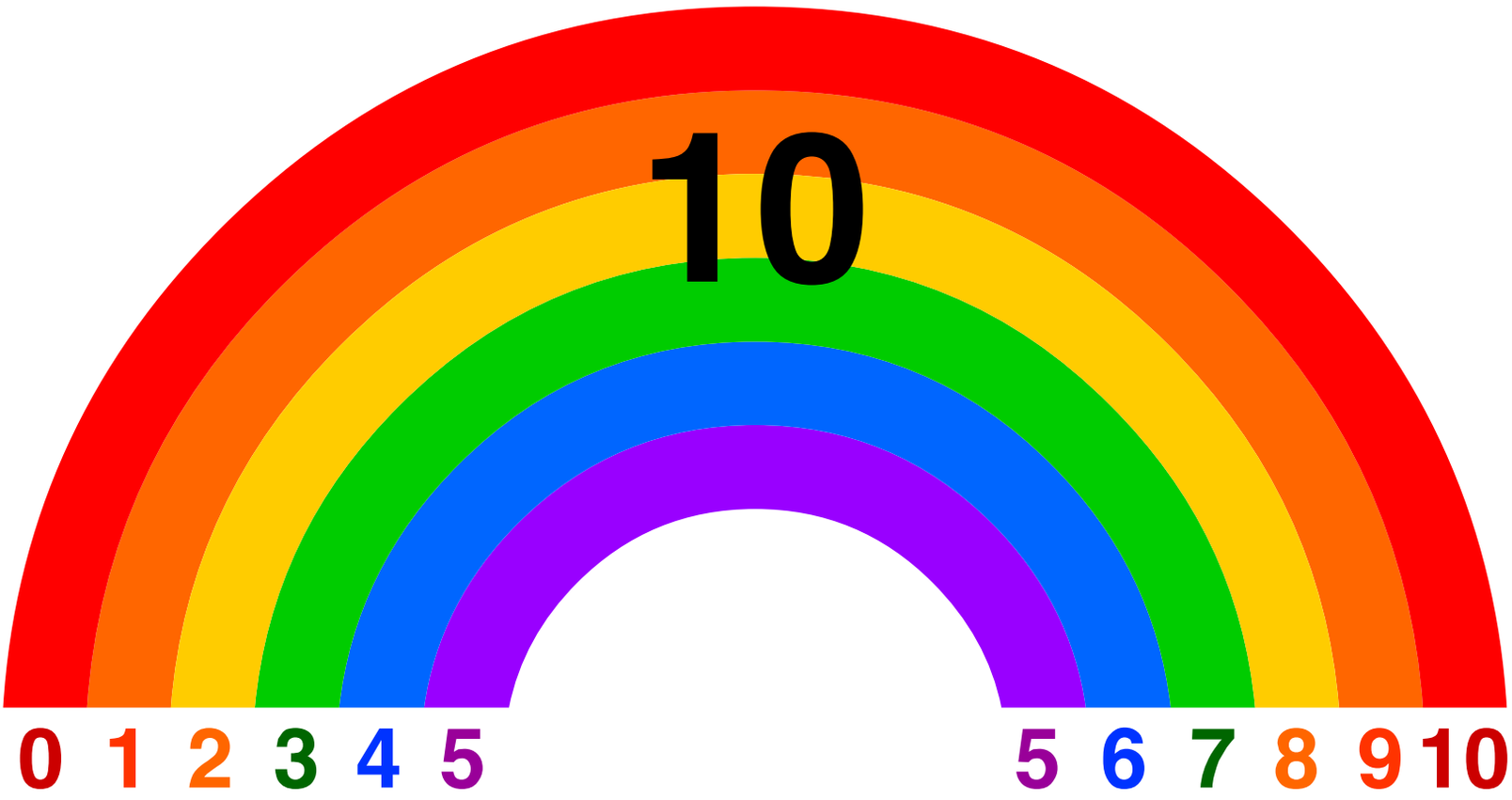
Addition
Opposite Change

923	+3 →	926
- 197	+3 →	- 200
		726

Subtraction
Same Change

Rainbow Facts

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com



0 + 10 = 10	10 + 0 = 10
1 + 9 = 10	9 + 1 = 10
2 + 8 = 10	8 + 2 = 10
3 + 7 = 10	7 + 3 = 10
4 + 6 = 10	6 + 4 = 10
5 + 5 = 10	5 + 5 = 10

Addition Table

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

Read across and down
to find the sum of any two green numbers.

+	1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	8	9	10	11
2	3	4	5	6	7	8	9	10	11	12
3	4	5	6	7	8	9	10	11	12	13
4	5	6	7	8	9	10	11	12	13	14
5	6	7	8	9	10	11	12	13	14	15
6	7	8	9	10	11	12	13	14	15	16
7	8	9	10	11	12	13	14	15	16	17
8	9	10	11	12	13	14	15	16	17	18
9	10	11	12	13	14	15	16	17	18	19
10	11	12	13	14	15	16	17	18	19	20

Look for the patterns.

Subtraction Table

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

Read across and down
to find the difference between any two blue numbers.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13
8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12
9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11
10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9
12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8
13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5
16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4
17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3
18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2
19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1
20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0

Look for the patterns.

Addition properties

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

Commutative property

- in addition, numbers may be added in any order.

$$a + b = b + a$$

$$6 + 2 = 8$$

or

$$2 + 6 = 8$$

Associative property

- in addition, no matter how the numbers are grouped, the answer will always be the same.

$$(a + b) + c = a + (b + c)$$

$$(4 + 2) + 6$$

gives the same total as

$$4 + (2 + 6)$$

Additive identity property of 0

- adding zero won't change a number,
- when zero is added to a number the result is the number itself.

$$a + 0 = a$$

$$6 + 0 = 6$$

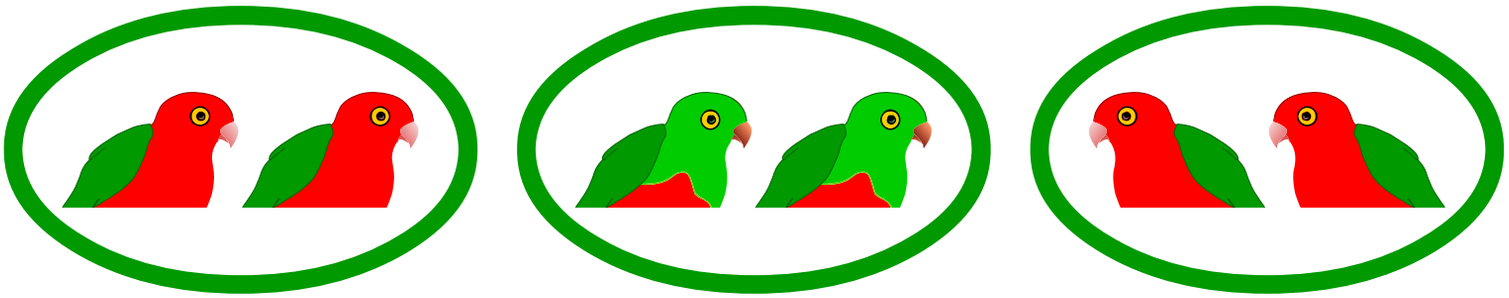
or

$$0 + 6 = 6$$

Multiplication 1

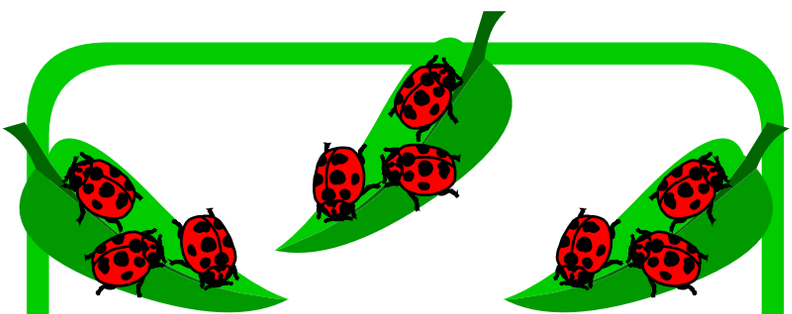
From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

groups of 2, 3 times = 6



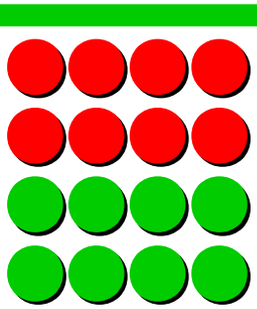
2 x 3 = 6

two times three equals six

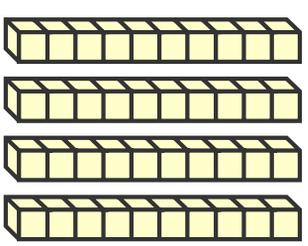


3 x 3 = 9

5 x 3 = 15



8 x 2 = 16



10 x 4 = 40

Multiplication is a mathematical operation where a number is added to itself a number of times.

Multiplication 2

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

10 x **20** = **200**

multiplier multiplicand product

Numbers may be multiplied in any order to get the product.
Multiplication Key Words: times, multiplied by, product.

To multiply larger numbers a vertical algorithm can be used.
Numbers are written underneath each other according their place value.
The numbers are multiplied vertically, starting with the ones column then moving left column by column.

Multiplying vertically without trading (carrying, regrouping)

132 x 3 =

	H	T	O
	1	3	2
x			3
	3	9	6

4234 x 2 =

	Th	H	T	O
	4	2	3	4
x				2
	8	4	6	8

Multiplying vertically with trading (carrying, regrouping)

153 x 6 =

	H	T	O
	1	5	3
x			6
	9	1	8

3 1

1386 x 7 =

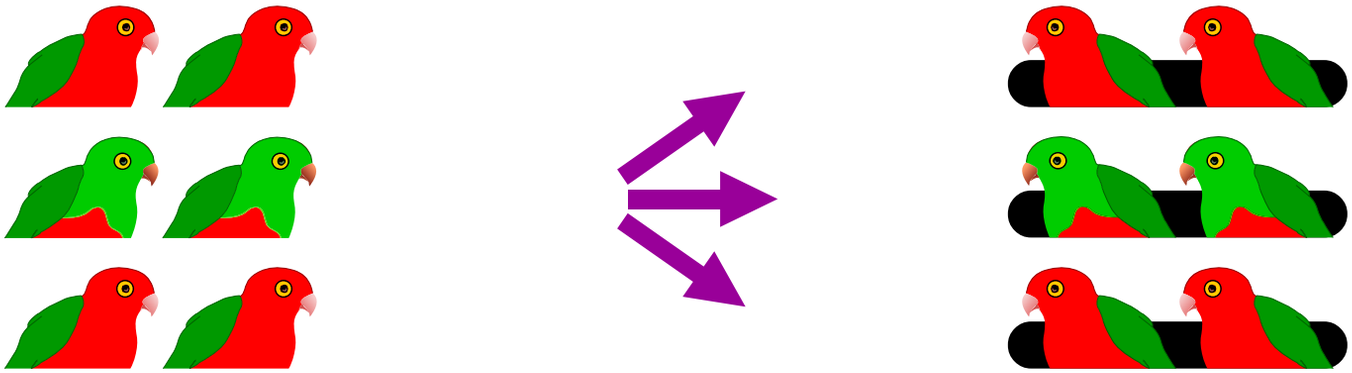
2 6 4

	Th	H	T	O
	1	3	8	6
x				7
	9	7	0	2

When a column is more than ten, the **tens** go into the **next column left** and are **added to the answer,** the **ones** stay in their own column.

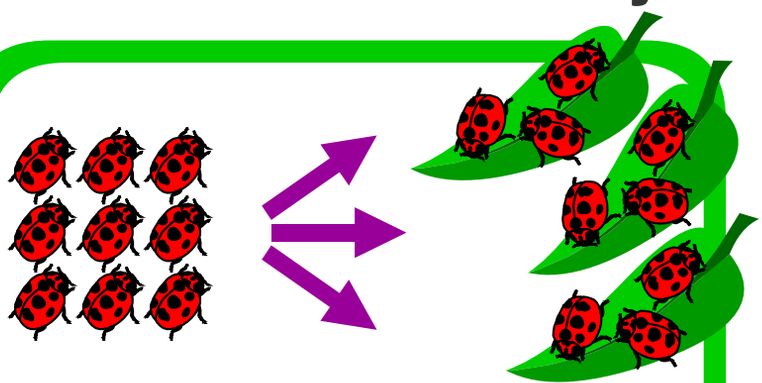
Division 1

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

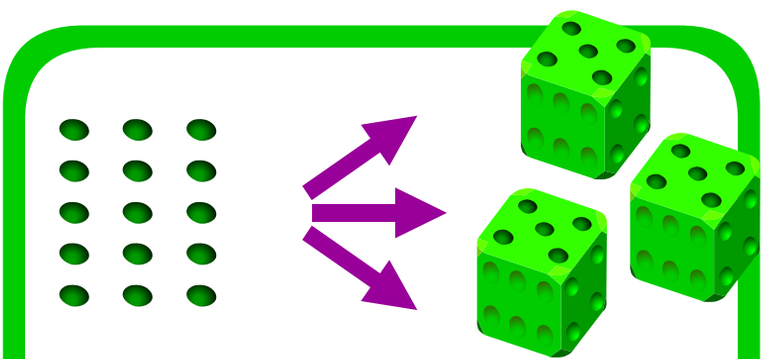


6 ÷ 3 = 2

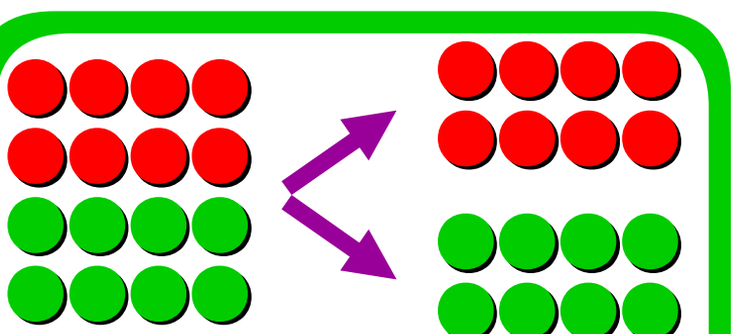
six divided by three equals two



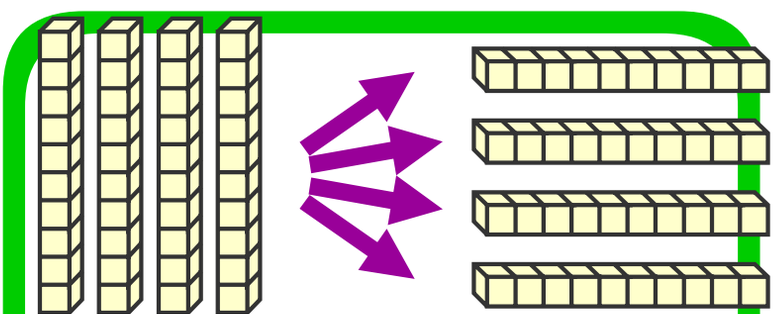
9 ÷ 3 = 3



15 ÷ 3 = 5



16 ÷ 2 = 8



40 ÷ 4 = 10

Division is a mathematical operation which involves sharing or grouping a number into equal parts.

Division 2

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

$$\underset{\text{dividend}}{56} \div \underset{\text{divisor}}{8} = \underset{\text{quotient}}{7}$$

Division Key Words: divide, divided by, remainder, dividend, divisor, quotient.

To divide larger numbers a horizontal algorithm is used with a division symbol often called the division bracket.

$$\text{divisor } 8 \overline{)\,56\,} \text{ dividend}$$

7 quotient (answer)

Start at the left and work to the right.

Any remainders are moved to become the tens in the next place to the right.

Any final remainder may be written as shown.

$$7 \overline{)\,9^{2}3\,}$$

$13\text{r}2$

Remainder as a whole number.

$$4 \overline{)\,9^{1}5^{3}7\,}$$

$239\frac{1}{4}$

Remainder as a fraction.

$$8 \overline{)\,9^{1}3^{5}8\,}$$

117.25

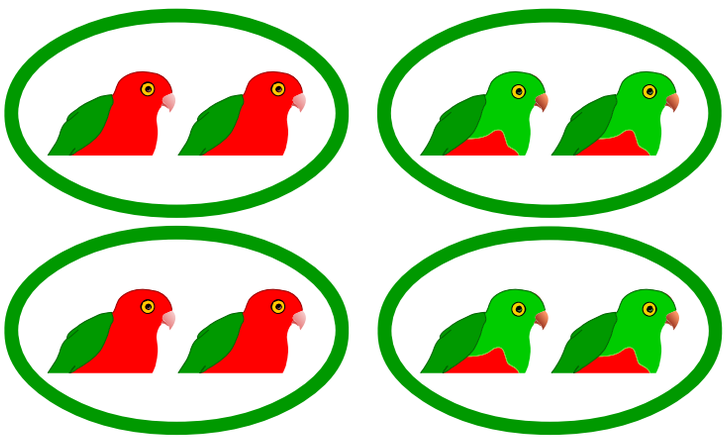
Remainder as a decimal fraction.

Remainders may be written as whole numbers, fractions or decimal fractions.

Using groups and arrays

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

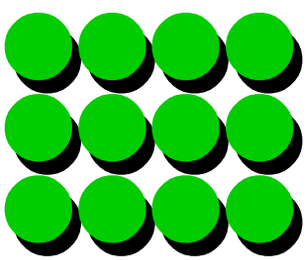
In early multiplication and division, using groups or arrays of rows and columns make counting and calculating easier.



4 groups of 2 = 8

2 x 4 = 8

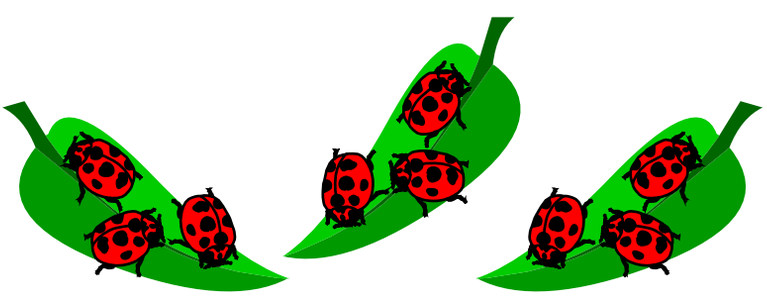
8 ÷ 4 = 2



3 rows of 4 = 12

4 x 3 = 12

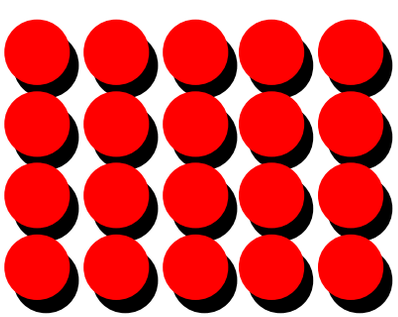
12 ÷ 3 = 4



3 groups of 3 = 9

3 x 3 = 9

9 ÷ 3 = 3



4 rows of 5 = 20

5 x 4 = 20

20 ÷ 4 = 5

Extensions

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

A strategy to extend easy number facts to larger numbers using multiplying by 10.

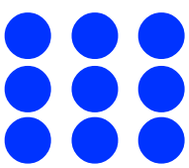
Multiplication

$2 \times 3 = 6$

$2 \times 30 = 60$

$2 \times 300 = 600$

$2 \times 3000 = 6000$



$3 \times 3 = 9$

$3 \times 30 = 90$

$3 \times 300 = 900$

$3 \times 3000 = 9000$

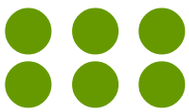
$2 \times 4 = 8$

$2 \times 40 = 80$

$2 \times 400 = 800$

$2 \times 4000 = 8000$

Division

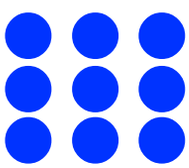


$6 \div 2 = 3$

$60 \div 2 = 30$

$600 \div 2 = 300$

$6000 \div 2 = 3000$



$9 \div 3 = 3$

$90 \div 3 = 30$

$900 \div 3 = 300$

$9000 \div 3 = 3000$

$8 \div 2 = 4$

$80 \div 2 = 40$

$800 \div 2 = 400$

$8000 \div 2 = 4000$

Look for the patterns.

Inverse operations

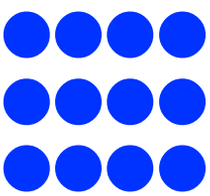
From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

Inverse operations are opposite or reverse operations.
Multiplication and division are inverse operations.
A multiplication fact will give a division fact and vice versa.

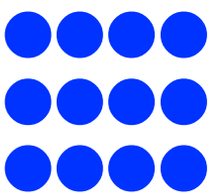
Multiplication ⟷ **inverse** ⟷ **Division**

$2 \times 3 = 6$
$3 \times 2 = 6$

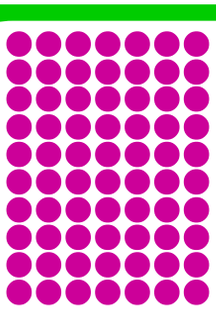
$6 \div 2 = 3$
$6 \div 3 = 2$



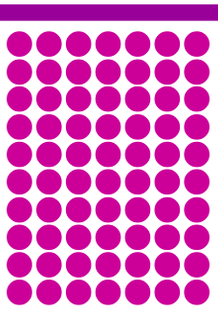
$3 \times 4 = 12$
$4 \times 3 = 12$



$12 \div 3 = 4$
$12 \div 4 = 3$



$10 \times 7 = 70$
$7 \times 10 = 70$



$70 \div 10 = 7$
$70 \div 7 = 10$

$$\begin{array}{r} 213 \\ \times \quad 3 \\ \hline 639 \end{array}$$

$$3\overline{)639} \quad 213$$

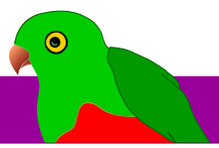
You can use multiplication facts to check division,
or use division facts to check multiplication.

Split strategy (partitioning)

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

A way to multiply larger numbers where each digit is multiplied separately according to its place value.

1. Split the larger number into hundreds, tens and ones.
2. Multiply the hundreds, then the tens, then the ones.
3. Add the products together.



EXAMPLES:

$$165 \times 6 = (100 \times 6) + (60 \times 6) + (5 \times 6)$$
$$= 600 + 360 + 30$$
$$= 990$$

OR

$$165 \times 6 = (100 + 60 + 5) \times 6$$
$$= 600 + 360 + 30$$
$$= 990$$

OR

$$\begin{array}{r} 165 \\ \times \quad 6 \\ \hline 600 \\ 360 \\ 30 \\ \hline 990 \\ \hline \end{array}$$

Start with the largest place value.

Reordering

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

A multiplication strategy that changes the order of the numbers to make calculations easier.

This strategy is based on the commutative law, rule or property of multiplication.
That is, the product will remain the same regardless of the order of the numbers being multiplied.

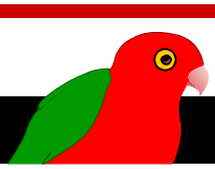
$$43 \times 3 = 3 \times 43$$
$$= 129$$

$$20 \times 2 \times 4 = 4 \times 20 \times 2$$
$$= 160$$

$$3 \times 620 =$$

$$\begin{array}{r} 620 \\ \times \quad 3 \\ \hline 1860 \end{array}$$

Use whatever order is easier for you.



Area model of multiplication

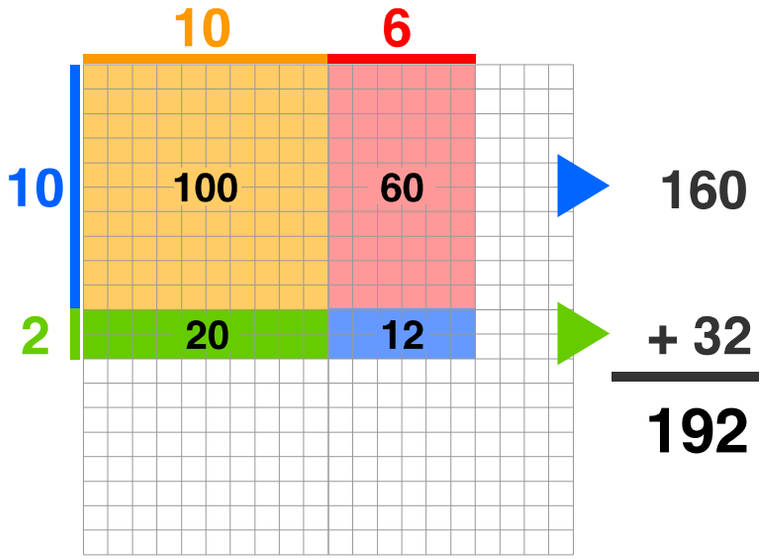
From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

The area of rectangles is used to model the multiplication of digits in two numbers according to their place value.

It shows the partial products which are then added together to get the answer.

EXAMPLES:

16 x 12

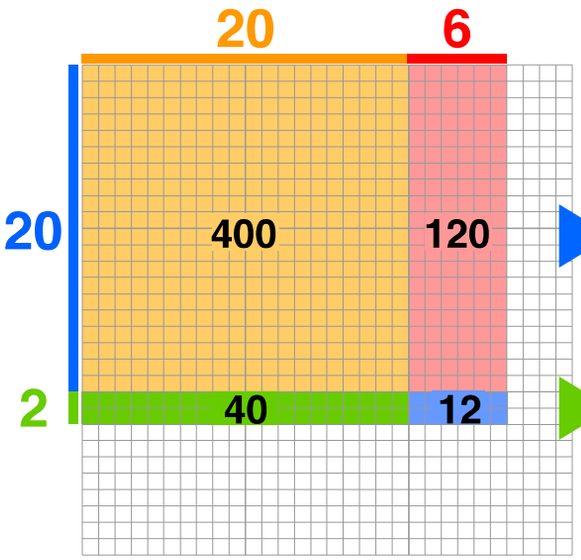


160

+ 32

192

26 x 22



520

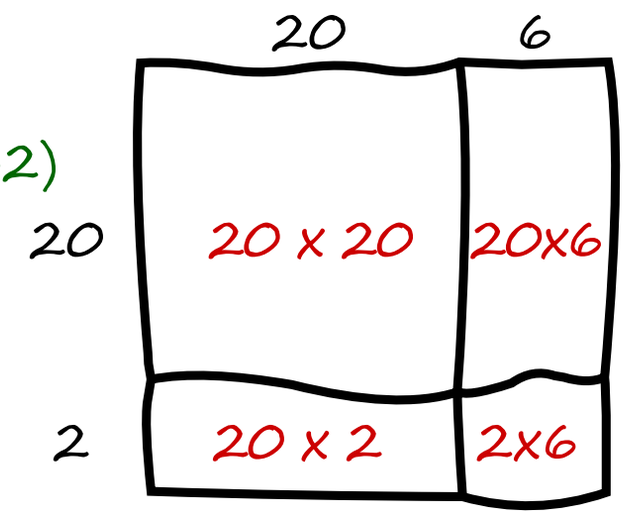
+ 52

572

Multiply

26 x 22

(20+6) x (20+2)



Add Answer

400
120

40
12

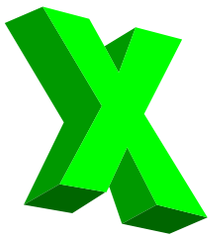
572

Also called the partial products model.

This model is an application of the distributive property of multiplication which states multiplying a number is the same as multiplying its addends by the number, then adding the partial products.

Multiplication Chart

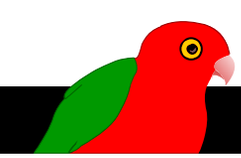
From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

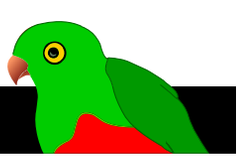


Read across and down
to find the product of any two green numbers.

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

Read across or down to find the multiples of
any green number.





Times Tables

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

1 x 1 = 1	1 x 2 = 2	1 x 3 = 3	1 x 4 = 4
2 x 1 = 2	2 x 2 = 4	2 x 3 = 6	2 x 4 = 8
3 x 1 = 3	3 x 2 = 6	3 x 3 = 9	3 x 4 = 12
4 x 1 = 4	4 x 2 = 8	4 x 3 = 12	4 x 4 = 16
5 x 1 = 5	5 x 2 = 10	5 x 3 = 15	5 x 4 = 20
6 x 1 = 6	6 x 2 = 12	6 x 3 = 18	6 x 4 = 24
7 x 1 = 7	7 x 2 = 14	7 x 3 = 21	7 x 4 = 28
8 x 1 = 8	8 x 2 = 16	8 x 3 = 24	8 x 4 = 32
9 x 1 = 9	9 x 2 = 18	9 x 3 = 27	9 x 4 = 36
10 x 1 = 10	10 x 2 = 20	10 x 3 = 30	10 x 4 = 40
11 x 1 = 11	11 x 2 = 22	11 x 3 = 33	11 x 4 = 44
12 x 1 = 12	12 x 2 = 24	12 x 3 = 36	12 x 4 = 48

1 x 5 = 5	1 x 6 = 6	1 x 7 = 7	1 x 8 = 8
2 x 5 = 10	2 x 6 = 12	2 x 7 = 14	2 x 8 = 16
3 x 5 = 15	3 x 6 = 18	3 x 7 = 21	3 x 8 = 24
4 x 5 = 20	4 x 6 = 24	4 x 7 = 28	4 x 8 = 32
5 x 5 = 25	5 x 6 = 30	5 x 7 = 35	5 x 8 = 40
6 x 5 = 30	6 x 6 = 36	6 x 7 = 42	6 x 8 = 48
7 x 5 = 35	7 x 6 = 42	7 x 7 = 49	7 x 8 = 56
8 x 5 = 40	8 x 6 = 48	8 x 7 = 56	8 x 8 = 64
9 x 5 = 45	9 x 6 = 54	9 x 7 = 63	9 x 8 = 72
10 x 5 = 50	10 x 6 = 60	10 x 7 = 70	10 x 8 = 80
11 x 5 = 55	11 x 6 = 66	11 x 7 = 77	11 x 8 = 88
12 x 5 = 60	12 x 6 = 72	12 x 7 = 84	12 x 8 = 96

1 x 9 = 9	1 x 10 = 10	1 x 11 = 11	1 x 12 = 12
2 x 9 = 18	2 x 10 = 20	2 x 11 = 22	2 x 12 = 24
3 x 9 = 27	3 x 10 = 30	3 x 11 = 33	3 x 12 = 36
4 x 9 = 36	4 x 10 = 40	4 x 11 = 44	4 x 12 = 48
5 x 9 = 45	5 x 10 = 50	5 x 11 = 55	5 x 12 = 60
6 x 9 = 54	6 x 10 = 60	6 x 11 = 66	6 x 12 = 72
7 x 9 = 63	7 x 10 = 70	7 x 11 = 77	7 x 12 = 84
8 x 9 = 72	8 x 10 = 80	8 x 11 = 88	8 x 12 = 96
9 x 9 = 81	9 x 10 = 90	9 x 11 = 99	9 x 12 = 108
10 x 9 = 90	10 x 10 = 100	10 x 11 = 110	10 x 12 = 120
11 x 9 = 99	11 x 10 = 110	11 x 11 = 121	11 x 12 = 132
12 x 9 = 108	12 x 10 = 120	12 x 11 = 132	12 x 12 = 144

Multiples and LCM

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

The multiple of a number is the product of multiplying that number by another whole number.

Multiples Chart

X	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

The LCM is the least or lowest number that is a common multiple of two or more numbers.

Finding the LCM

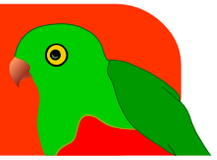
1. List the multiples for each number.
   - 4: 4, 8, 12, 16, 20, 24, 28, 32, 36, ...
   - 6: 6, 12, 18, 24, 30, 36, 42, 48, ...
2. List the common multiples in order.
   - 12, 24, 36, ...
3. Record the lowest.
   - LCM = 12

Factors and HCF

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

A factor is a whole number that divides exactly into another given number.

That is, a whole number that multiplies with another number to make a third number.



To find the factors of a number, first divide by 1 and then keep working down using the next lowest number that will divide exactly. Record each factor pair.

20

1 x 20
2 x 10
4 x 5

24

1 x 24
2 x 12
3 x 8
4 x 6

48

1 x 48
2 x 24
3 x 16
4 x 12
6 x 8

96

1 x 96
2 x 48
3 x 32
4 x 24
6 x 16
8 x 12

The HCF or GCF is the highest or greatest common factor that will divide two or more other numbers exactly.

Finding the HCF or GCF

1. List the factors for each number.

   20 1, 2, 4, 5, 10, 20
   24 1, 2, 3, 4, 6, 8, 12, 24

2. List the common factors.

   1, 2, (4)

3. Record the highest.

   HCF or GCF = 4

Prime factors and HCF

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

A prime factor is a prime number that divides exactly into another given number. Every positive integer has its own unique set of prime factors.

In prime factorisation, a number is written as the product of its prime factors.

To find the prime factors of a composite number, first divide the number by 2 and then keep working down using 2 or the next lowest prime number that will divide exactly, until there are no composite factors left.

20

2 x 10

2 x 5

20=2x2x5

24

2 x 12

2 x 6

2 x 3

24=2x2x2x3

48

2 x 24

2 x 12

2 x 6

2 x 3

48=2x2x2x2x3

75

3 x 25

5 x 5

75=3x5x5

The HCF (highest common factor) or GCF (greatest common factor) is the product of all the prime factors two or more numbers have in common.

Finding the HCF or GCF

1. List the prime factors for each number.

   20 2 x 2 x 5

   48 2 x 2 x 2 x 2 x 3

2. Find the common prime factors.

   2 x 2

3. Calculate their product. HCF or GCF = 4

Divisibility rules

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

A number is divisible by another number if it can be divided exactly without leaving a remainder.

Divisibility Chart

A number is divisible by ...	If ...	Divisible	Not Divisible
2	the last digit is divisible by 2	8724	8721
3	the sum of the digits is divisible by 3	8724 21	8722
4	the number made by the last two digits is divisible by 4	8724	8723
5	the last digit is 0 or 5	8725	8724
6	the number is divisible by both 2 and 3	8724	8722
7	the number is 0 or divisible by 7, after removing, doubling and subtracting the last digit from the number	8722 868	8724
8	the number made by the last three digits is divisible by 8	8720	8724
9	the sum of the digits is divisible by 9	8721 18	8724
10	the last digit is 0	8720	8724

Long multiplication

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

A traditional method used to multiply by a number which contains more than one digit.

The larger number to be multiplied is usually written on the top line with the smaller number written underneath.

Numbers are written underneath each other according their place value. The numbers are multiplied vertically, starting with the ones column then moving left column by column.

The multiplication lines are then added together to give the final answer.

Example

$43,864 x 423 =

Multiply by the digit in:

- **the 1s column**
- **the 10s column**
- **the 100s column**

Add the results

$$\begin{array}{r} 43864 \\ \times \quad 423 \\ \hline 131592 \\ 877280 \\ 17545600 \\ \hline 18554472 \end{array}$$

Zero or blank spaces may be used as placeholders.

$43,864 x 423 = $18,554,472

When a column is more than ten, the tens go into the next column left and are added to the answer in that line, the ones stay in their own column.

Long division

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

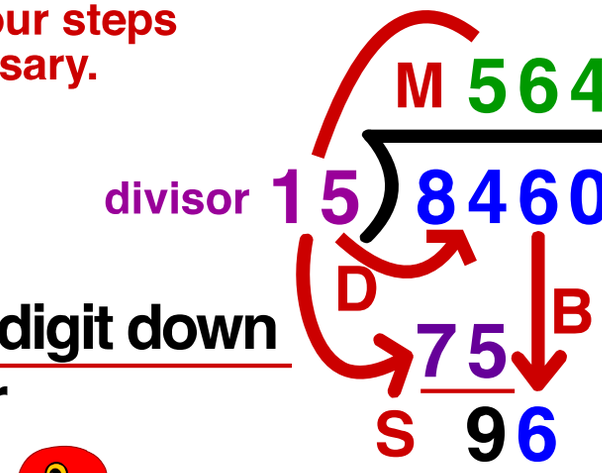
To divide larger numbers a horizontal algorithm is used with a division symbol often called the division bracket.

Long Division Steps

Repeat the first four steps as often as necessary.

1. **D** ivide
2. **M** ultiply
3. **S** ubtract
4. **B** ring next digit down

R emainder



D 84 ÷ 15 = 5
M 5 x 15 = 75
S 84 - 75 = 9
B 6 to make 96

Example

$$
\begin{array}{r}
1225\frac{13}{21} \\
21\overline{)\,25738} \\
-21 \\
\hline
47 \\
-42 \\
\hline
53 \\
-42 \\
\hline
118 \\
-105 \\
\hline
13
\end{array}
$$

To calculate the final remainder as a decimal fraction, add a decimal point to the dividend and the quotient. Then add zeros as necessary and keep dividing until the required number of decimal places is reached.

$$
\begin{array}{r}
1225.619 \\
21\overline{)\,25738.0000}
\end{array}
$$

$$
\begin{array}{r}
1225.62 \\
21\overline{)\,25738.000}
\end{array}
$$

The final remainder may be written as a fraction or decimal fraction, whole number(s) after the letter R or may be used to round the quotient (answer) to a whole number.

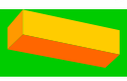
Key Words

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

Key words can help us solve mathematical word problems.

Addition

add
add to, added to
addition of
altogether
and
both
combined
extra
in all
increase by
increased by
join
more, more than
plus
sum
together
total, total of
whole amount



Subtraction

decrease, decreased
deduct
difference
difference between
dropped, fell
fewer, fewer than
how much less
how many more
how much more
how many left
how much left
less, less than
minus
nearer, further
reduce, reduced by
remaining
subtract
take away

Multiplication

area of
at
by
double, doubled
each had
groups of
multiplied by
of
multiple
per
product, product of
rate
rows of
sets of
times
triple
twice

Division

divide evenly
divided by
equal parts
equal pieces
fraction
for each, per
half, quarter
how many each
out of
percent, percentage
quotient
ratio, ratio of
share, share of
shared equally
split

Equals

answer to
corresponds to
equals
equates to
gives
is equal to
is identical to
is, are, would be
makes
matches
result is, results in
same amount, value
the same, same as
yields, produces

Problem Solving

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

Following steps and using strategies can help us solve mathematical problems, particularly unfamiliar ones.

for word problems the question

- Circle the numbers
- Underline key words
- Box the question
- Eliminate irrelevant info

Q

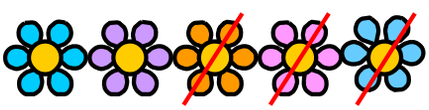
Lily had (5) cookies.
She gave some away to Liam.
She had (1) cookie left.
How many cookies did Liam get?

the strategies

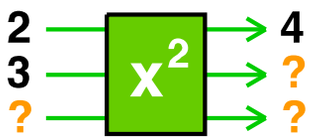
- Apply known methods, or
- Research strategies
- Choose a strategy

S

find a pattern or rule



draw a picture



draw a diagram

work backwards

$5 - \boxed{?} = 1$

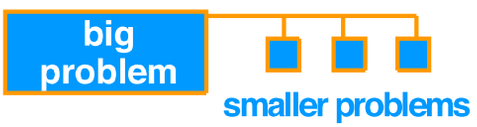
write an equation

$198 - 72 = ?$
$200 - 70 = 130$
estimated
$198 - 72 = 126$
checked

guess and check

act it out

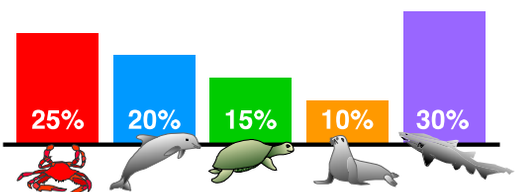
which operation(s)?



break it down

Animal	Sightings
crabs	5
dolphins	4
sharks	6

make a list or table



draw a graph or chart

the answer

- Write your answer
- Check the maths ✓
- Does it make sense? ✓

A

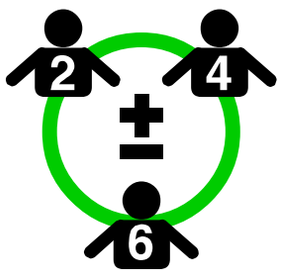
✓ Liam got 4 cookies. ✓

- Explain your reasoning.

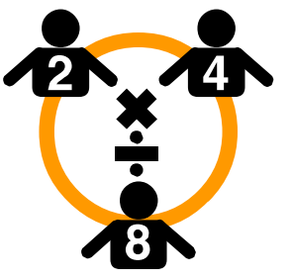
Fact families

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

A fact family is made up of four facts related by addition and subtraction or multiplication and division. Each fact family consists of a pair of numbers plus the answer when they are either added or multiplied.



For example, 2 and 4 with 6 if they are added or 2 and 4 with 8 if they are multiplied.



Knowing one fact can help work out the other facts.

EXAMPLES: Addition and subtraction

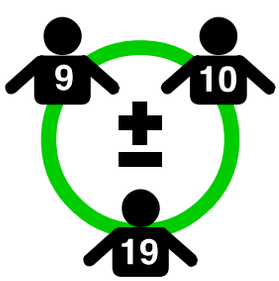
2, 4, and 6	2 + 4 = 6	4 + 2 = 6	6 - 2 = 4	6 - 4 = 2
3, 5, and 8	3 + 5 = 8	5 + 3 = 8	8 - 3 = 5	8 - 5 = 3

EXAMPLES: Multiplication and division

2, 4, and 8	2 x 4 = 8	4 x 2 = 8	8 ÷ 2 = 4	8 ÷ 4 = 2
3, 5, and 15	3 x 5 = 15	5 x 3 = 15	15 ÷ 3 = 5	15 ÷ 5 = 3

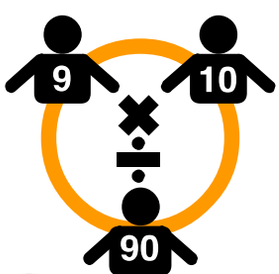
Fact family relationships

9	10



FACT FAMILY: Addition and subtraction

9 + 10 = 19	10 + 9 = 19
19 - 9 = 10	19 - 10 = 9



FACT FAMILY: Multiplication and division

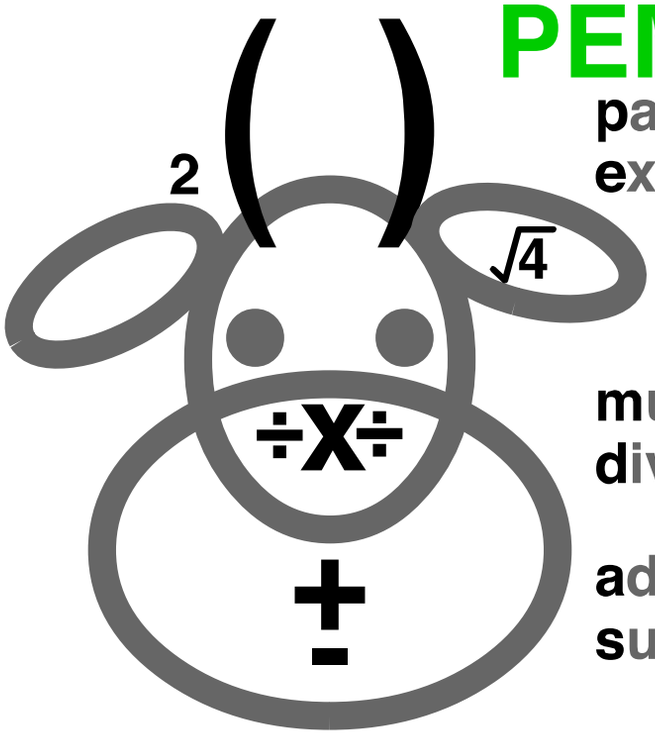
9 x 10 = 90	10 x 9 = 90
90 ÷ 9 = 10	90 ÷ 10 = 9

Order of operations

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

Mathematical operations need to be done in the right order.

Often acronyms such as PEMDAS, BIDMAS or BODMAS are used to help remember the sequence.



PEMDAS

parentheses
exponents, roots

multiplication
division

addition
subtraction

e.g. $2 + 6\,(3+1)^2$

P = $2 + 6\,(4)^2$

E = $2 + 6\,(16)$

M = $2 + 96$

D

A = 98

S

wrong order … wrong answer

PEMDAS

1. **P**arentheses ( ) or {} or [ ] , brackets
2. **E**xponents (indices, orders), roots
3. **M**ultiplication (times)
   Division (divided by) — x and ÷ have equal precedence
4. **A**ddition (plus)
   Subtraction (minus) — + and - have equal precedence

Use the PEMDAS order.

Operations properties

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

Addition

Associative property

$(a + b) + c = a + (b + c)$ $(4 + 2) + 1 = 4 + (2 + 1)$

Commutative property

$a + b = b + a$ $4 + 2 = 2 + 4 = 6$

Additive identity property of 0

$a + 0 = 0 + a = a$ $4 + 0 = 0 + 4 = 4$

Multiplication

Associative property

$(a \times b) \times c = a \times (b \times c)$ $(4 \times 2) \times 1 = 4 \times (2 \times 1)$

Commutative property

$a \times b = b \times a$ $4 \times 2 = 2 \times 4 = 8$

Multiplicative identity property of 1

$a \times 1 = 1 \times a = a$ $4 \times 1 = 1 \times 4 = 4$

Zero product property

$a \times b = 0$ either $a = 0$, $b = 0$ or both a and $b = 0$

Distributive property of multiplication over addition

$a \times (b + c) = a \times b + a \times c$ $4 \times (2 + 1) = 4 \times 2 + 4 \times 1$

Inverses

Additive inverses

$a + (-a) = (-a) + a = 0$ $4 + (-4) = (-4) + 4 = 0$

Multiplicative inverses

$a \times 1/a = 1/a \times a = 1$ $4 \times 1/4 = 1/4 \times 4 = 1$

if $a \neq 0$

Operations on positive and negative numbers

From: A Maths Dictionary for Kids by Jenny Eather at www.amathsdictionaryforkids.com

Addition

Positive + Positive = Positive
Negative + Negative = Negative
*** Positive + Negative or Negative + Positive**
- subtract the smaller number from the larger number,
- then use the sign of the larger number in the answer

5 + 3 = 8
(- 5) + (- 3) = - 8
(- 5) + 3 = - 2
3 + (- 5) = - 2
(- 3) + 5 = 2
5 + (- 3) = 2

Subtraction

Negative - Positive = Negative
Positive - Negative = Positive
*** Negative - Negative = Negative + Positive**
- treat as Negative + Positive
- subtract the smaller number from the larger number,
- then use the sign of the larger number in the answer

(- 5) - 3 = (- 5) + (- 3) = - 8
5 - (- 3) = 5 + 3 = 8
(- 5) - (- 3) = (- 5) + 3 = - 2
(- 3) - (- 5) = (- 3) + 5 = 2

Multiplication

Positive x Positive = Positive
Negative x Negative = Positive
Negative x Positive = Negative
Positive x Negative = Negative
- change double negatives to a positive

5 x 3 = 15
(- 3) x (- 5) = 15
(- 3) x 5 = - 15
3 x (- 5) = - 15

Division

Positive ÷ Positive = Positive
Negative ÷ Negative = Positive
Negative ÷ Positive = Negative
Positive ÷ Negative = Negative
- change double negatives to a positive

15 ÷ 3 = 5
(- 15) ÷ (- 3) = 5
(- 15) ÷ 3 = - 5
15 ÷ (- 3) = - 5