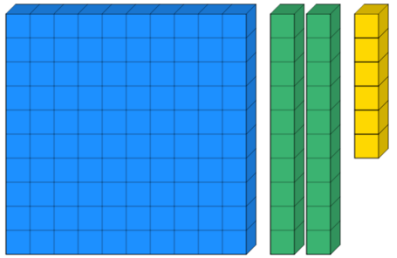
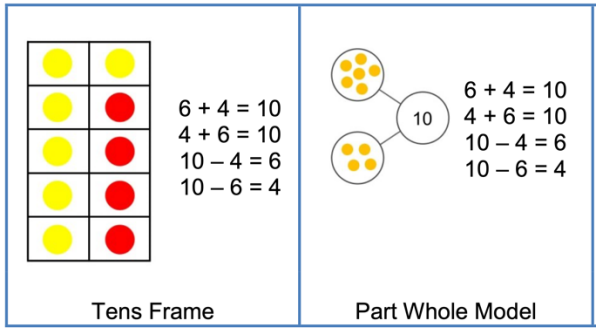


COOKHAM RISE PRIMARY SCHOOL

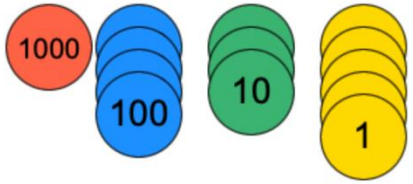
S·H·I·N·E



"They didn't do it like that when I was at school."

Find out more about the mastery approach to maths and how to support your child's learning

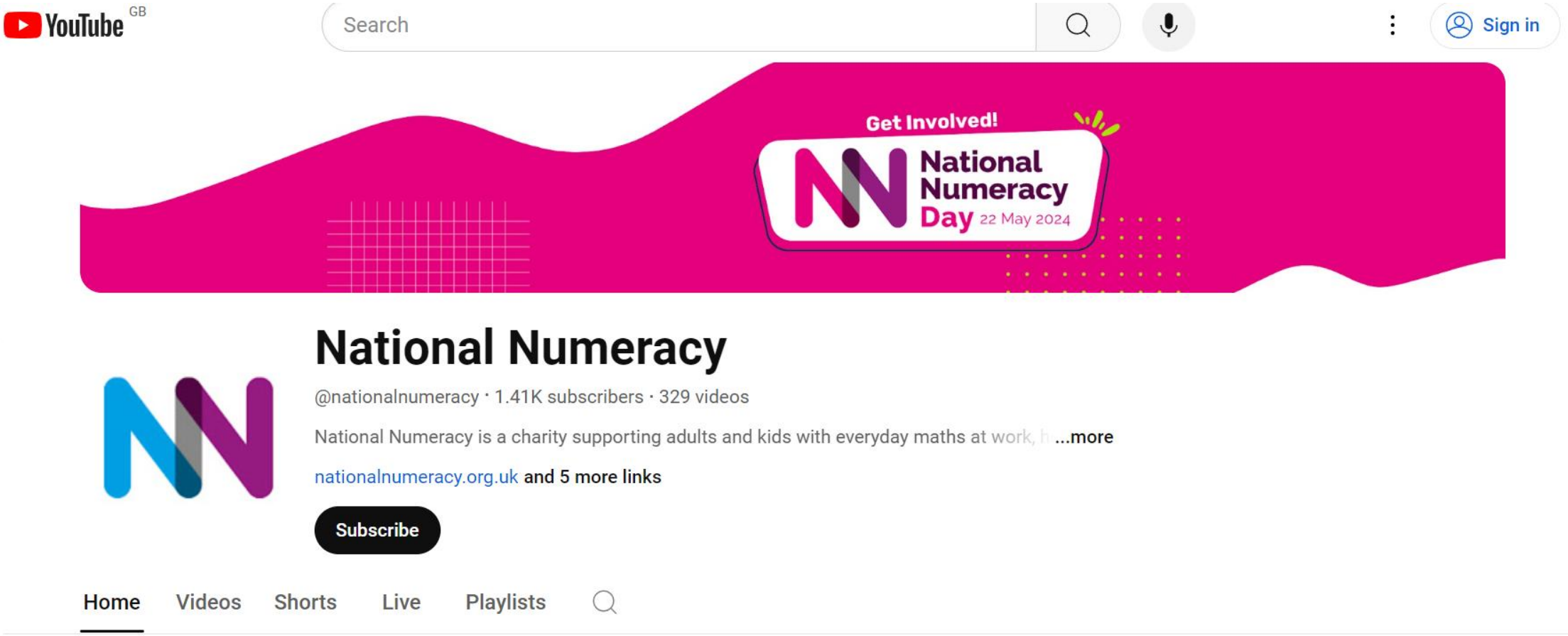
Workshop 2: Multiplication and division
7 – 8pm Wednesday 16th October 2024
Year 6 Classroom



Welcome

- Introduction
- What is Maths Mastery and what does teaching maths look like at Cookham Rise?
- Supporting your child at home
- How is multiplication and division taught at school?
- Questions

National Numeracy



[Supporting Children - New methods (youtube.com)]

National Numeracy

How parents can help with maths at home

Be positive about maths. Try not to say things like "I can't do maths" or "I hated maths at school" – your child may start to think like that themselves.

Point out the maths in everyday life. Include your child in activities involving numbers and measuring, such as shopping, cooking and travelling.

Praise your child for effort rather than for being "clever". This shows them that by working hard, they can always improve.

National Numeracy

National Numeracy
Getting on with numbers

Number Confidence Week | Go to the Challenge

Supporting children | Numeracy for work | Managing money | About numeracy | About us | Support us

Home / Supporting children

Free Family Maths Toolkit

The Family Maths Toolkit resources help families enjoy maths together.

These short, fun maths activities can be used by schools or families. They help schools engage parents and carers with children's maths learning – and they help parents and carers boost their children's confidence with numbers.

› Access the Family Maths resources for free by filling in the form below

[Click here to find out more]

What's inside the Family Maths Toolkit?

In the Family Maths resource set, you will find:

- Over 200 'everyday maths' activities for children and their families to do together.
- Full year group packs, with one activity per week in term time, for reception through to year 6 (P1-7 / age 4-11).
- A set of mindset-focused activities for each key stage EYFS to Key Stage 4 (covering ages 4-16).
- Information sheets for parents and carers about boosting their own confidence with numbers and supporting children to develop positive attitudes towards maths.

National Numeracy

click here to find out more

Help yourself to help others

If a fear of maths has you hiding from homework, we can help!

With a little help from us you can build your number confidence and skills, and begin to feel more prepared for when children come to you for help, and help pass your confidence onto them.

The free National Numeracy Challenge is designed to help you! It's a free, quick and easy way to check your skills and confidence with numbers, where you can go at your own pace, with learning resources tailored to you and your level. It helps with the maths we come across at work and in daily life – not algebra, or trigonometry. You can get started in just 10 minutes, and join the **390,000** others that have already started their journey to number confidence. Give it a go!

Start now

What is Maths Mastery?

The Maths Mastery approach originated in Asia, in high performing schools in cities including Shanghai and Singapore. In the UK, hundreds of schools have adopted this approach, and organisations including Ofsted, the DfE, and the NCETM are supporting Maths Mastery.

• Mathematics teaching for mastery assumes everyone can learn and enjoy mathematics.

• Mathematical learning behaviours are developed such that pupils focus and engage fully as learners who reason and seek to make connections.

• In a typical lesson, the teacher leads back and forth interaction, including questioning, short tasks, explanation, demonstration, and discussion, enabling pupils to think, reason and apply their knowledge to solve problems. We call this the 'ping-pong' method.

• Use of precise mathematical language enables all pupils to communicate their reasoning and thinking effectively.

• Key number facts are learnt to automaticity, and other key mathematical facts are learned deeply and practised regularly, to avoid cognitive overload in working memory and enable pupils to focus on new learning.

MASTERY MATHS

CAN YOU MAKE IT?

CAN YOU DRAW IT?

CAN YOU EXPLAIN IT?

HOW COULD YOU DO IT DIFFERENTLY?

WHY DID YOU CHOOSE THAT METHOD?

CAN YOU MAKE IT EASIER?

CAN YOU MAKE IT HARDER?

HOW MANY DIFFERENT WAYS COULD YOU SOLVE IT?

HOW DO YOU KNOW IF IT'S RIGHT?

CAN YOU SPOT AN ERROR?

HOW EFFICIENT IS THE METHOD USED?

CAN YOU CREATE YOUR OWN PROBLEM USING THE SAME STYLE?

CAN YOU TEACH SOMEONE ELSE?

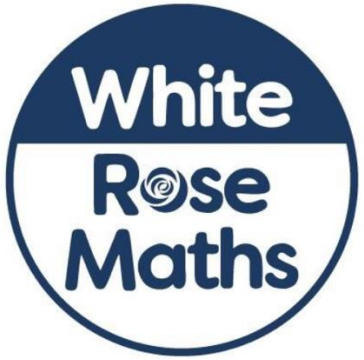
CAN YOU WRITE INSTRUCTIONS FOR SOMEONE TO FOLLOW?

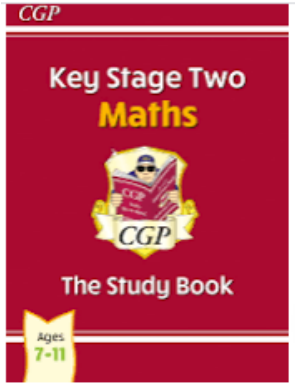
WHAT NEW MATHS LANGUAGE HAVE YOU LEARNT? CAN YOU EXPLAIN IT?

EXPLAIN WHAT WAS DIFFICULT ABOUT THE PROBLEM? HOW DID YOU OVERCOME IT?

Maths at Cookham Rise

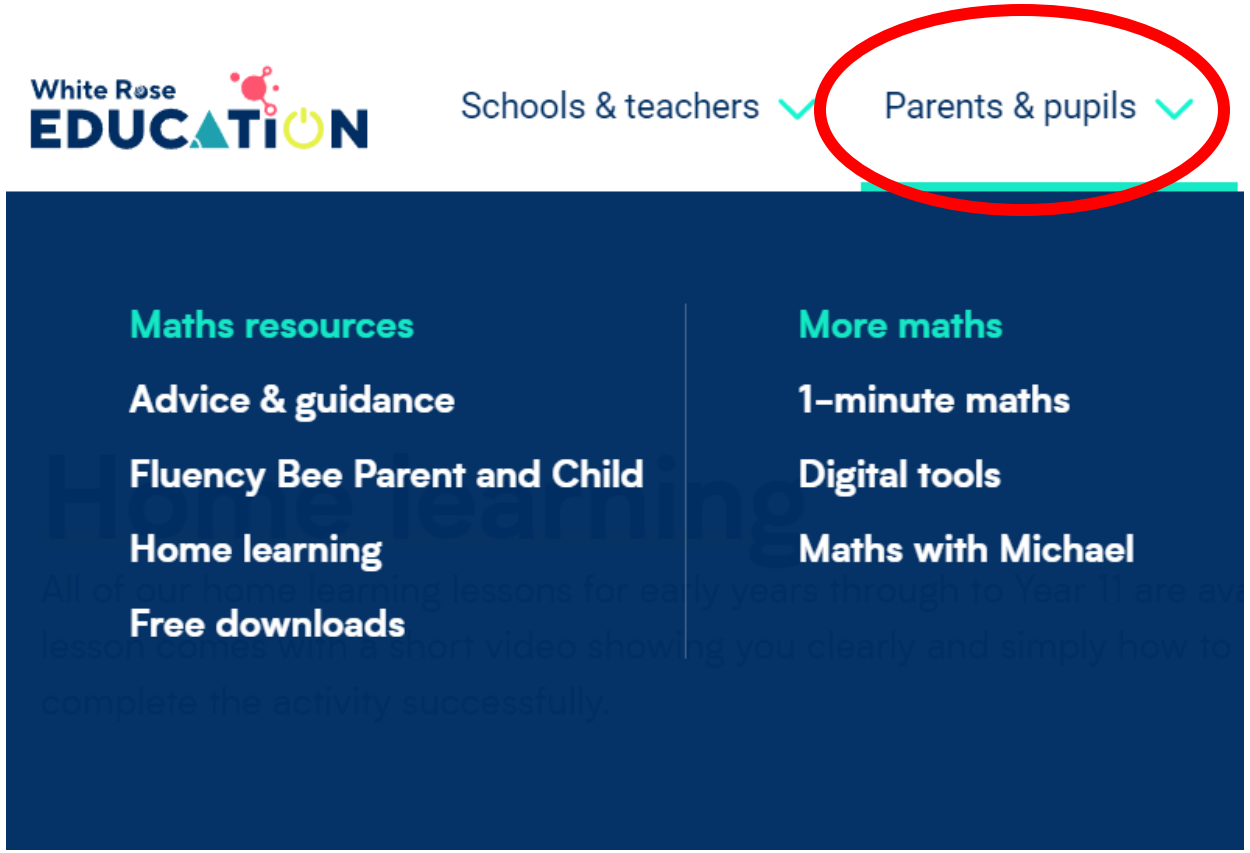
- White Rose Maths
- NCETM
- nrich
- CGP workbooks
- Times Table Rock Stars





White Rose parents & pupils

- https://whiteroseeducation.com/1-minute-maths
- https://whiteroseeducation.com/resources/digital-tools
- https://whiteroseeducation.com/parent-pupil-resources/maths/free-downloads
- https://whiteroseeducation.com/parent-pupil-resources/maths/home-learning?year=year-6-new



KS1 multiplication and division

Pupils should be taught to:

- solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher

Notes and guidance (non-statutory)

Through grouping and sharing small quantities, pupils begin to understand:

- multiplication and division
- doubling numbers and quantities
- finding simple fractions of objects, numbers and quantities

They make connections between arrays, number patterns, and counting in 2s, 5s and 10s.

Lower KS2 multiplication and division

Pupils should be taught to:

- 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, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects

Notes and guidance (non-statutory)

Pupils continue to practise their mental recall of multiplication tables when they are calculating mathematical statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 multiplication tables.

Pupils develop efficient mental methods, for example, using commutativity and associativity (for example, $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$) and multiplication and division facts (for example, using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$) to derive related facts ($30 \times 2 = 60$, $60 \div 3 = 20$ and $20 = 60 \div 3$).

Pupils develop reliable written methods for multiplication and division, starting with calculations of two-digit numbers by one-digit numbers and progressing to the formal written methods of short multiplication and division.

Pupils solve simple problems in contexts, deciding which of the 4 operations to use and why. These include measuring and scaling contexts, (for example 4 times as high, 8 times as long etc) and correspondence problems in which m objects are connected to n objects (for example, 3 hats and 4 coats, how many different outfits?, 12 sweets shared equally between 4 children, 4 cakes shared equally between 8 children).

Upper KS2 multiplication and division

- identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 numbers
- know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
- establish whether a number up to 100 is prime and recall prime numbers up to 19
- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- multiply and divide numbers mentally, drawing upon known facts
- divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000
- recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})
- solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates

Pupils practise and extend their use of the formal written methods of short multiplication and short division (see mathematics appendix 1 (PDF, 248KB)). They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations.

They use and understand the terms factor, multiple and prime, square and cube numbers.

Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (for example, $98 \div 4 = \frac{98}{4} = 24$ r 2 $= 24\frac{1}{2} = 24.5 \approx 25$).

Pupils use multiplication and division as inverses to support the introduction of ratio in year 6, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1,000 in converting between units such as kilometres and metres.

Distributivity can be expressed as $a(b + c) = ab + ac$.

They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example, $4 \times 35 = 2 \times 2 \times 35$; $3 \times 270 = 3 \times 3 \times 9 \times 10 = 9^2 \times 10$).

Distributivity can be expressed as $a(b + c) = ab + ac$.

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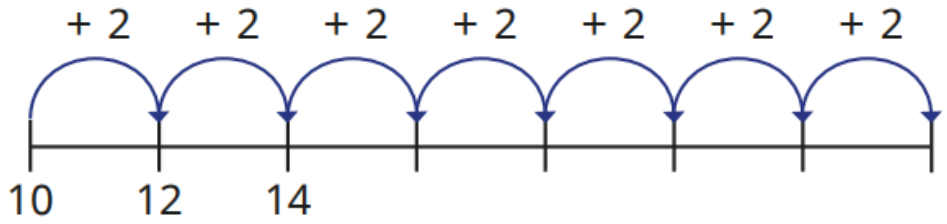
Pupils use and explain the equals sign to indicate equivalence, including in missing number problems (for example 13 + 24 = 12 + 25; 33 = 5 x ?).

Skip counting

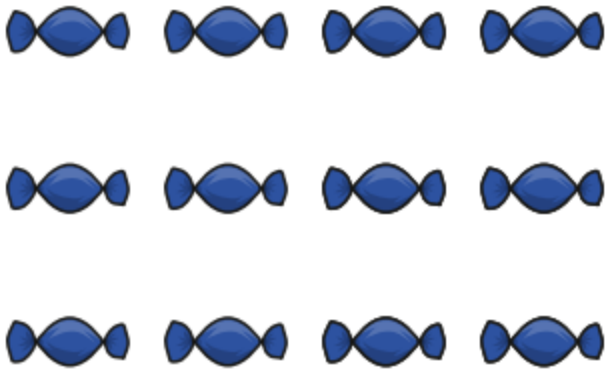
Skip counting is a method of counting using any number other than 1. For example, you can skip count by 2s, 3s, 5s or 10s. What this means is that you count using **multiples** of that particular number, ignoring all the numbers in between. You literally 'skip' over the numbers that aren't multiples of the number you're skip counting by.



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

Arrays

An array is an arrangement of objects or pictures in rows and columns. It is the beginning of multiplication.

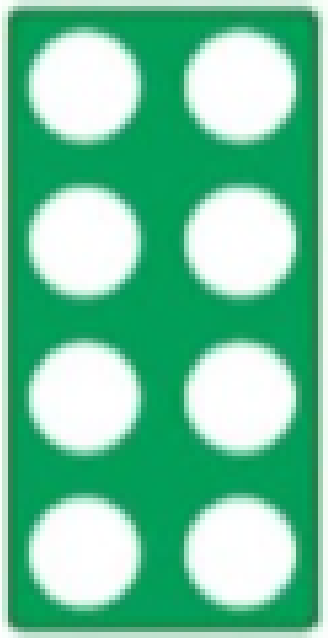


4 + 4 + 4 = 12

4 x 3 = 12

2 + 2 + 2 + 2 = 8

2 x 4 = 8



Grouping and sharing

Two types of division in KS1.

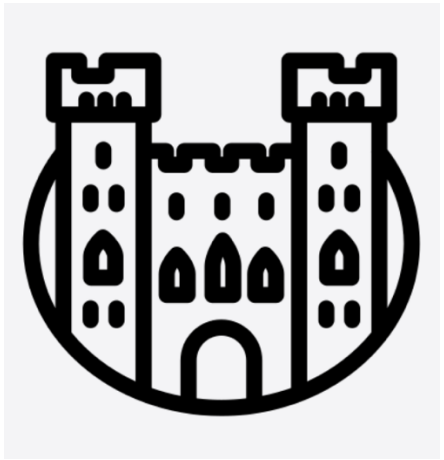
Sharing: the total amount of objects in each group, once the amount has been shared.

Q: Jim has 20 apples. He shares them between 4 friends. How many apples do they get each?

Grouping: the number of groups once the amount has been shared.

Q: Jim share 20 apples between friends. They each have 5 apples. How many friends did he share them with?

Understanding the power of 10



Distance from Cookham to Windsor

15,000m

Mountain

1500m

Skyscraper

150m

Whale

15m

Year 6 child

1.5m

Rat

0.15m

Bee

0.015m

Wool

0.0015m

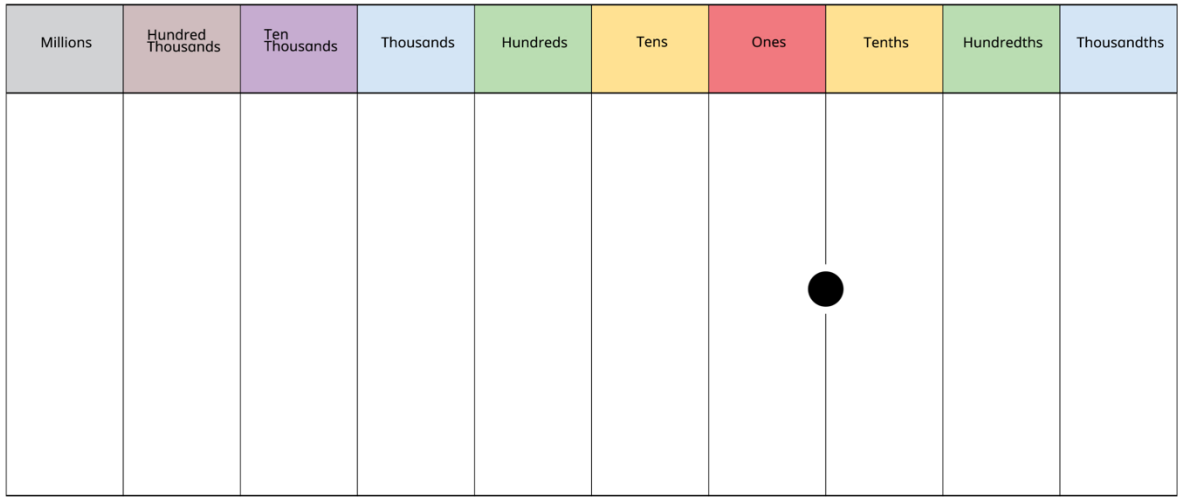
Multiplying and dividing by 10, 100 and 1000

Remember - the decimal point never moves!

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths

Multiplying and dividing by 10, 100 and 1000

Remember - the decimal point never moves!

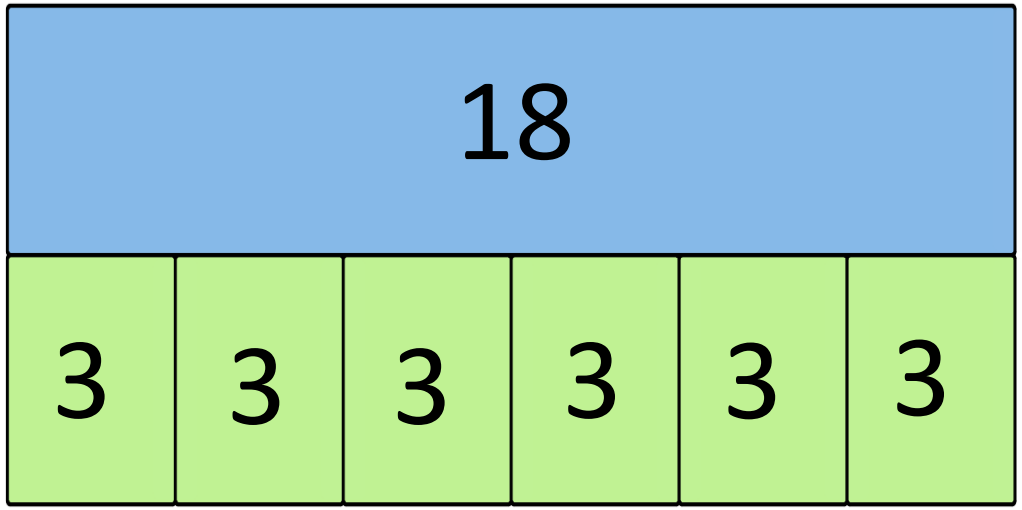


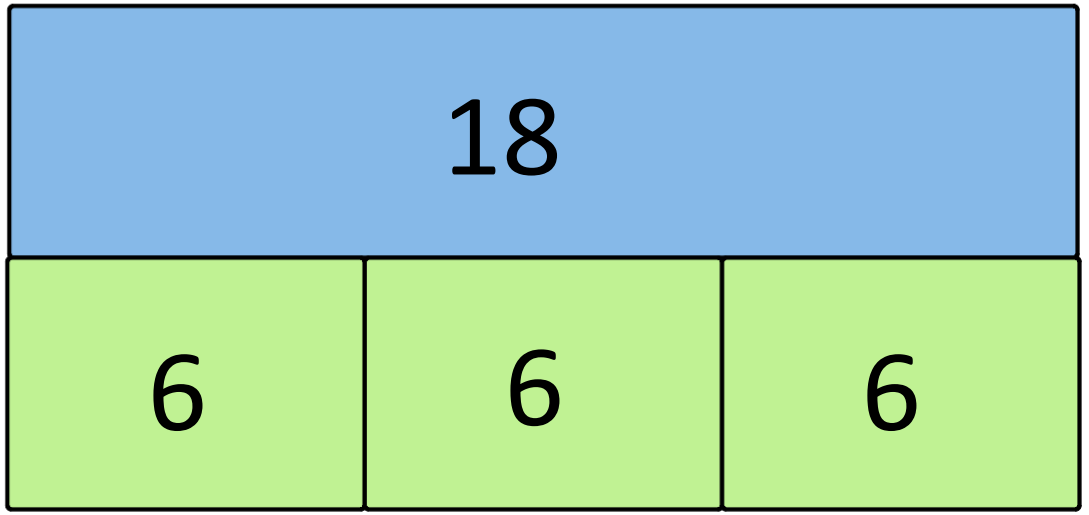
Using a place value grid

Understanding the power of ten

$10^4 = 10 \times 10 \times 10 \times 10$

Recognising the relationship between multiplication and division





6 x 3 = 18

18 ÷ 6 = 3

3 x 6 = 18

18 ÷ 3 = 6

Maths laws

Law of commutativity

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

in addition and multiplication, the order doesn't matter

Associative law

$$3 \times 2 \times 4 = 2 \times 4 \times 3$$

in addition and multiplication, it doesn't matter which ones you multiply first

Distributive law

$$3 \times (2 + 4) = 3 \times 2 + 3 \times 4$$

the idea of "multiplying out" brackets- or partitioning a number to make it easier to multiply

$$3 \times 15 = 3 \times 10 + 3 \times 5$$

X-Factor

X	4	6	11	3	9	2	10	7	1	12	5	8	X	Total
2													2	
6													6	
11													11	
7													7	
1													1	
3													3	
8													8	
12													12	
10													10	
9													9	
5													5	
4													4	

Primes, factors and factor pairs

What are the factors of 24?

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

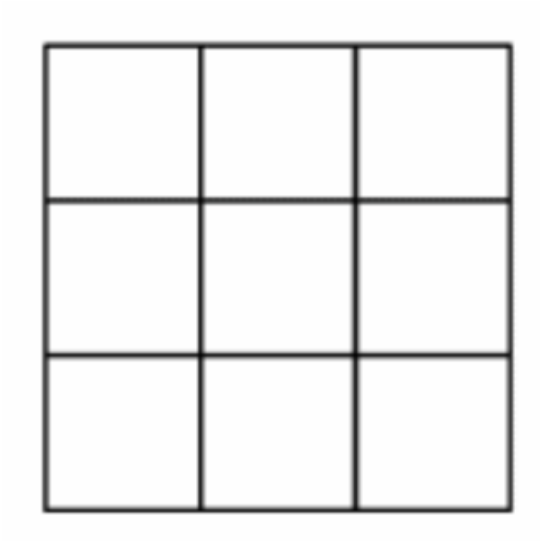
24

1	24
2	12
3	8
4	6

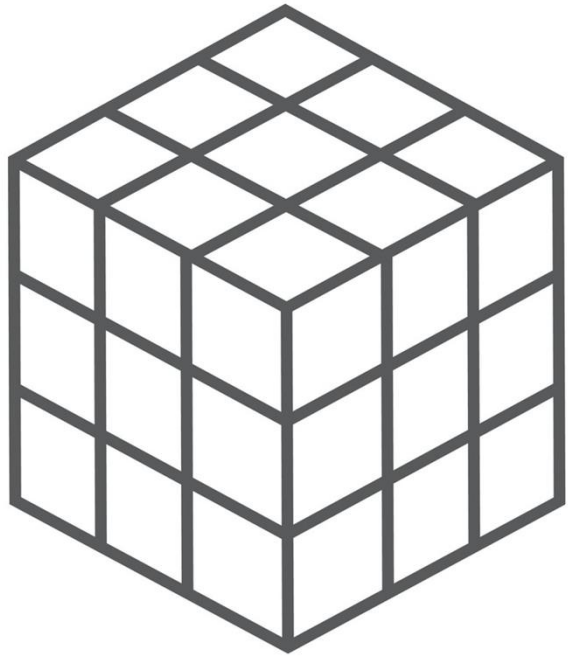
The only factors of a prime number are 1 and itself:
2, 3, 5, 7, 11, 13, 17, 19, 23

We can use prime numbers and the divisibility rules to check we've found all the factors of a number.

Square and cube numbers



$3^2 = 3 \times 3 = 9$



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

Formal methods of multiplication

Multiplication

$times$ $multiply$

$product$ $repeated\ addition$

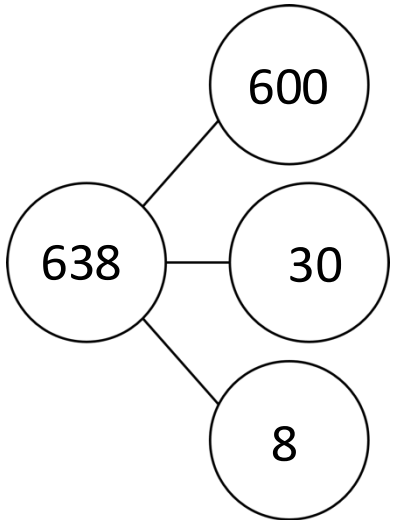
$lots\ of$

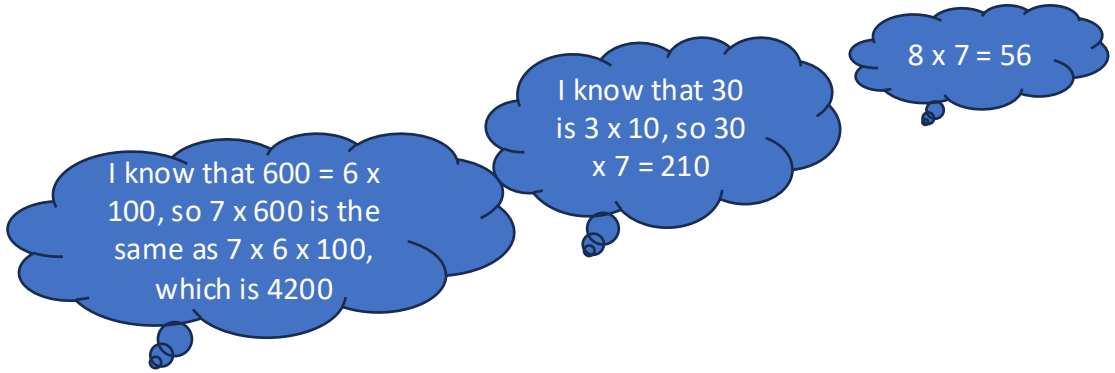
$multiplicand\ x\ multiplicand = product$

$factor\ x\ factor = product$

Grid method

$$638 \; x \; 7 =$$





	600	30	8
7	4200	210	56

4,200 + 210 + 56 = 4,466

Expanded method

$$638 \; x \; 7 =$$

	600	30	8
7	4200	210	56

4,200 + 210 + 56 = 4,466

	6	3	8
X			7
		5	6
	2	1	0
4	2	0	0
4	4	6	6

Short method

$$638\ x\ 7 =$$

	600	30	8
7	4200	210	56

4,200 + 210 + 56 = 4,466

	6	3	8
X			7
		5	6
	2	1	0
4	2	0	0
4	4	6	6

	6	3	8
X			7
	2	5	
4	4	6	6

Long multiplication

$$543\ x\ 27 =$$

	500	40	3	
7	3,500	280	21	3,801
20	10,000	800	60	10,860
				14,661

		5	4	3
	X		2	7
			2	1
		2	8	0
	3	5	0	0
			6	0
		8	0	0
1	0_1	0_1	0	0
1	4	6	6	1

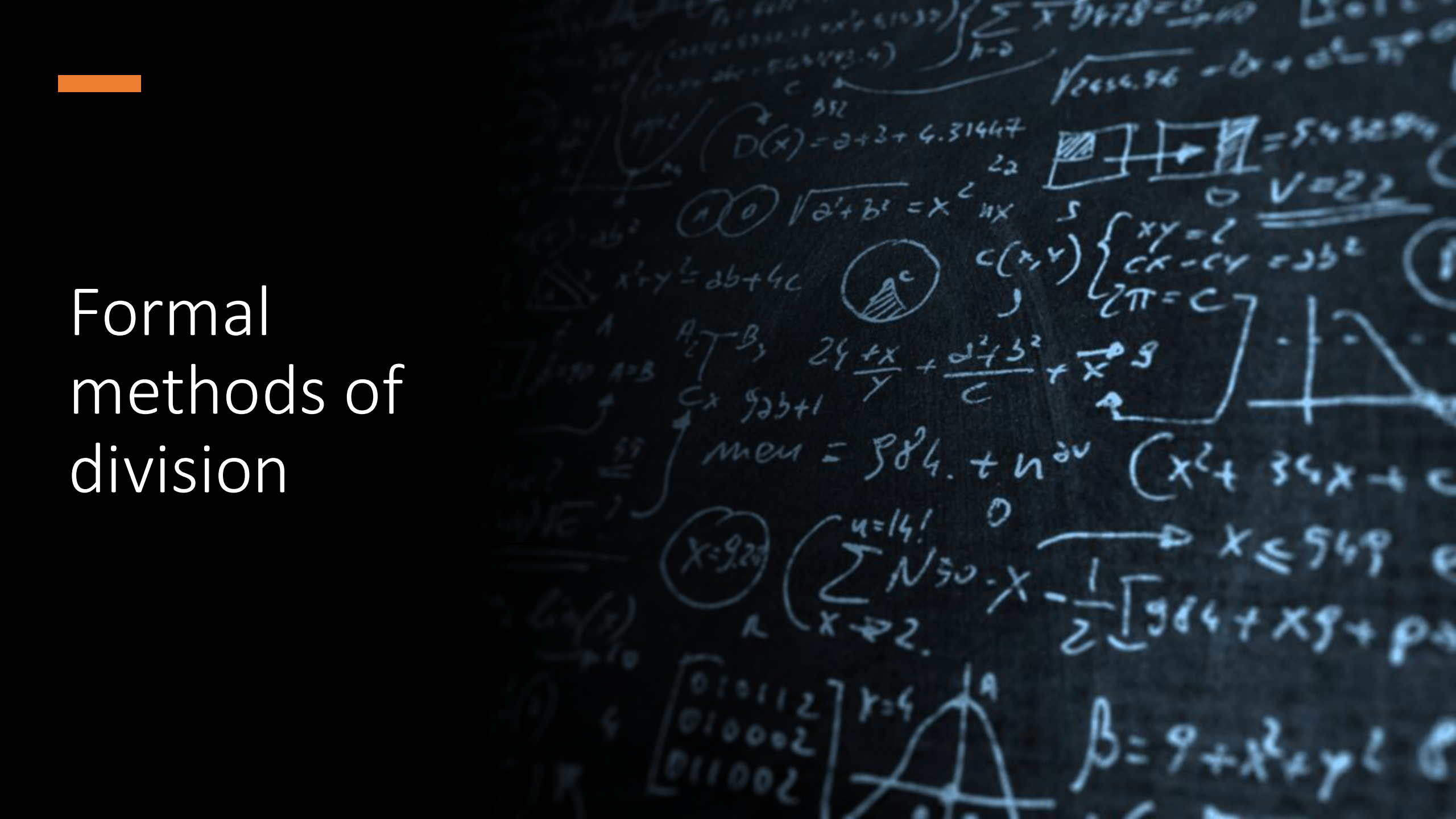
		5	4	3
	X		2	7
		3	2	
	3	8	0	1
1	0_1	8	6	0
1	4	6	6	1

543 x 7

543 x 20

Add products

Formal methods of division



Division

sharing equally

equal groups

chunking

divide

repeated subtraction

$$dividend\ x\ divisor = quotient$$

Chunking

1 5 4 8 ÷ 6 =

100 lots of 6 is 600
200 lots of 6 is 1,200 (we now have 348 left)

10 lots of 6 is 60
50 lots of 6 is 300 (we now have 48 left)

48 ÷ 6 = 8

So our answer will be 200 + 50 + 8

Short division (bus-stop) method

1 5 4 8 ÷ 6 =

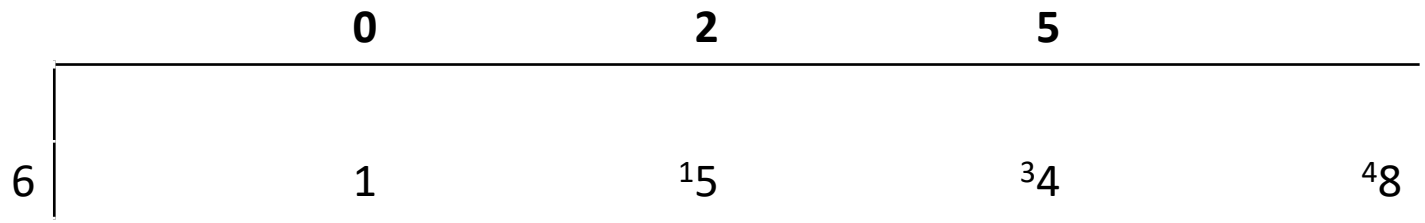
Short division (bus-stop) method

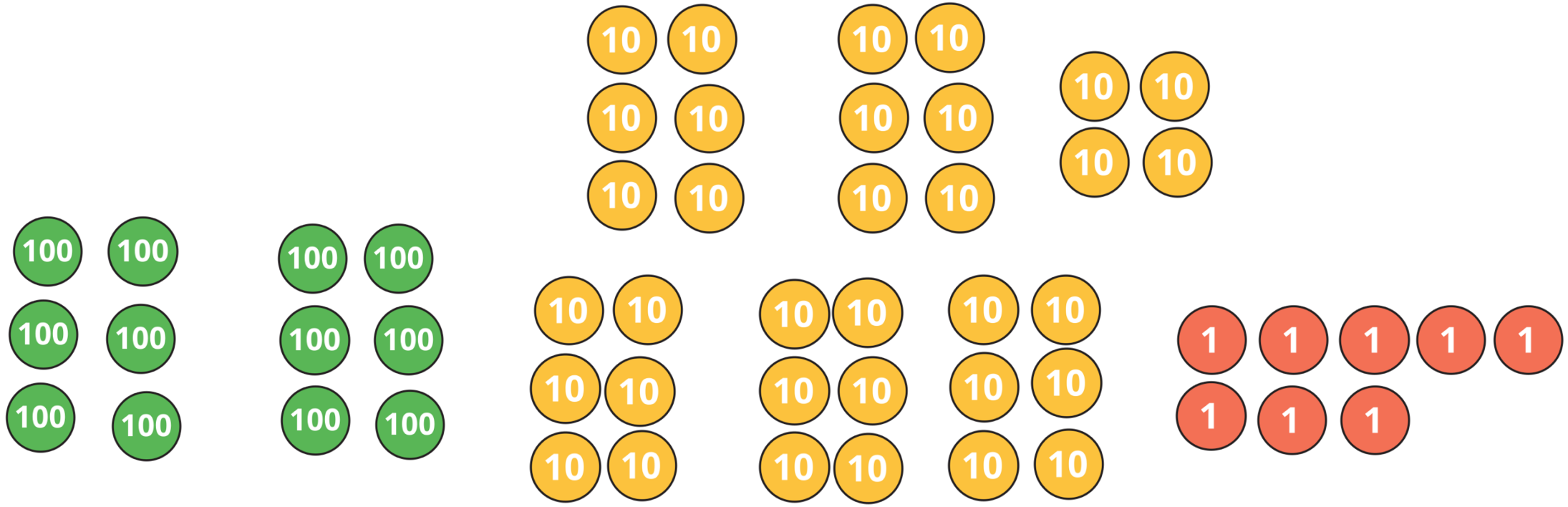
1 5 4 8 ÷ 6 =

	0	2		
6	1	$^{1}5$	4	8

Short division (bus-stop) method

1 5 4 8 ÷ 6 =

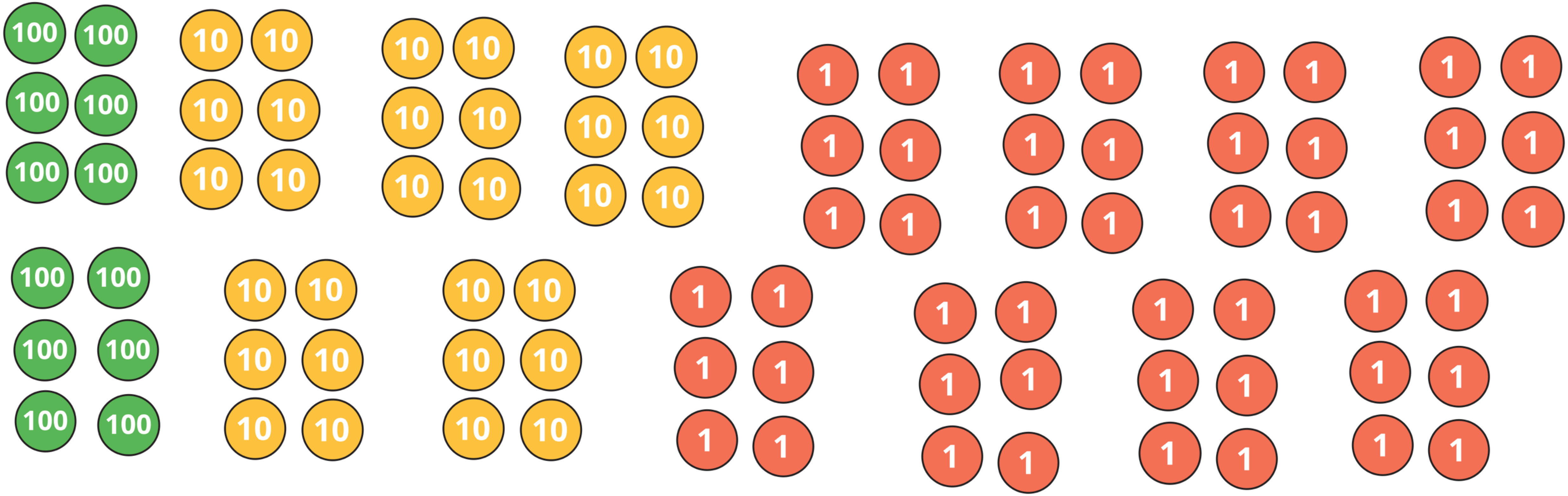




Short division (bus-stop) method

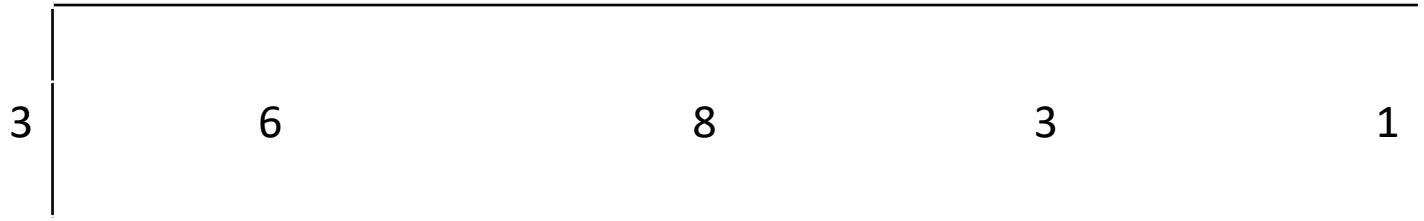
1 5 4 8 ÷ 6 =

	0	2	5	8
6	1	${}^{1}5$	${}^{3}4$	${}^{4}8$



Short division (bus-stop) method

6,831 ÷ 3 =

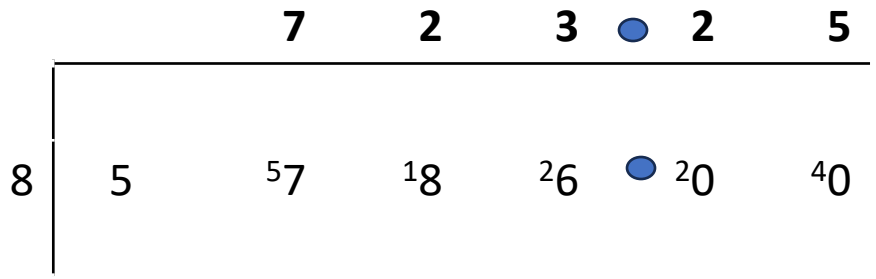


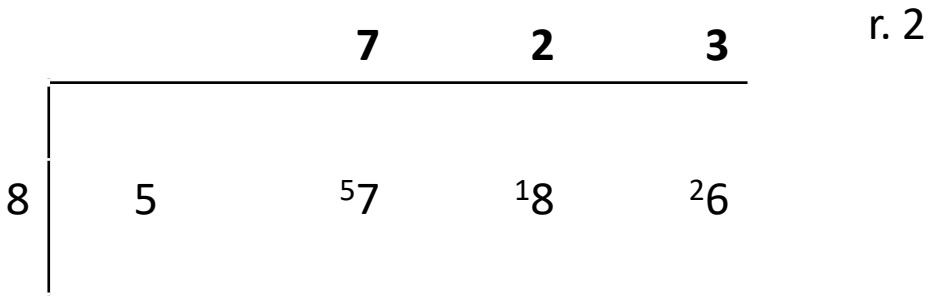
What’s a remainder anyway?

5,786 ÷ 8 =

What's a remainder anyway?

$5{,}786 \div 8 =$





$$723\frac{2}{8} = 723\frac{1}{4}$$

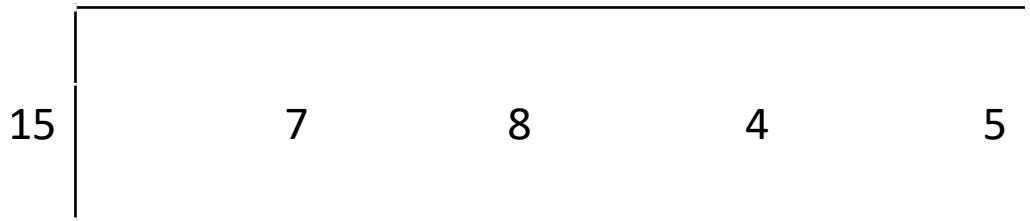
Long division

Not worth losing sleep over –
in real life, use a calculator!

7845 ÷ 15

Can we use ordinary short division?

Can we use factors?



Two-digit division using factors

Can we use ordinary short division?

Can we use factors?

I know that the factors of 15 are 1,3, 5, 15

I know that if it ends in a 5 or 0, it must be in the 5 x table.

I know that if its digital root is 3, 6 or 9, it must be a multiple of 3

15	7	8	4	5

	1	**5**	**6**	**9**
5	7	$^{2}8$	$^{3}4$	$^{4}5$

		5	**2**	**3**
3	1	$^{1}5$	6	9

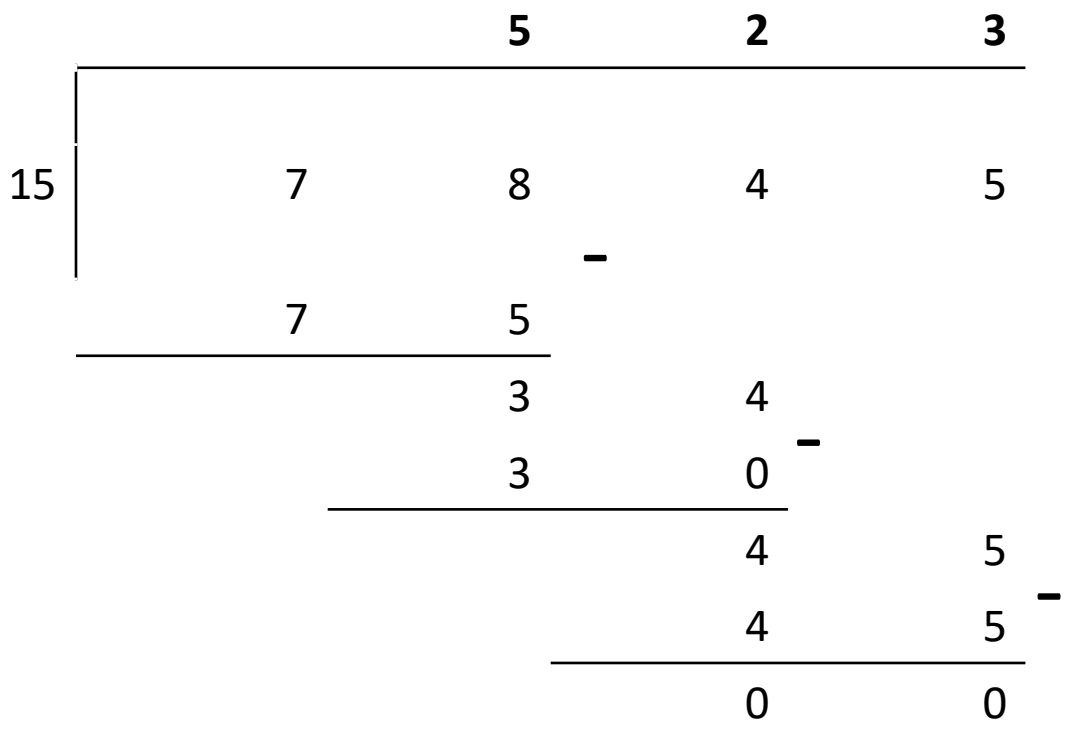
Two-digit short division

		5	**2**	**3**
15	7	$^{7}8$	$^{3}4$	$^{4}5$

15
30
45
60
75
90
105
120
135
150

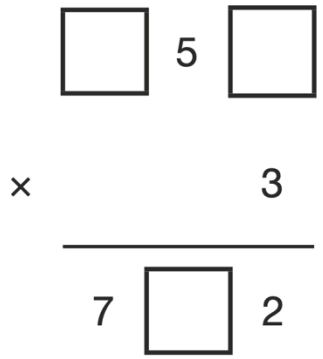
Long division

Old-fashioned long division

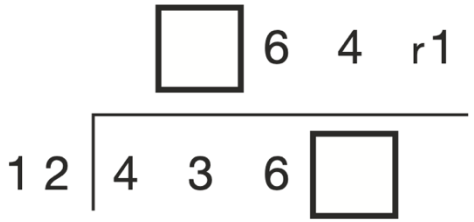


Sample questions

Write the three missing digits to make this multiplication correct.



19 Complete this division.



2 marks

Sample questions

Here are four numbers.

40 60 64 100

Use each number **once** to complete these statements.

☐ is a square number.

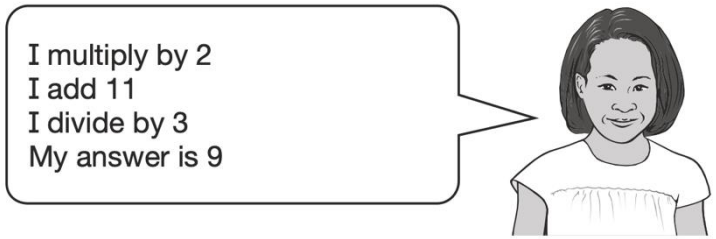
☐ is a cube number.

☐ is a common multiple of **4** and **5**

☐ is a common factor of **80** and **120**

2 marks

Emma thinks of a number. She says,



What number did Emma think of?

☐

1 mark

Sample questions

A box holds 40 packets of envelopes.

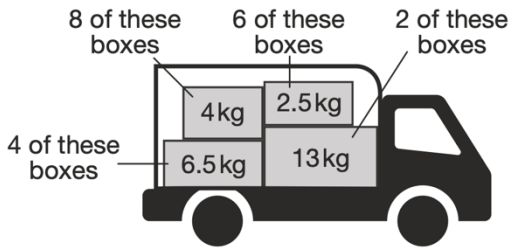
Each packet holds 25 envelopes.

How many **envelopes** does the box hold?

1 mar

13 There are 20 boxes on a truck.

The boxes are in 4 different sizes.



What is the **total mass** of the 20 boxes on the truck?

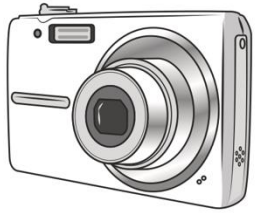
Show your method

kg

2 marks

Sample questions

18 Layla wants to buy a camera that costs £65



For the first 10 weeks, she saves £2 each week.

Then she saves £3 each week.

How many weeks **altogether** does it take Layla to save £65?

Show your method

weeks

2 marks

21 A band holds a concert for charity.

The tickets cost £27 each.

They sell 635 tickets.

They pay £3,180 to use the hall.

They give one-third of the **remaining** amount to charity.

How much money does the band give to charity?

Show your method

£

3 marks

Any questions?