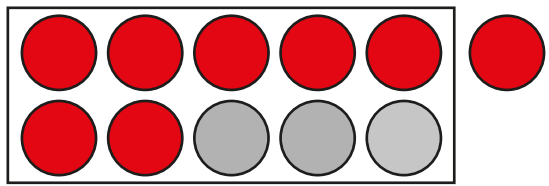


4 + 1, 6 + 3, 10 + 4
Number facts
Single digit numbers
Doubles
Ten and single digits

I just knew it!

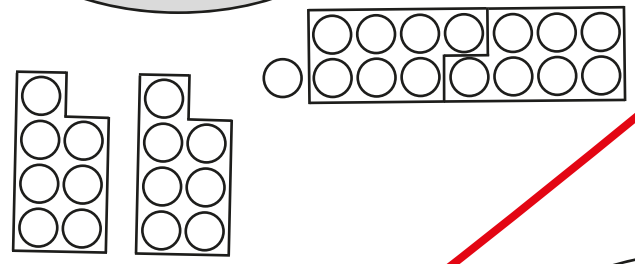
3 + 7
Use known addition facts

If I know $3 + 7 = 10$
then I know
 $3 + 8 = 11$
because it is 1 more

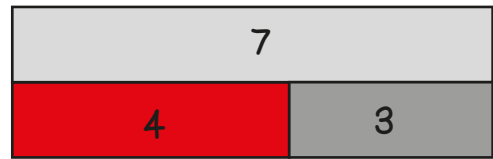
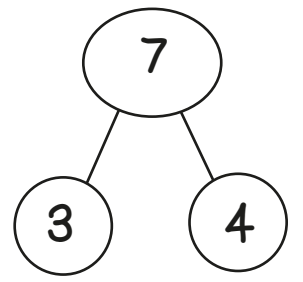
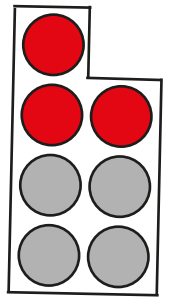


7 + 8
Use near doubles

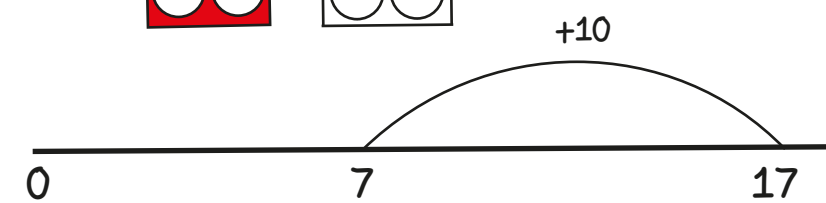
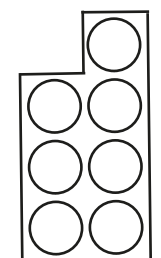
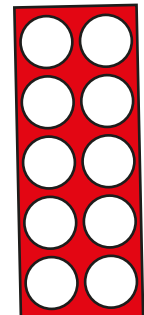
If I know $7 + 7 = 14$
then I know
 $7 + 8 = 15$
because it is 1 more



7 = 3 + 4
Secure addition bonds of
single digits and ten



7 + 10
Add ten

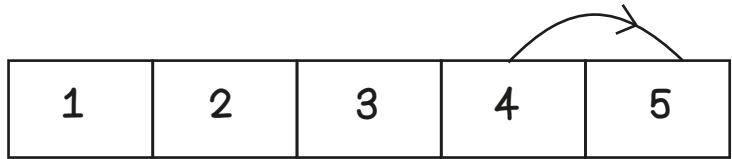


How shall I add?

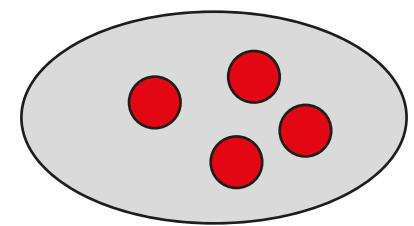
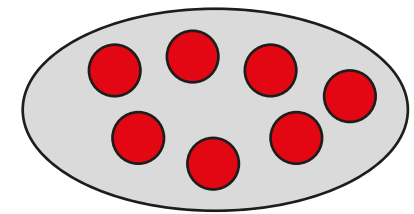
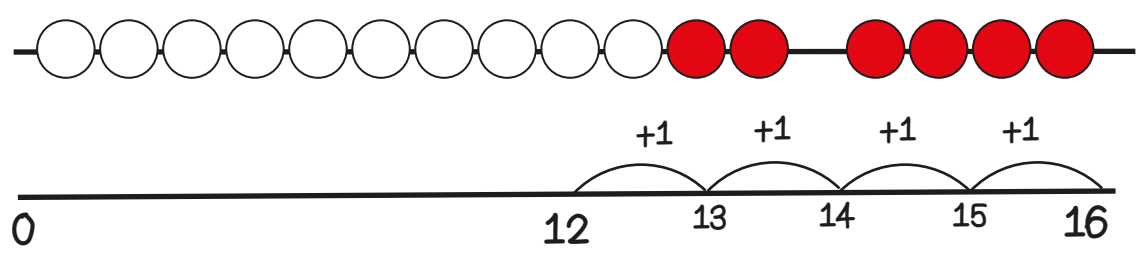
Notice the relationships

24 + 1
Find one more

1 more than 4 is 5
1 more than 14 is 15
1 more than 24 is 25



12 + 4
Counting on in 1s



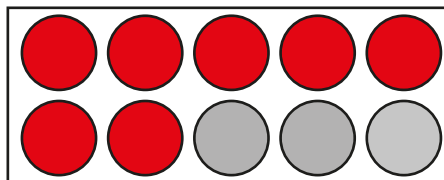
7 + 4
Count all

5 - 1, 7 - 3, 10 - 6
Number facts
Single digit numbers
Teens subtract single digits

I just knew it!

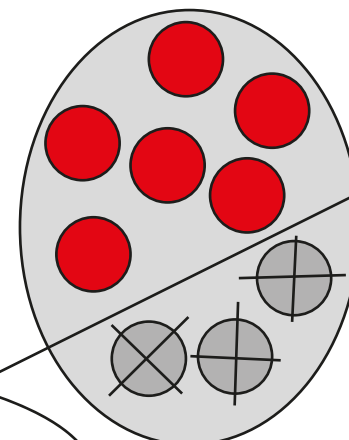
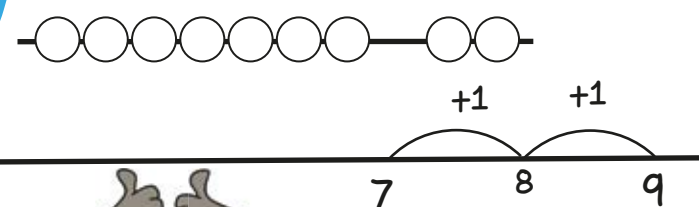
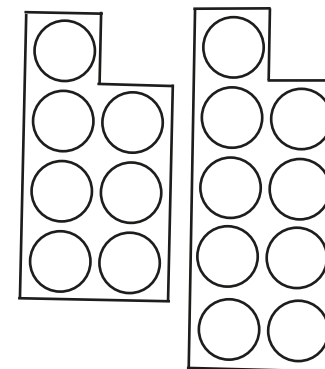
3 + 7
Use known addition facts
to derive subtraction facts

If I know $3 + 7 = 10$
then I know
 $10 - 3 = 7$

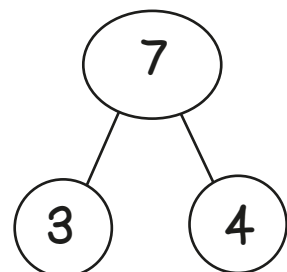
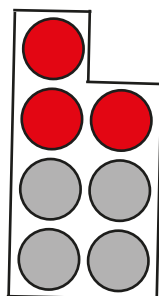


9 - 7
Find the difference between
two numbers

9 is 2 more than 7
7 is 2 less than 9 so
the difference
between 7 and 9 is 2



7 - 3 = 4
Secure subtraction facts of
single digits and ten



7	
4	3

How shall I subtract?



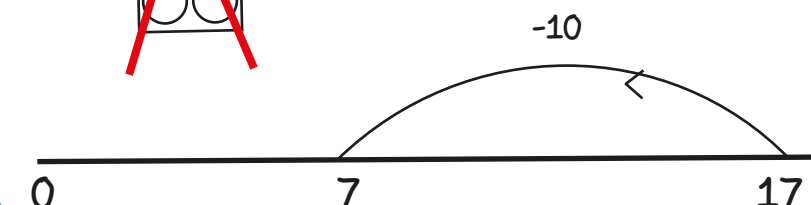
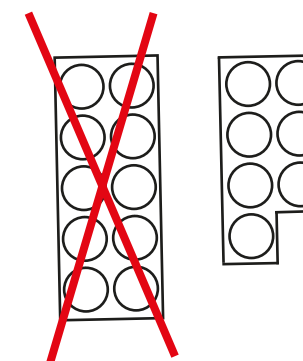
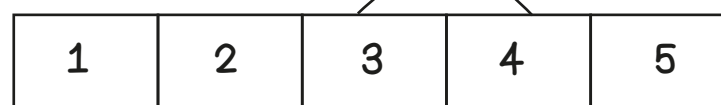
9 - 3
Take away

17 - 10
Take away ten

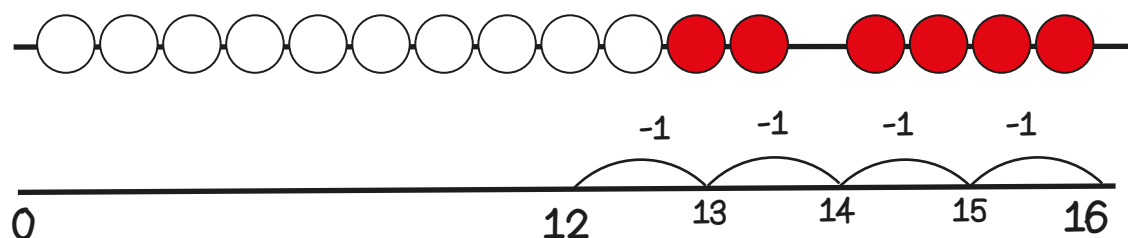
Notice the relationships

23 - 1
Find one less

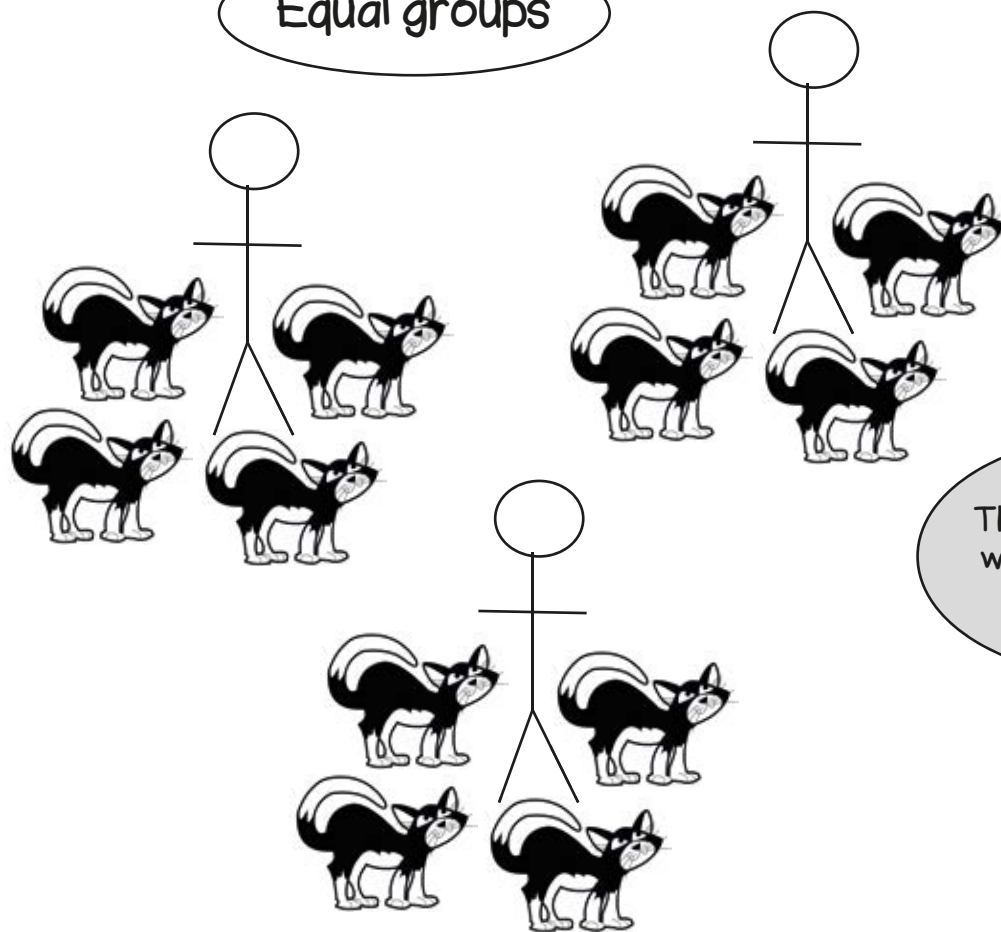
1 less than 4 is 3
1 less than 14 is 13
1 less than 24 is 23



16 - 4
Counting back in 1s

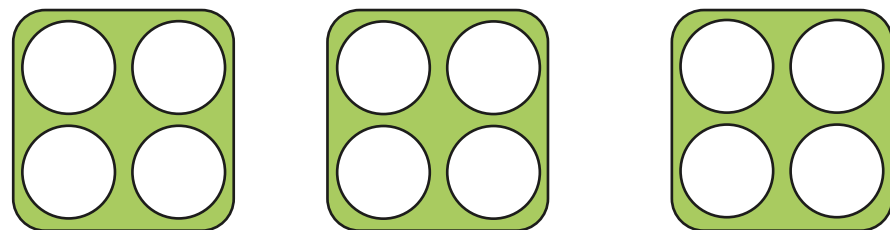
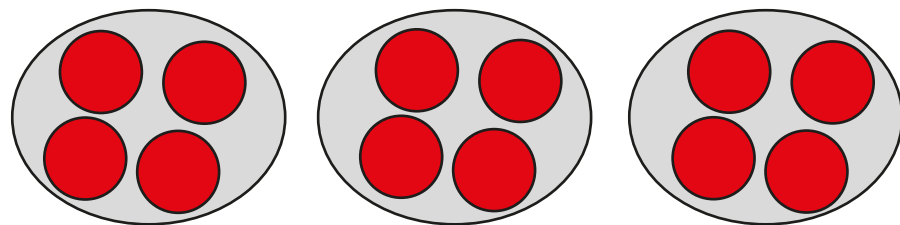


Equal groups



Count in ones

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



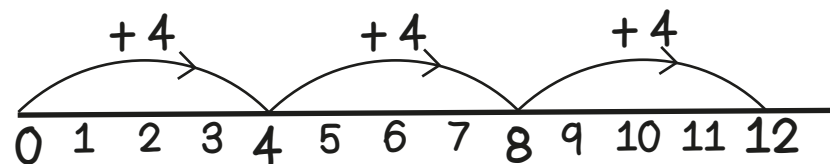
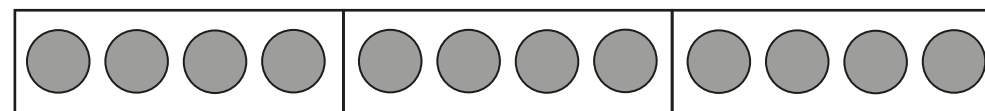
3 people each have 4 cats.
How many cats are
there in total?

There are 3 groups
with 4 cats in each
group

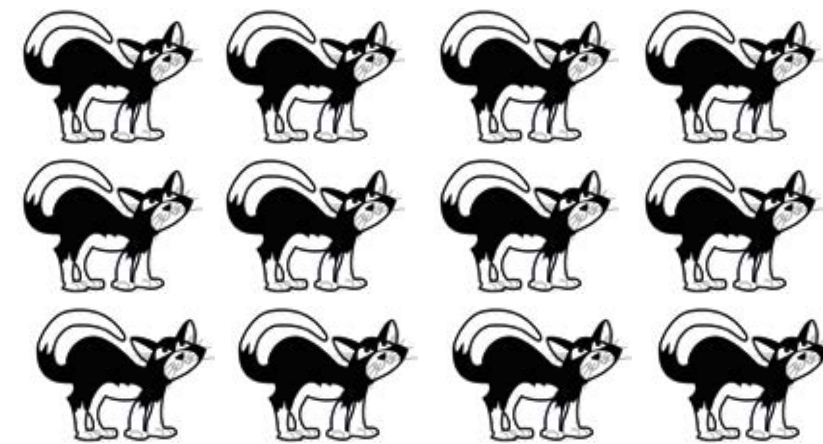
How shall I multiply?



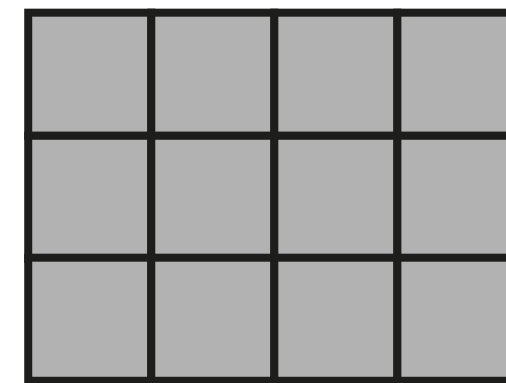
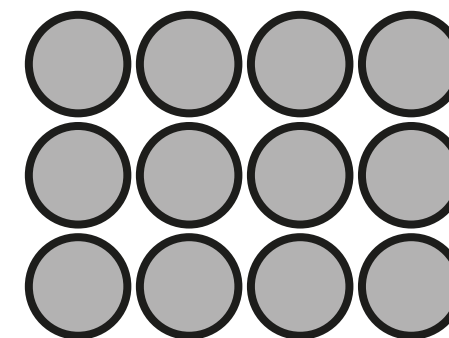
Repeated addition



$$4 + 4 + 4 = 12$$



Arrays



Sharing

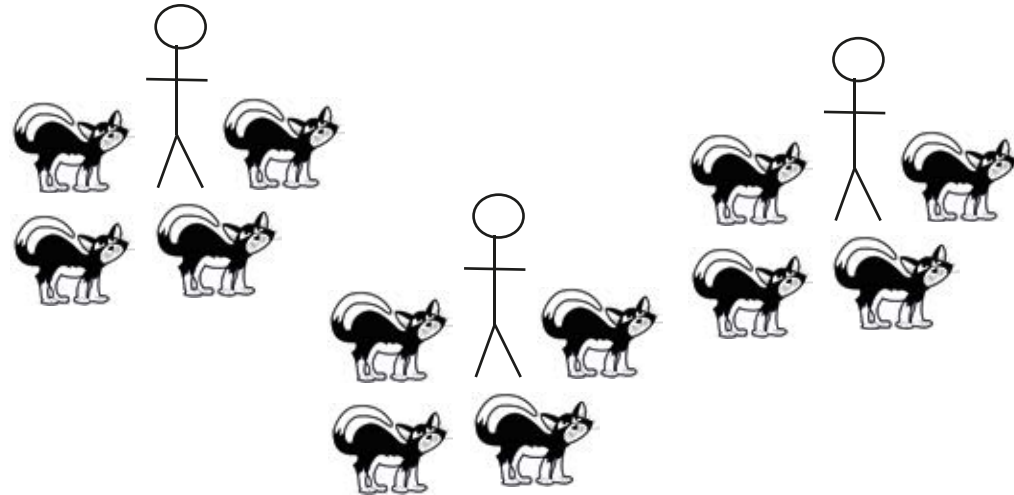
12 shared into
3 equal groups

$$12 \div 3 = 4$$

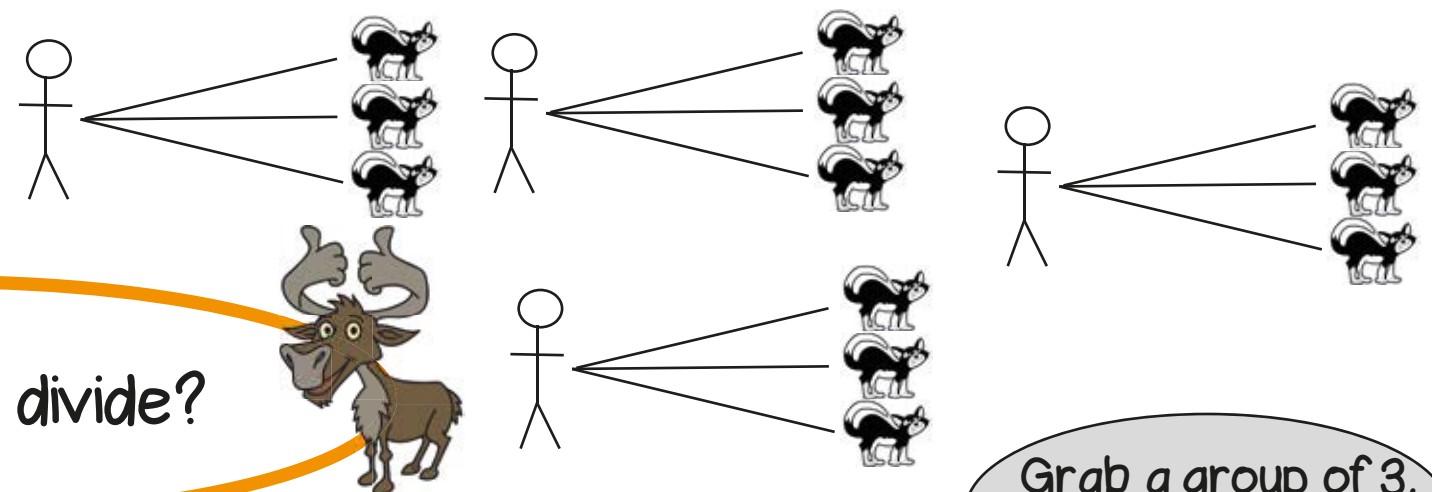
Grouping

How many groups
of 3 are there in 12?

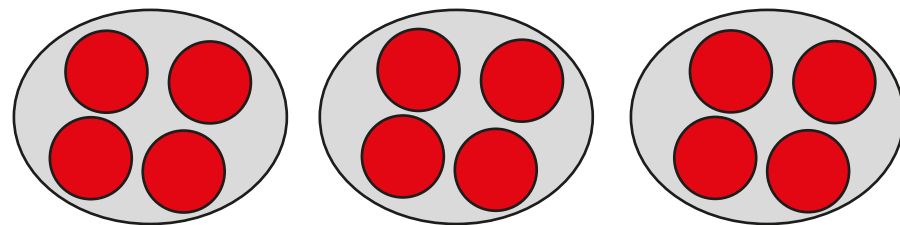
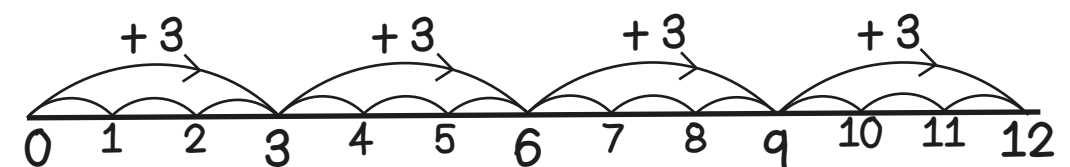
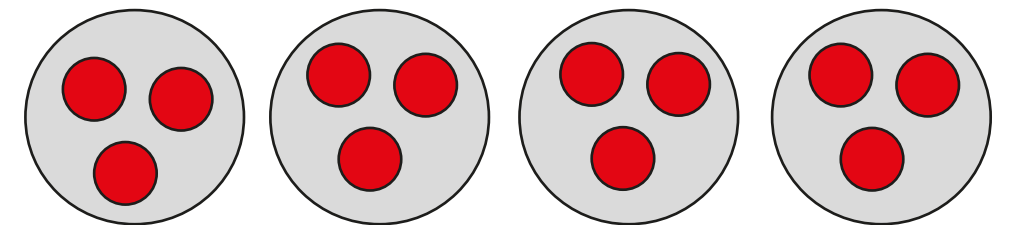
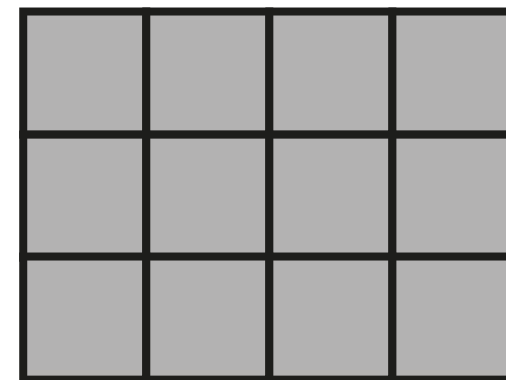
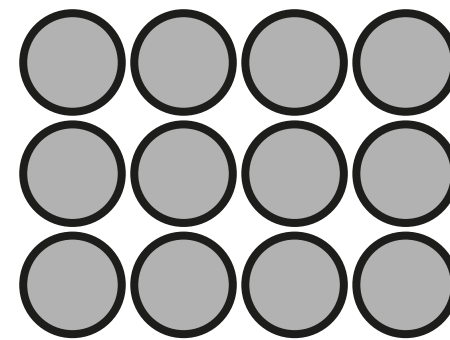
There are 12 cats.
Three people each have the same number of cats.
How many do they have each?

1 for you, 1 for you,
1 for you...

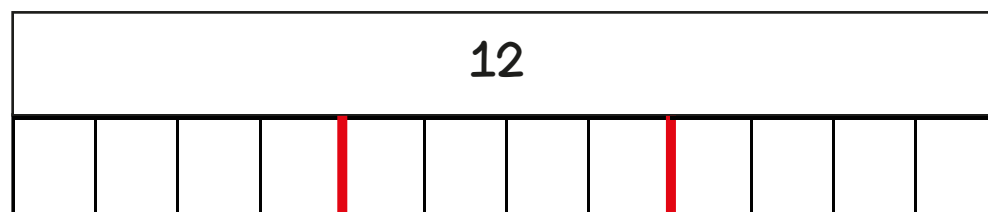
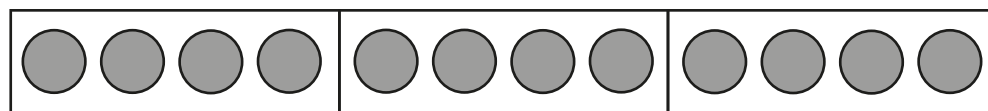
There are 12 cats.
Each person owns 3 cats.
How many people are there?

Grab a group of 3,
grab a group of 3...

How shall I divide?

12 can be described as
3 columns of 4
or 4 rows of three

Bar model



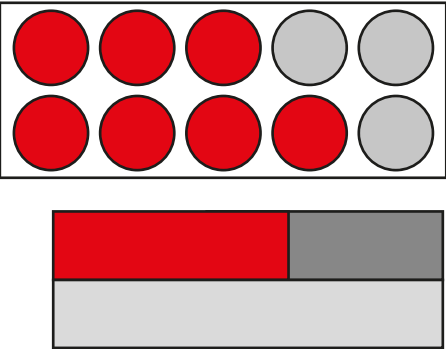
8 + 7, 9 + 9, 14 + 3
Number facts
Single digit numbers
Doubles
Teens and single digits

I just knew it!

13 + 17
Use known facts
30 + 70

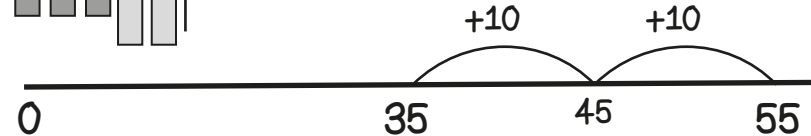
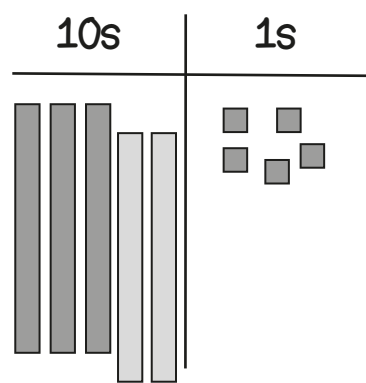
If I know 3 + 7 = 10
then I know
3 tens + 7 tens = 10 tens

If I know 3 + 7 = 10
then I know
13 + 17 is 2 tens more

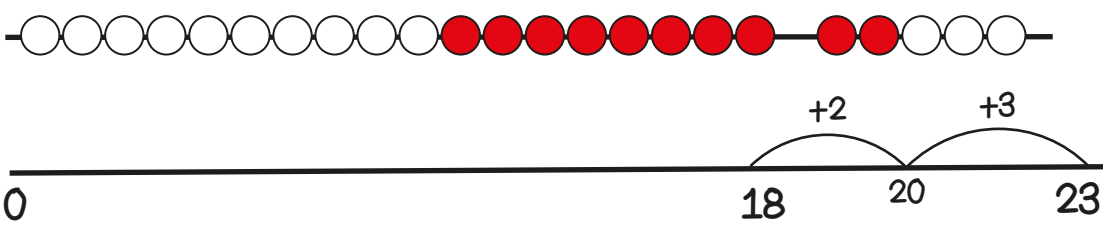


35 + 20
Add multiples of ten

If I know 3 + 2 = 5
then I know
3 tens + 2 tens = 5 tens
so 30 + 20 = 50



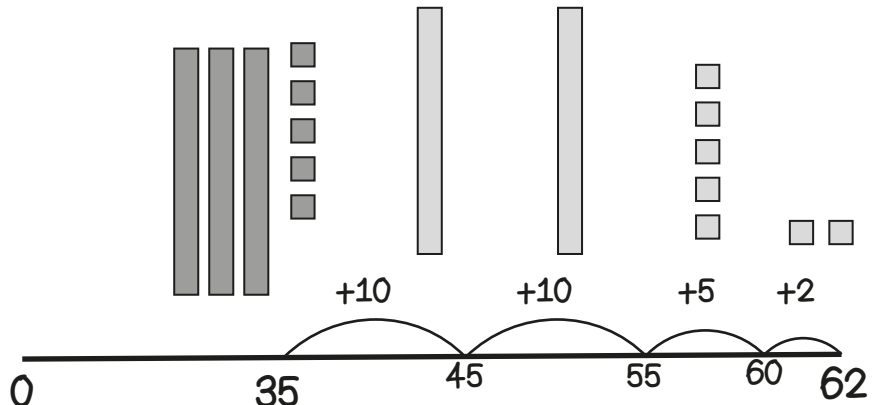
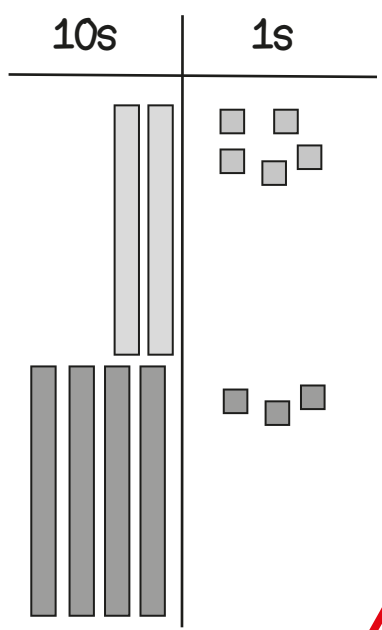
5 + 18
Greatest number first
then bridge



How shall I add?

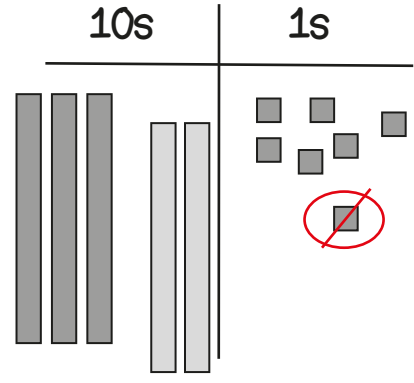
25 + 43
Partition and recombine

25 + 43
 $20 + 5 + 40 + 3$
 $60 + 8 = 68$

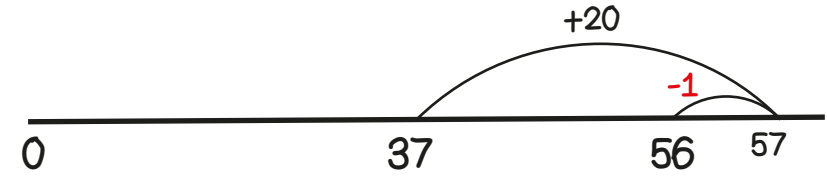


35 + 27
Count on in tens then ones

37 + 19
Round then adjust



Add 20 then subtract 1

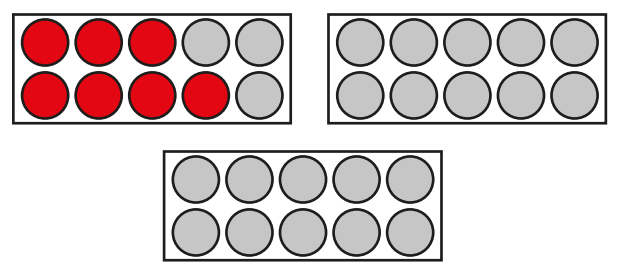
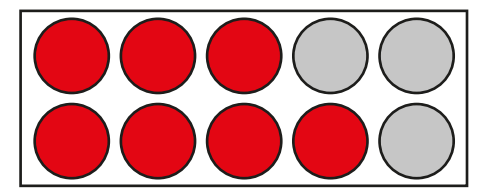


9 - 4, 13 - 5, 18 - 9
Number facts
Single digit numbers
Halves
Teens and single digits

I just knew it!

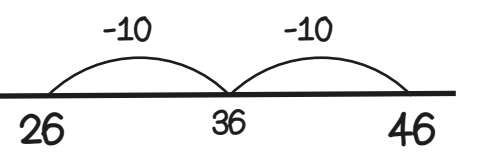
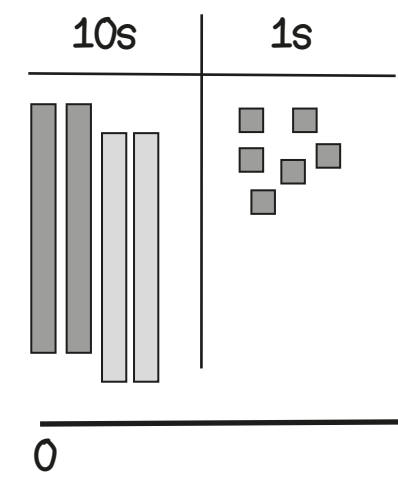
30 - 7
Use known facts
100 - 70

If I know 10 - 7 = 3
then I know
30 - 7 is 2 tens and 3

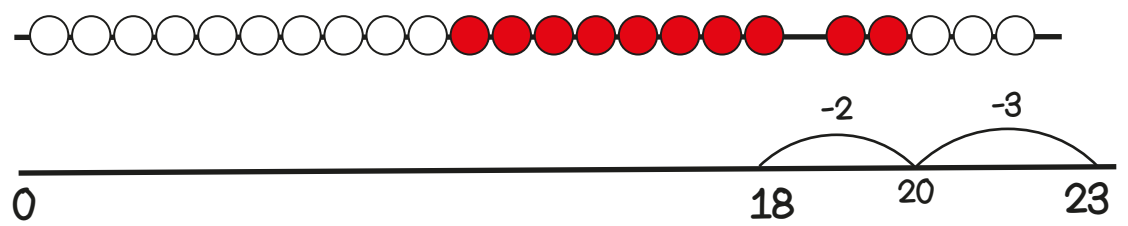


46 - 20
Count back: multiples of ten

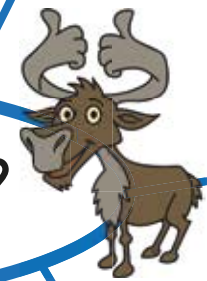
If I know 4 - 2 = 2
then I know
4 tens - 2 tens = 2 tens
so 40 - 20 = 20



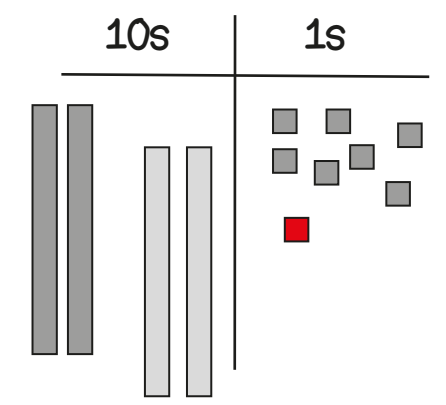
23 - 5
Count back: bridge through
a multiple of ten



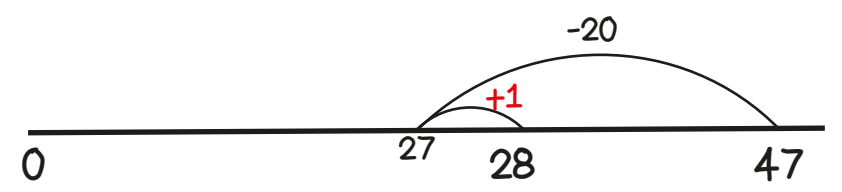
How shall I subtract?



47 - 19
Round then adjust

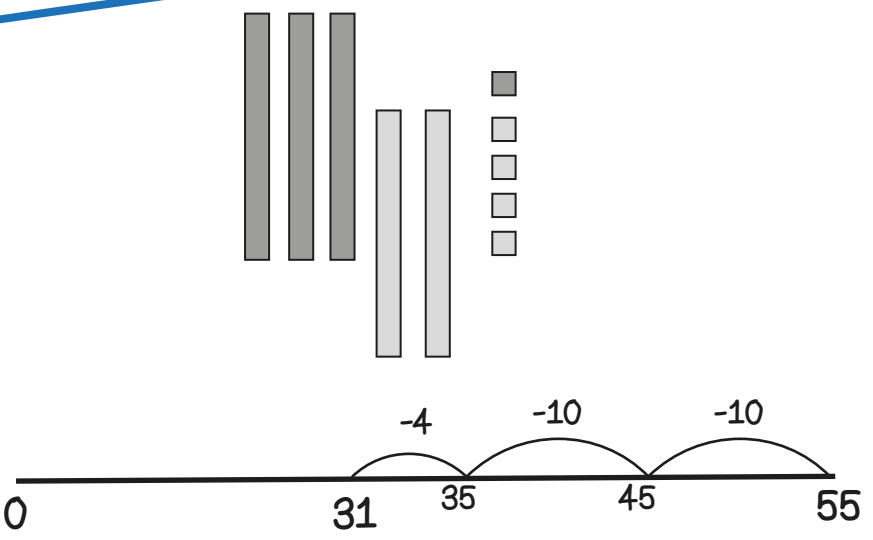
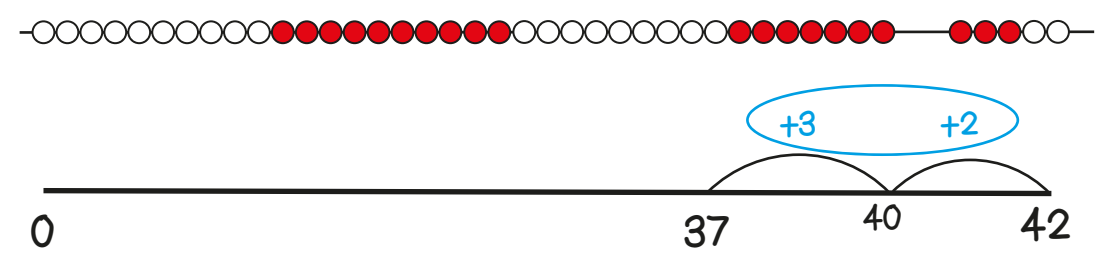
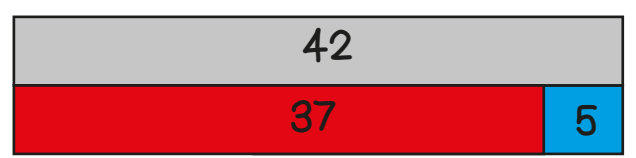


Take away 20 then **add 1**



42 is 5 more than 37,
37 is 5 less than 42 so
the difference between
37 and 42 is 5

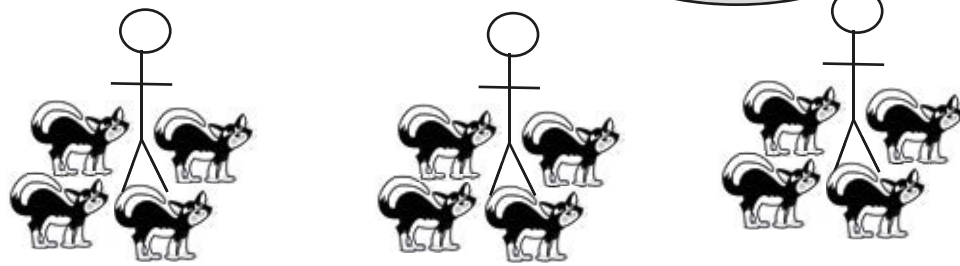
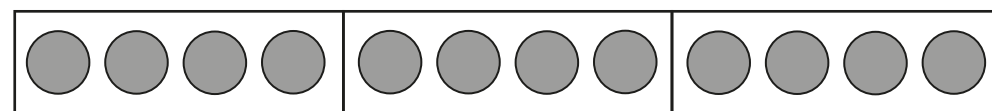
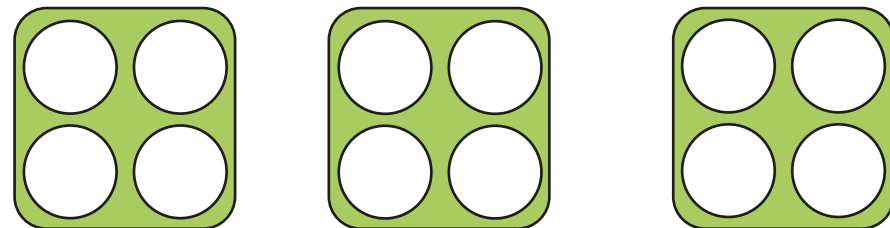
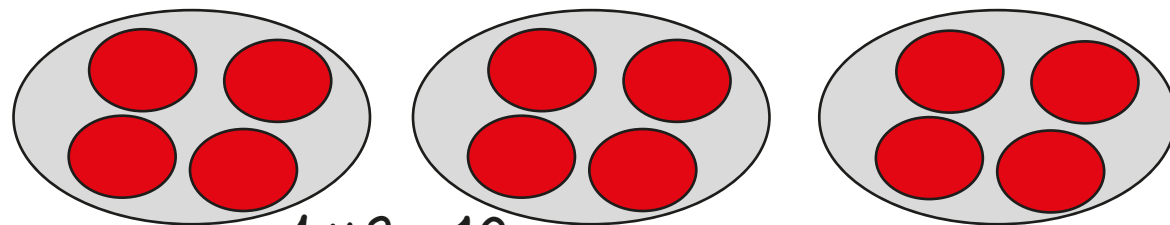
42 - 37
Find the difference between
two numbers



55 - 24
Count back in tens then ones



There are 3 groups
with 4 cats in each
group


$$4 \times 3 = 12$$


4

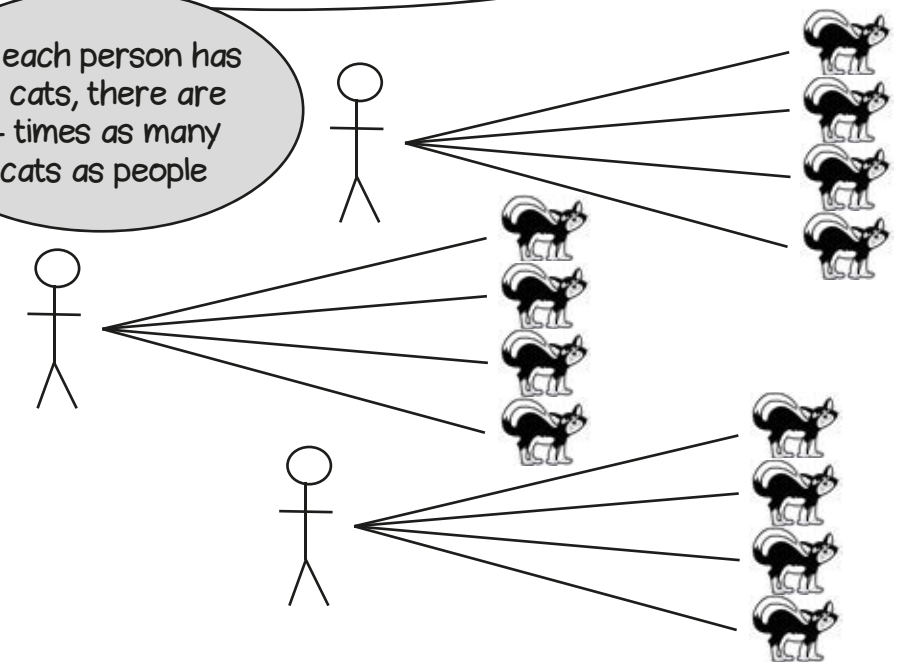
+ 4

0 4 8 12

$$4 + 4 + 4 = 12$$

Recall of 2x, 5x and 10x tables

If each person has 4 cats, there are 4 times as many cats as people



People	Cats
1	4
2	8
3	12

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

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

2, 4, 6, 8, 10, 12

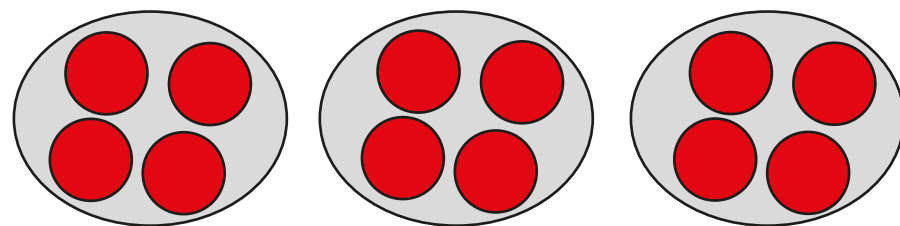
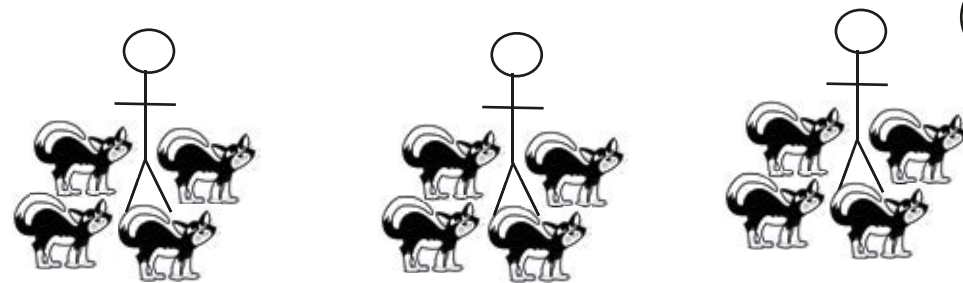
If 2×3 is 6, then
 4×3 is double 6.

© Liz Hopkins

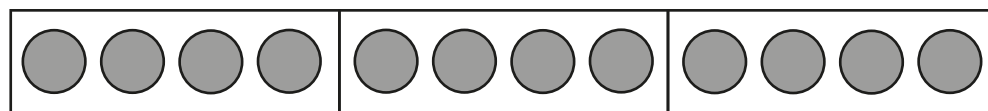
Sharing

12 shared into 3 equal groups

There are 12 cats.
Three people each have the same number of cats.
How many do they have each?



Bar model



12		
4	4	4

Link to fractions.
One third of 12 is 4

$$12 \div 3 = 4$$

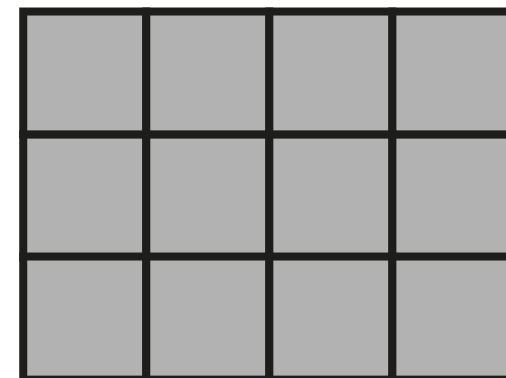
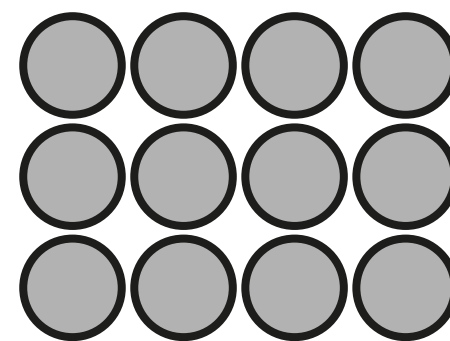
Recall and use 2x, 5x and 10x tables

1 for you, 1 for you,
1 for you...

Grab a group of 3,
grab a group of 3...

How shall I divide?

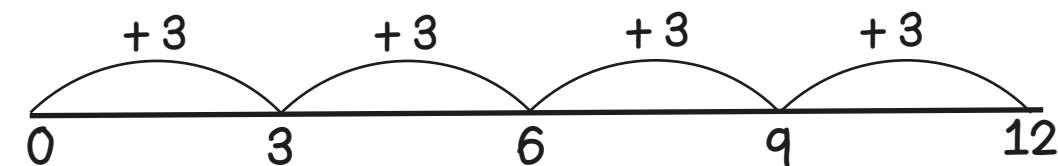
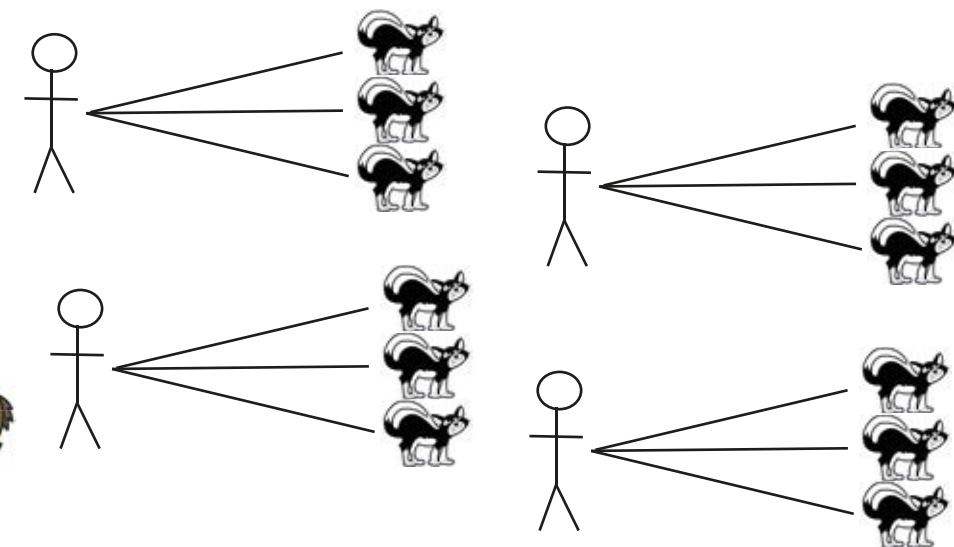
12 can be described as
3 columns of 4
or 4 rows of three



Grouping

How many groups of 3 are there in 12?

There are 12 cats.
Each person owns 3 cats.
How many people are there?

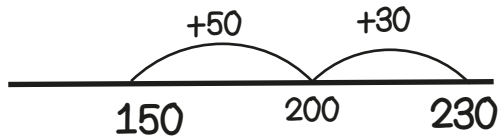
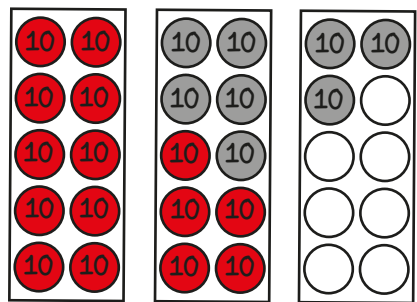


If I know $3 \times 4 = 12$
then I know $12 \div 3 = 4$

8 + 7, 9 + 9, 14 + 3
Number facts
Single digit numbers
Doubles
Tens to make 100

I just knew it!

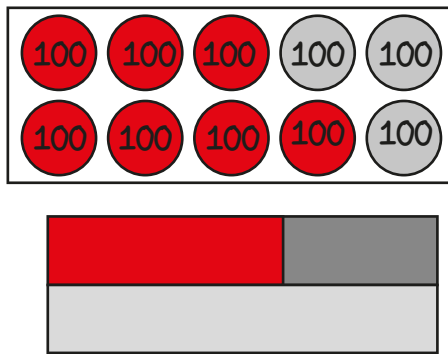
150 + 80
Bridging boundaries



243 + 7
Use known facts
300 + 700

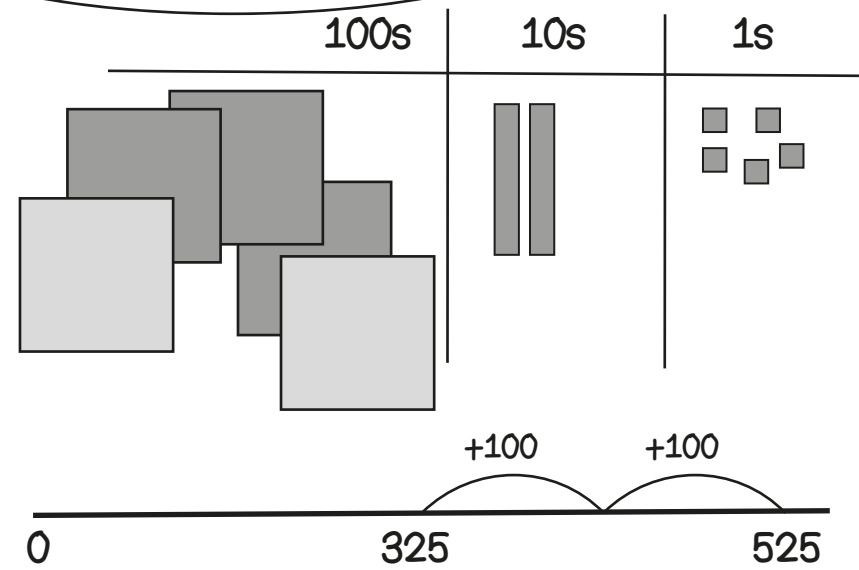
If I know 3 + 7 = 10
then I know
3 hundreds + 7 hundreds
= 10 hundreds

If I know 3 + 7 = 10
then I know
243 + 7 makes the
next multiple of 10



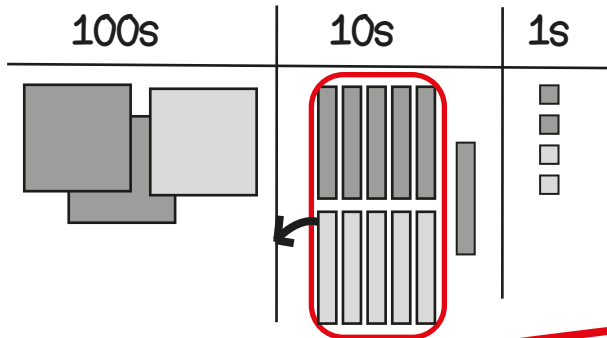
325 + 200
Add multiples of ten and hundred

If I know 3 + 2 = 5
then I know
3 hundreds + 2 hundreds
= 5 hundreds



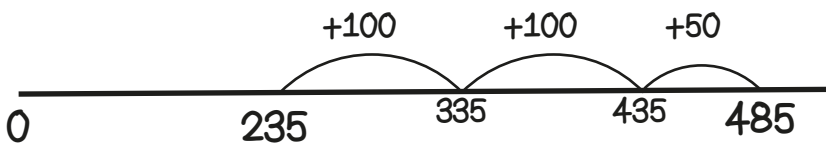
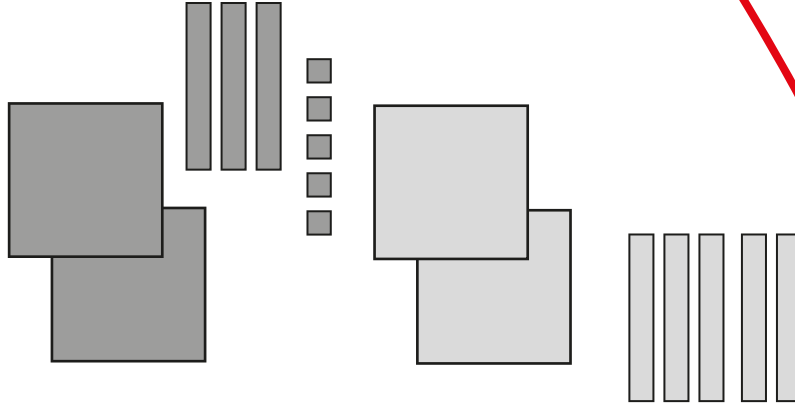
How shall I add?

262 + 152
Formal written method

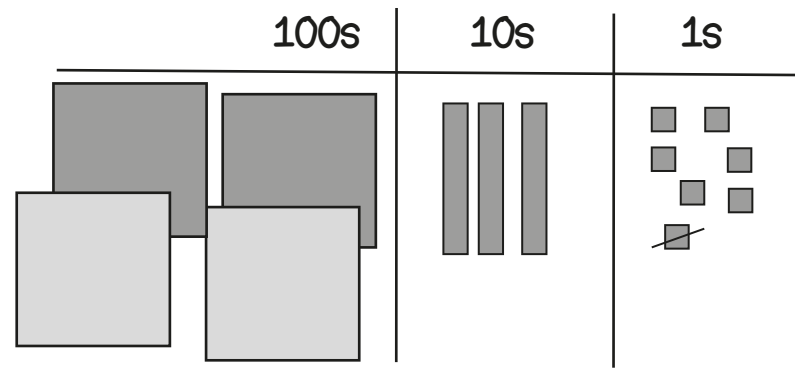


6 tens add 5 tens
= 11 tens or 110

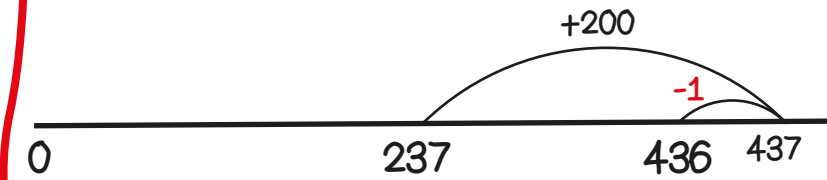
$$\begin{array}{r} 262 \\ + 152 \\ \hline 414 \\ \hline 1 \end{array}$$



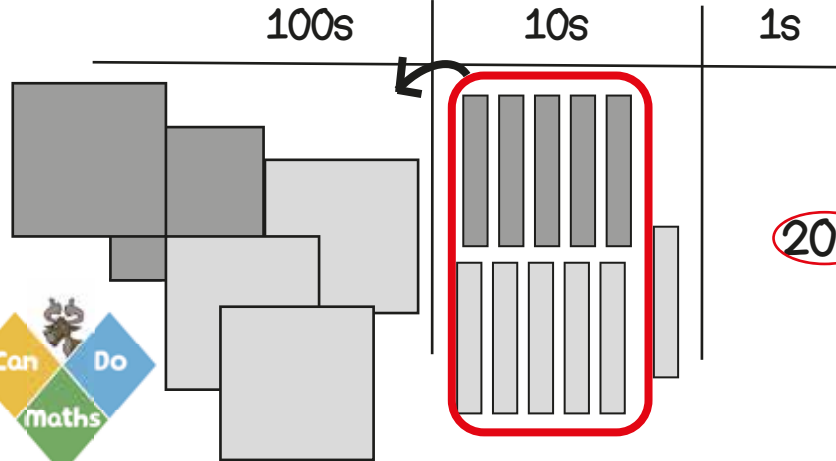
237 + 199
Round then adjust



Add 200 then **subtract 1**



250 + 360
Partition and recombine



$$\begin{array}{l} 200 + 50 + 300 + 60 \\ 500 + 110 = 610 \end{array}$$

235 + 250
Count on in hundreds then tens



15 - 8, 18 - 5
Number facts
Single digit numbers
Teens and single digits

I just knew it!

240 - 7
Use known facts
1000 - 700

If I know $10 - 7 = 3$
then I know
10 hundreds - 7 hundreds
= 3 hundreds

525 - 300
Take away multiples of ten
and a hundred

If I know $5 - 3 = 2$
then I know
5 hundreds - 3 hundreds
= 2 hundreds

100s | 10s | 1s

225 525

-100 -100 -100

230 - 80
Bridging boundaries
by counting back in efficient steps

$230 - 30 - 50 = 150$

0 - 7 = 3

If I know $10 - 7 = 3$
then I know
any multiple of 10,
take away 7 leaves
3 in the ones.

How shall I subtract?

234 - 152
Formal written method

$$\begin{array}{r} 234 \\ - 152 \\ \hline 182 \end{array}$$

$234 = 100 + 130 + 4$

335 - 326
Find the difference
between two numbers

335 is 9 more than 326
326 is 9 less than 335
so the difference between
them is 9

435 - 199
Round then adjust

Take away 200 then **add 1**

100s | 10s | 1s

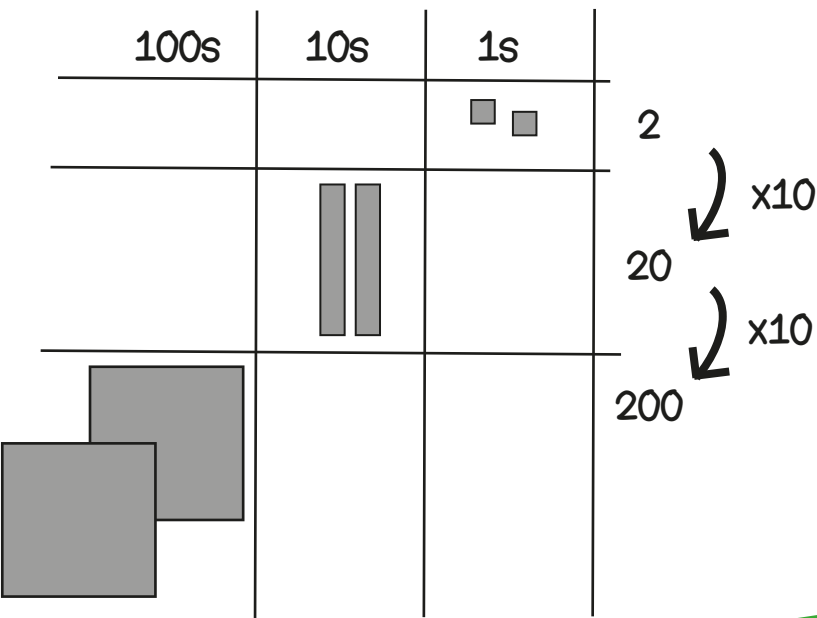
235 436 435

-200 +1



Rapid recall of
2x, 5x, 10x (year 2)
3x, 4x, 8x (year 3)
multiplication tables

Multiply by 10

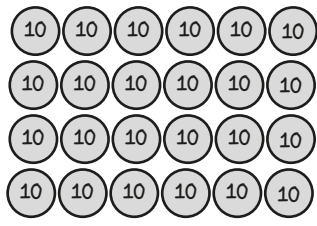
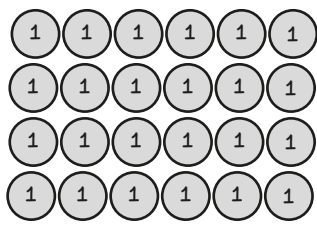


6 x 4
Use known facts
and place value

$6 \times 4 = 24$
 $60 \times 4 = 240$
 $6 \times 40 = 240$

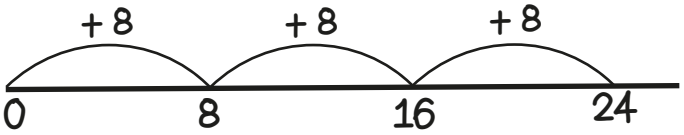
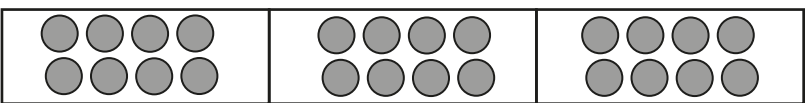
$6 \times 10 \times 4$
 $= 24 \times 10$

40 is ten times
greater than 4



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

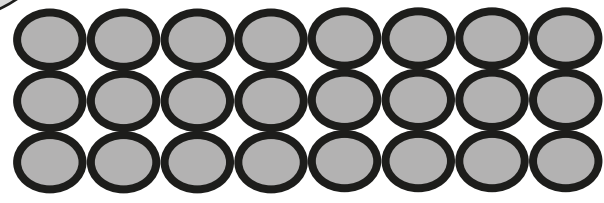
8 x 3
Repeated addition



How shall I multiply?

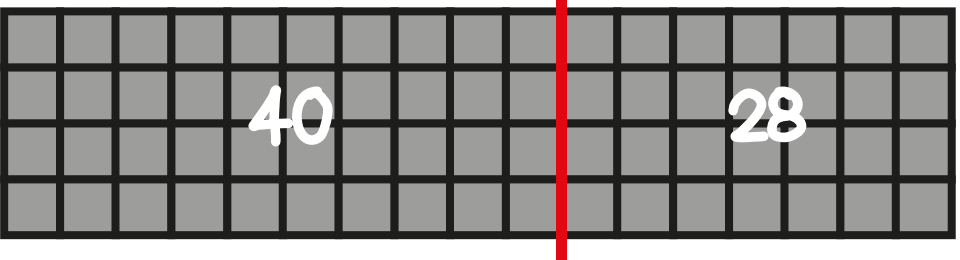
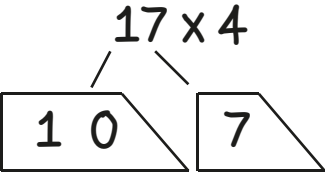


Arrays
If I know 3 x 8
then I know 8 x 3



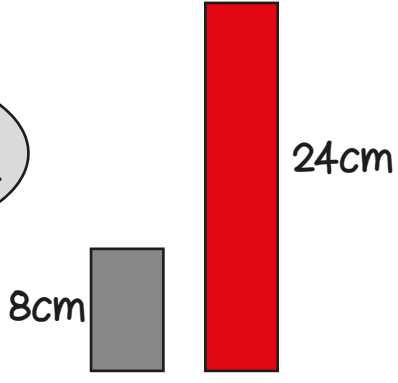
17 x 4
Partition and recombine

$10 \times 4 + 7 \times 4$
 $40 + 28 = 68$



Scaling

The red tower is
3 times taller
than the grey tower



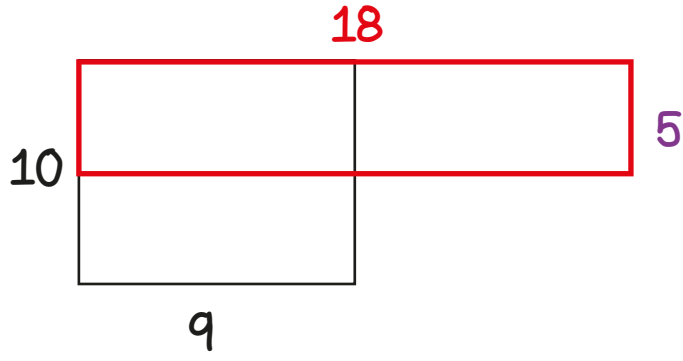
17 x 4
Formal written method

	10	7
4	40	28

17
 $\times 4$
 68
 2

5 x 18
Double and halve

5×18
 $= 5 \times 2 \times 18 \div 2$
 $= 10 \times 9$
 $= 90$



Known facts:
Use 2x, 5x, 10x (year 2)
3x, 4x, 8x (year 3)
multiplication tables to
derive division facts

$24 \div 4$
Use known facts
and place value

240 is ten times
greater than 24

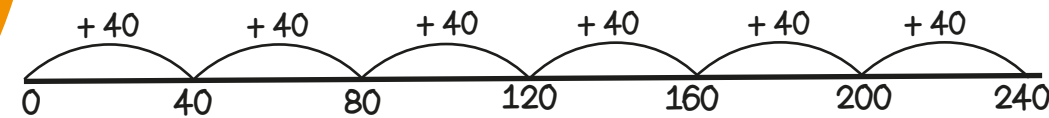
$24 \div 4 = 6$
 $240 \div 40 = 6$
 $240 \div 4 = 60$

24 biscuits shared between
4 people means they will get
6 biscuits each.
If there are 10 times as many
people and 10 times as many
biscuits, how many biscuits
each now?

How many 40s
are there in 240?

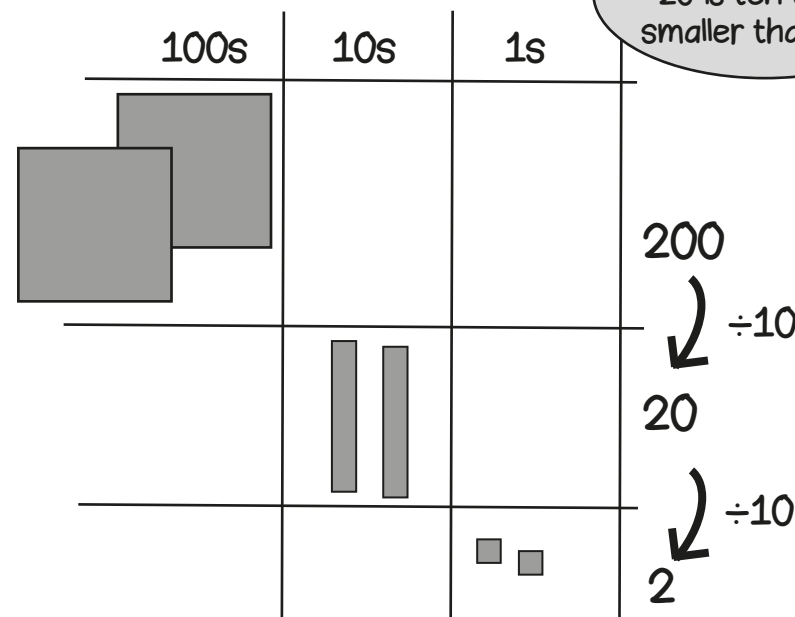
$240 \div 40$
Repeated addition

$240 \div 40 = 6$
How many steps of 40 make 240?



$200 \div 10$
Divide by 10

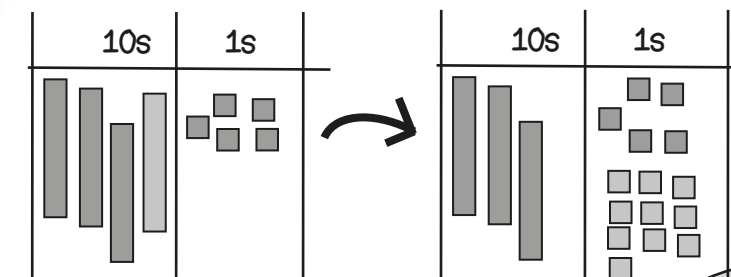
$200 \div 10 = 20$ so
20 is ten times
smaller than 200



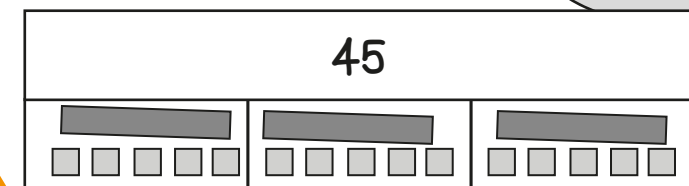
How shall I divide?



$45 \div 3$
Sharing equally



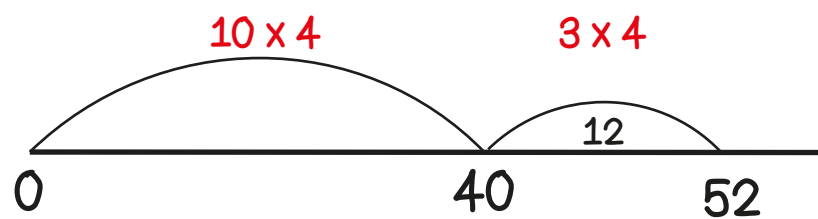
Ten for you,
ten for you,
ten for you...



$52 \div 4$
Partition and recombine

ten lots and the rest

$52 \div 4$
 $40 \div 4 = 10$
 $12 \div 4 = 3$
 $10 + 3 = 13$



$42 \div 6$
Double and halve

If there are half as many
biscuits and half as many
people...

$42 \div 6 = 21 \div 3$

42					
7	7	7	7	7	7
21					
7	7	7			

Link to fractions



0.9 + 0.9, 74 + 26
Number facts
Single digit decimals
Doubles
Bonds of 100

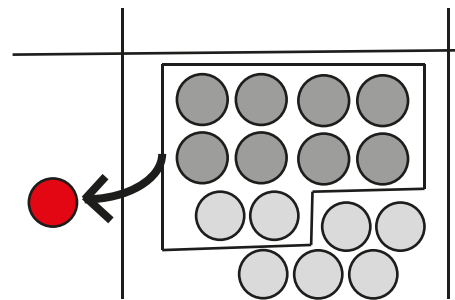
I just knew it!

7 + 8
Use known facts

If I know 7 + 8 = 15
then I know
0.7 + 0.8 = 1.5

$$70 + 80 = 150$$

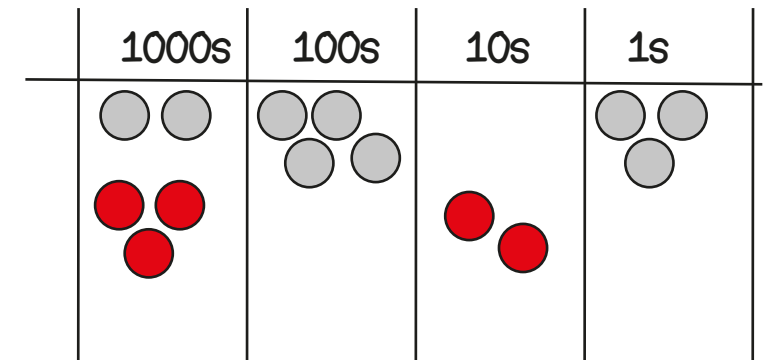
$$700 + 800 = 1,500$$



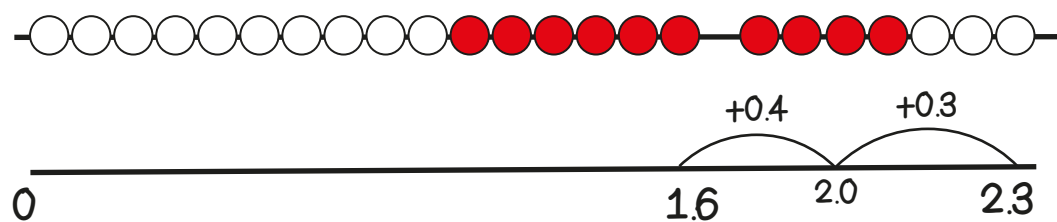
2,403 + 3,020
Use place value to add

If I know 2 + 3 = 5
then I know
2000 + 3000 = 5 000

I have noticed,
one number has no
hundreds or ones, the
other has no tens.



1.6 + 0.7
Bridge through boundaries
by counting in efficient steps



How shall I add?



5,250 + 2,360
Partition and recombine

$$5000 + 200 + 50 + 2000 + 300 + 60$$

$$7000 + 500 + 110 = 7610$$

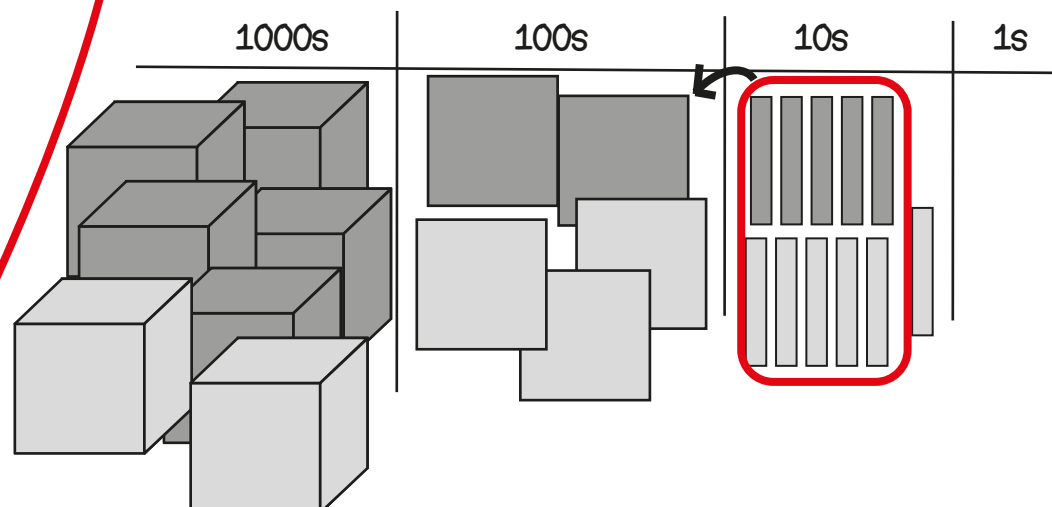
5,748 + 3,374
Formal written method

Exchange ten of
these for one of
those!

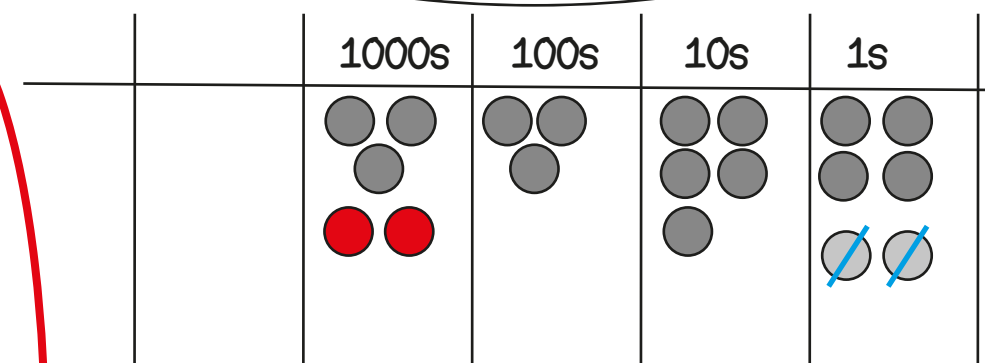
$$\begin{array}{r} 5,748 \\ + 3,374 \\ \hline 9,122 \end{array}$$

Regroup and rename

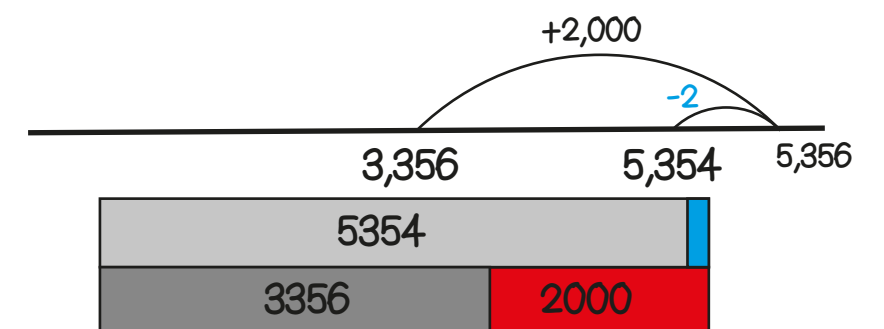
1000s	100s	10s	1s



3,356 + 1,998
Round then adjust



Add 2,000 then take away 2



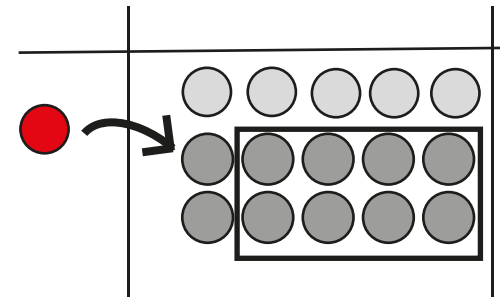
13 - 5, 1.8 - 0.8
Number facts
Single digit numbers
Halves
Wholes and tenths

I just knew it!

15 - 8 = 7
Use known facts

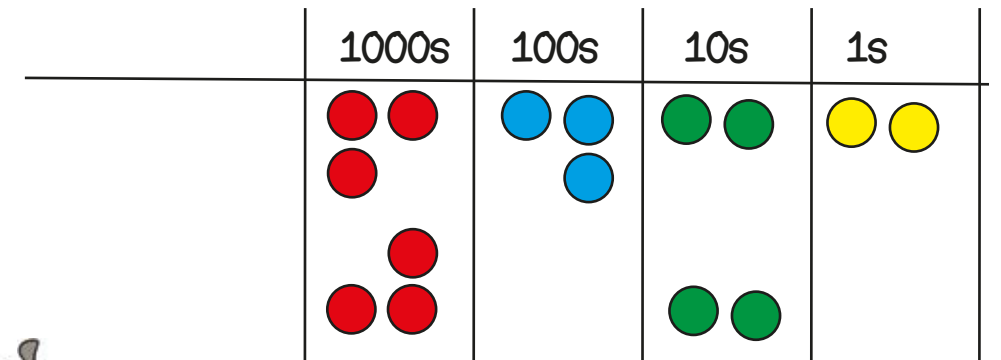
If I know 15 - 8 = 7
then I know
1.5 - 0.8 = 0.7

150 - 80 = 70
1500 - 800 = 700



6,342 - 3,020
Use place value to subtract

By using place value
counters it is easy to
see how to take away



1.5 - 0.7
Bridge through boundaries
by counting in efficient steps



How shall I subtract?



5,352 - 2,136
Formal written method

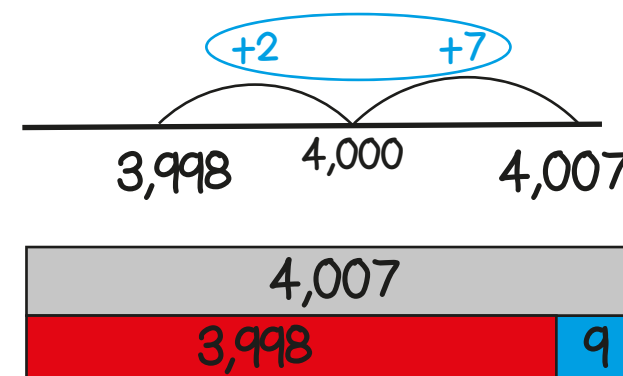
Exchange ten of
these for one of
those!

$$\begin{array}{r} 5,352 \\ - 2,136 \\ \hline 2,916 \end{array}$$

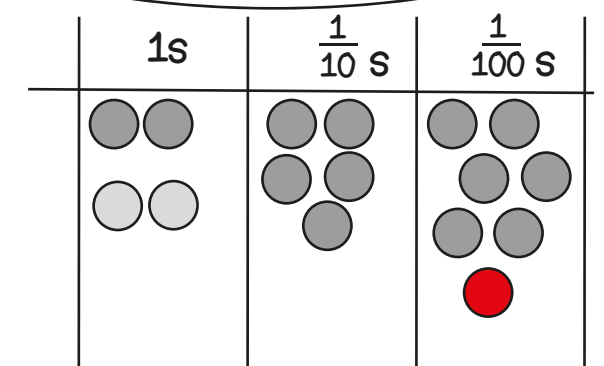
Regroup and rename

1000s	100s	10s	1s

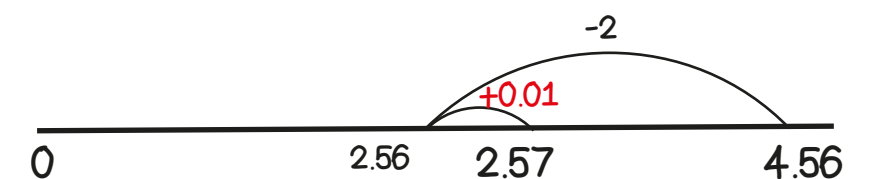
4007 - 3998
Find the difference between
two numbers



4.56 - 1.99
Round then adjust



Take away 2 then add one hundredth



Known facts:
Rapid recall of all
multiplication tables
up to 12 x 12

2.34×100
Multiply by 10, 100

1000s	100s	10s	1s	$\frac{1}{10}$ s	$\frac{1}{100}$ s
			● ●	● ● ●	● ● ● ●
		● ●	● ● ●	● ● ●	
	● ●	● ● ●	● ● ●		

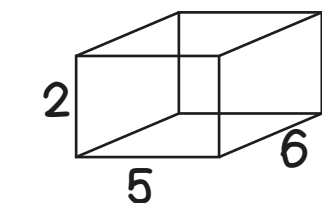
2.34
23.4
234

x10
x10
x100

45×6
Use factors and
commutativity

Write as factors
then re-order

$$\begin{aligned} 45 \times 6 &= 5 \times 9 \times 6 \\ &= 5 \times 6 \times 9 \\ &= 30 \times 9 \\ &= 270 \end{aligned}$$



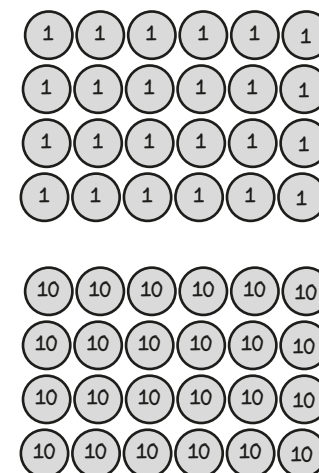
$$\begin{aligned} 2 \times (5 \times 6) &= (2 \times 5) \times 6 \\ 2 \times 30 &= 10 \times 6 \end{aligned}$$

6×4
Use known facts
and place value

$$\begin{aligned} 6 \times 4 &= 24 \\ 60 \times 4 &= 240 \\ 60 \times 40 &= 2400 \end{aligned}$$

$$6 \times 10 \times 4 \times 10 = 24 \times 100$$

40 is ten times
greater than 4



How shall I multiply?

7×36
Use the
distributive law

$$\begin{aligned} 7 \times 36 &= 7 \times 30 + 7 \times 6 \\ &= 210 + 42 \\ &= 252 \end{aligned}$$

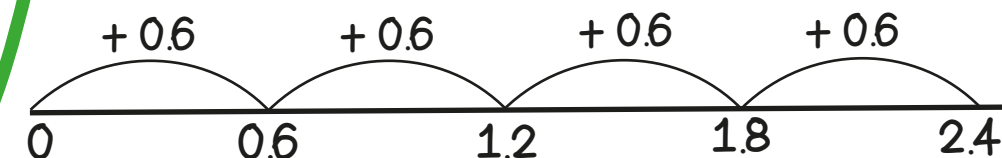
	30	6
7	210	42

$$\begin{aligned} 200 &\times 7 = 1400 \\ 30 &\times 7 = 210 \\ 6 &\times 7 = 42 \\ 1400 + 210 + 42 &= 1652 \end{aligned}$$

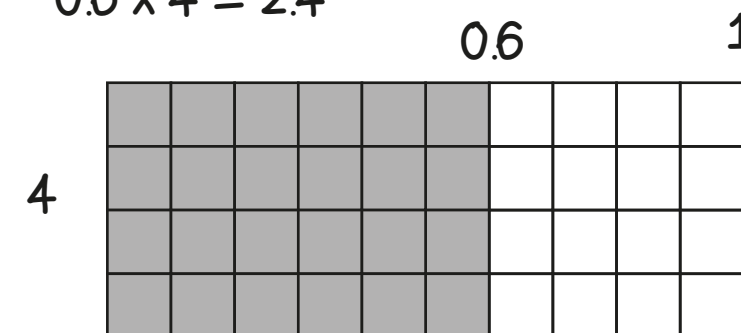
0.6 is ten times
smaller than 6

6×4
Use known facts
and place value

$$\begin{aligned} 0.6 \times 4 &= 2.4 \\ 4 \text{ jumps of } 0.6 \end{aligned}$$



$$\begin{aligned} 0.6 \times 4 &= 24 \text{ tenths} \\ 0.6 \times 4 &= 2.4 \end{aligned}$$



36×7
Formal written method

	30	6
7	210	42

$$\begin{array}{r} 36 \\ \times 7 \\ \hline 252 \\ 4 \end{array}$$

Known facts:
Use recall of all
multiplication tables
up to 12 x 12 to
derive division facts

$24 \div 100$
Divide by 10, 100

100s	10s	1s	$\frac{1}{10}$ s	$\frac{1}{100}$ s
	● ●	● ● ● ●		
		● ●	● ● ● ●	
			● ●	● ● ● ●
			● ●	● ● ● ●

24
↓ $\div 10$
2.4
↓ $\div 10$
0.24

↓ $\div 100$

$24 \div 4$
Use known facts
and place value

$$\begin{aligned} 24 \div 4 &= 6 \\ 240 \div 40 &= 6 \\ 2400 \div 400 &= 6 \end{aligned}$$

$$2400 \div 400 = \frac{24 \times 100}{4 \times 100}$$

$$\frac{24}{4} = 6$$

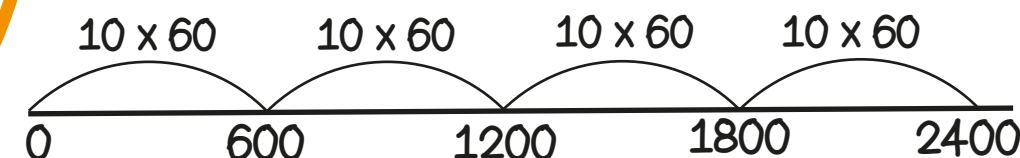
240 is ten times
greater than 24

24 biscuits shared between
4 people means they will get
6 biscuits each.
If there are 100 times as many
people and 100 times as many
biscuits, how many biscuits
each now?

$2400 \div 60$
Use known facts
and place value

$$2400 \div 60 = 40$$

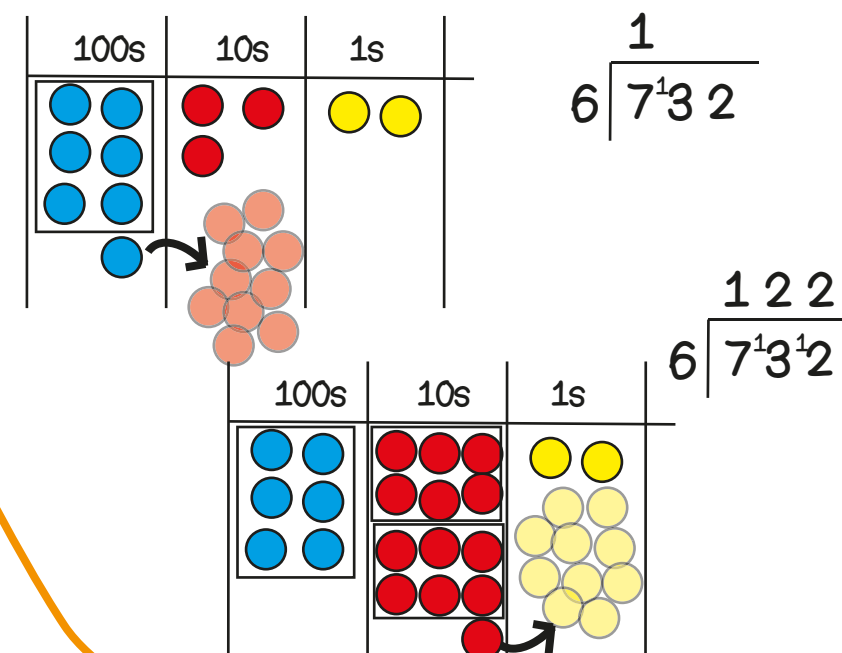
How many steps of 60 make 2400?



How shall I divide?



$732 \div 6$
Formal written method



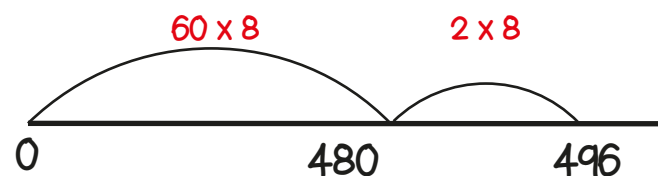
$516 \div 12$
Using factors

$$516 \div 3 \div 4$$

516											
172				172				172			
43	43	43	43								

$496 \div 8$
Partition and recombine

$$\begin{array}{r} 496 \div 8 \\ 480 \quad 16 \\ \div 8 \quad \div 8 \\ 60 + 2 = 62 \end{array}$$



0.8 + 0.7, 45 + 45
 Number facts
 Single digit decimals
 Doubles
 Bonds of 1 and 100

I just knew it!

Rapid fluency of 2 digit add 2 digit numbers

7 + 8
 Use known facts

If I know $7 + 8 = 15$
 then I know
 $0.7 + 0.8 = 1.5$

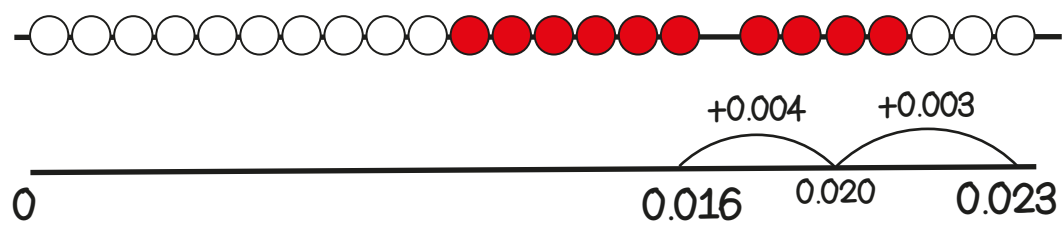
$7,000 + 8,000 = 15,000$
 $70,000 + 80,000 = 150,000$
 $700,000 + 800,000 = 1,500,000$

12,403 + 3,020
 Use place value to add

If I know $2 + 3 = 5$
 then I know
 $2000 + 3000 = 5000$

I have noticed,
 one number has no
 hundreds or ones, the
 other has no tens.

0.016 + 0.007
 Bridge through boundaries
 by counting in efficient steps



How shall I add?

25,748 + 46,374
 Formal written method

Exchange ten of these for one of those!

$$\begin{array}{r} 25,748 \\ + 46,374 \\ \hline 72,122 \end{array}$$

1 1 1 1

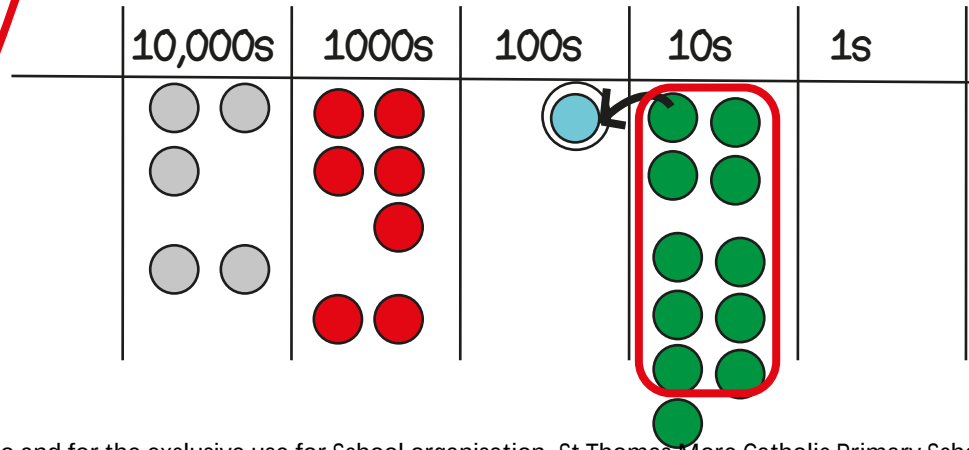
Regroup and rename

10,000s	1000s	100s	10s	1s

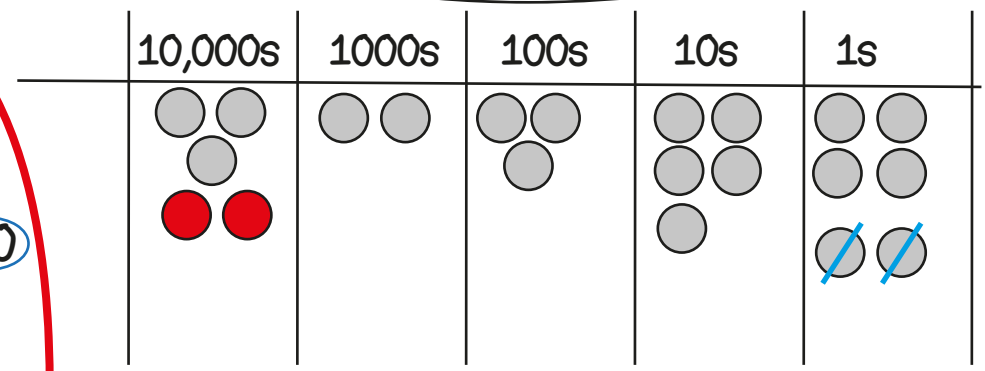
35,040 + 22,070
 Partition and recombine

$30,000 + 5,000 + 40 + 20,000 + 2,000 + 70$

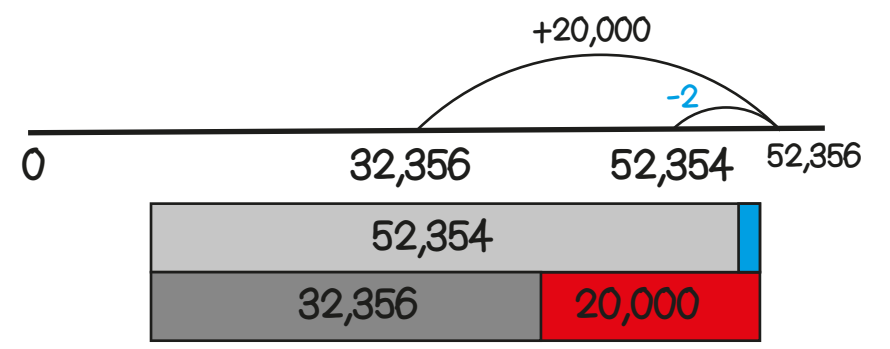
$50,000 + 7,000 + 110 = 57,110$



32,356 + 19,998
 Round then adjust



Add **20,000** then **subtract 2**



9 - 4, 13 - 5, 18 - 9
Number facts
Single digit decimals
Halves
Subtract from 1 and 100

I just knew it!

Rapid fluency of
2 digit subtract
2 digit numbers

15 - 8 = 7
Use known facts

If I know 15 - 8 = 7
then I know
1.5 - 0.8 = 0.7

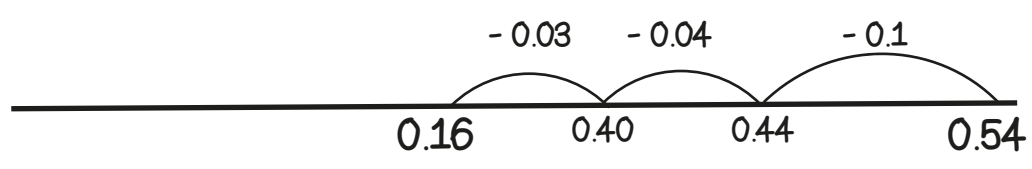
15,000 - 8,000 = 7,000
150,000 - 80,000 = 70,000
1,500,000 - 800,000 = 700,000

40,012 - 3,005
Use place value to subtract

5 less than 12 is 7
Now it is easy to
take away 3000

If I know 40 - 3 = 37
then I know that
40 thousand take away
3 thousand is 37 thousand

0.54 - 0.17
Bridge through boundaries
by counting in efficient steps



How shall I subtract?



40,000 = 4 tens of thousands or 40 thousands
12 = 1 ten and 2 ones or 12 ones

40,012 = 40 thousands and 12 ones
take away 3 thousands and 5 ones
equals 37 thousands and 7 ones.

45,748 - 26,374
Formal written method

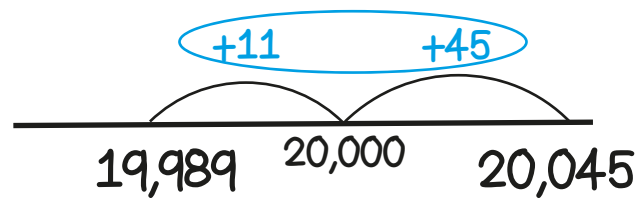
Exchange ten of
these for one of
those!

Regroup and rename

3 1 6 1
~~4~~5, ~~7~~48
- 26,374
19,374

10,000s	1000s	100s	10s	1s

20,045 - 19,989
Find the difference between
two numbers

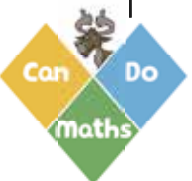
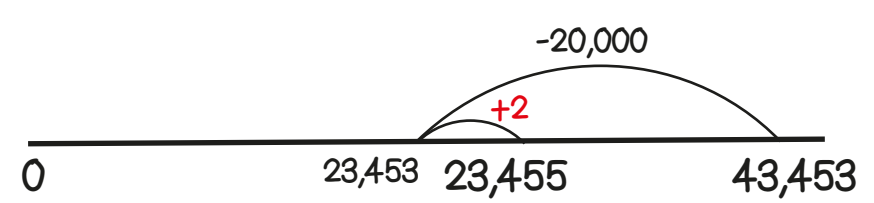


20,045	
19,989	56

43,453 - 19,998
Round then adjust

10,000s	1000s	100s	10s	1s

Take away 20,000 then add 2



Known facts:
Rapid recall of all
multiplication tables
up to 12 x 12

2.34×1000
Multiply by 10, 100, 1000

1000s	100s	10s	1s	$\frac{1}{10}$ s	$\frac{1}{100}$ s
			● ●	● ● ●	● ● ●
		● ●	● ● ●	● ● ●	
	● ●	● ● ●	● ● ●		
● ●	● ● ●	● ● ●			

423×4
Partition and recombine

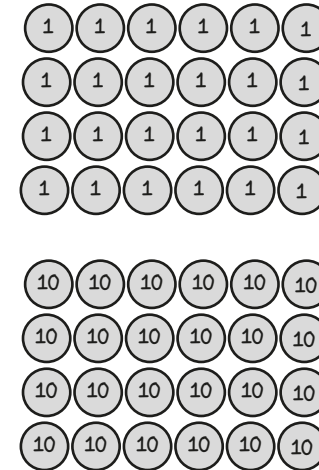
$$\begin{array}{r}
 423 \times 4 \\
 \hline
 400 \times 4 = 1600 \\
 20 \times 4 = 80 \\
 3 \times 4 = 12 \\
 \hline
 1600 + 80 + 12 = 1692
 \end{array}$$

6×4
Use known facts
and place value

$$\begin{aligned}
 6 \times 4 &= 24 \\
 60 \times 4 &= 240 \\
 60 \times 40 &= 2400
 \end{aligned}$$

$$\begin{aligned}
 6 \times 10 &= 60 \\
 4 \times 10 &= 40 \\
 60 \times 40 &= 2400
 \end{aligned}$$

40 is ten times
greater than 4

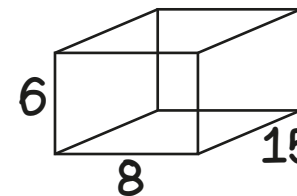


How shall I multiply?

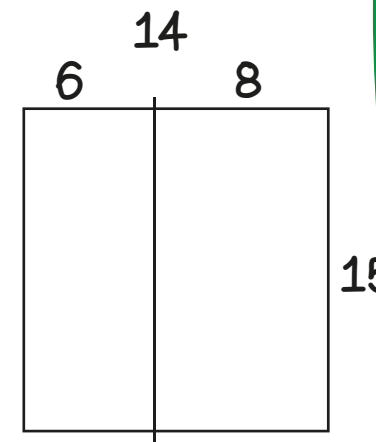


15×42
Using factors and
distributive law

$$\begin{aligned}
 15 \times 42 &= 15 \times 6 \times 7 \\
 &= 90 \times 7 \\
 &= 630
 \end{aligned}$$



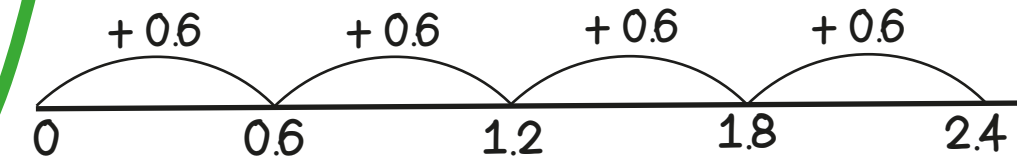
$$\begin{aligned}
 15 \times 42 &= 15 \times 6 \times 7 \\
 &= 90 \times 7 \\
 &= 630
 \end{aligned}$$



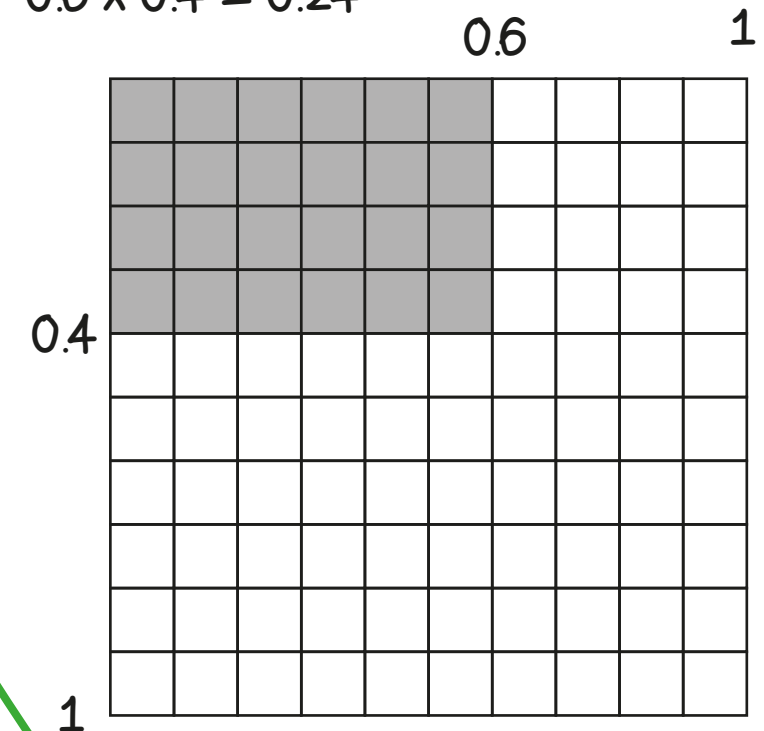
0.6 is ten times
smaller than 6

6×4
Use known facts
and place value

$$\begin{aligned}
 0.6 \times 4 &= 2.4 \\
 4 \text{ jumps of } 0.6
 \end{aligned}$$



$$\begin{aligned}
 0.6 \times 0.4 &= 24 \text{ hundredths} \\
 0.6 \times 0.4 &= 0.24
 \end{aligned}$$



427×38
Formal written method

	400	20	7	
				3416
30	12,000	600	210	12810
8	3,200	160	56	16226



Known facts:
Use recall of all multiplication tables up to 12 x 12 to derive division facts

Include calculations where remainders occur

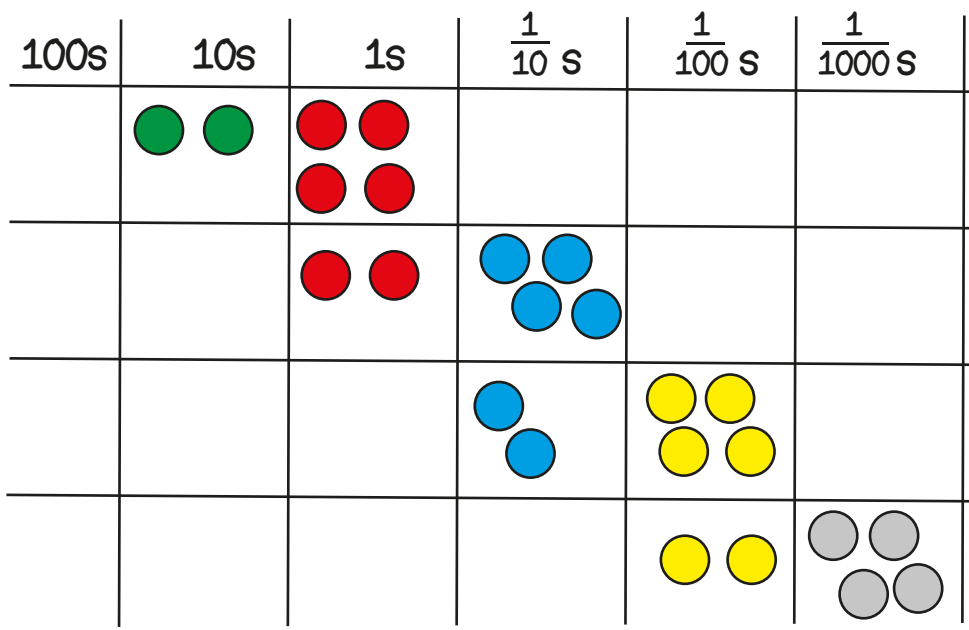
$24 \div 4$
Use known facts and place value

24,000 is a thousand times greater than 24

0.6 is ten times smaller than 6

$2.4 \div 0.6$
Use known facts and place value

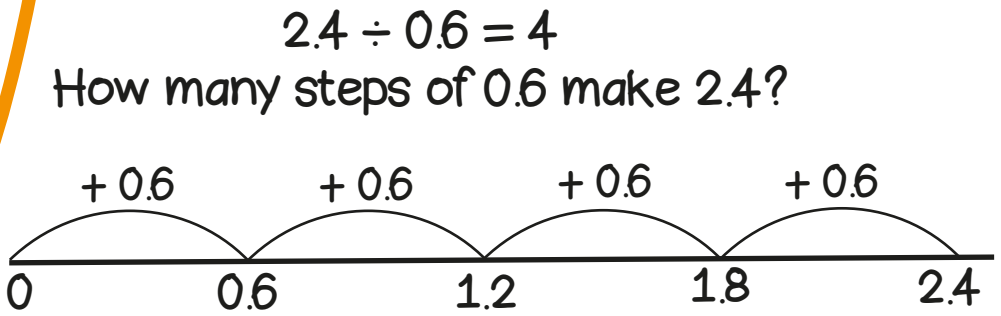
$24 \div 1000$
Divide by 10, 100, 1000



$24 \div 4 = 6$
 $240 \div 40 = 6$
 $2400 \div 400 = 6$
 $24,000 \div 4000 = 6$

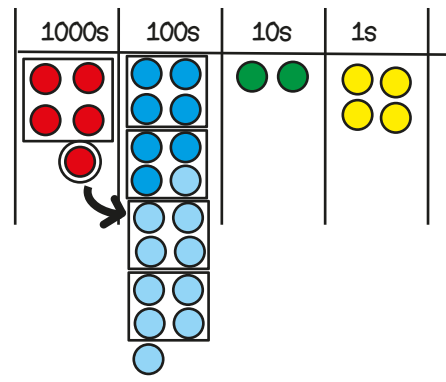
24 biscuits shared between 4 people means they will get 6 biscuits each.
If there are 1000 times as many people and 1000 times as many biscuits, how many biscuits each now?

$24,000 \div 400 = \frac{24 \times 1000}{4 \times 100}$
 $\frac{240}{4} = 60$



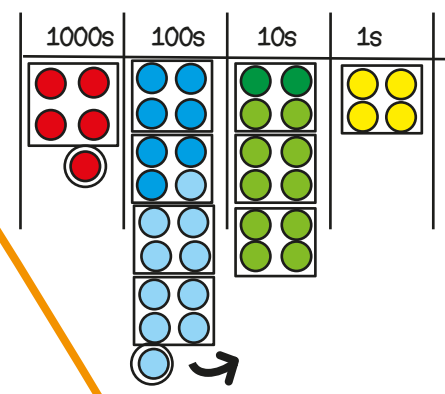
How shall I divide?

$5724 \div 4$
Formal written method



$$\begin{array}{r} 14 \\ 4 \overline{) 5724} \end{array}$$

$1512 \div 24$
Using factors

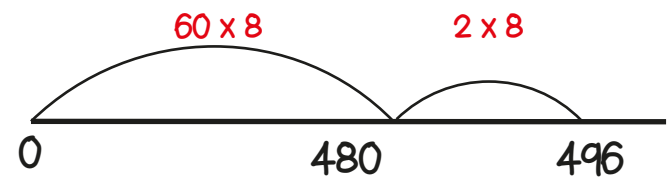


$$\begin{array}{r} 1431 \\ 4 \overline{) 5724} \end{array}$$

$496 \div 8$
Partition and recombine

$496 \div 8$

480 16
 $\div 8$ $\div 8$
60 + 2 = 62



$1512 \div 6 \div 4$

1512																							
252				252				252				252				252				252			
63	63	63	63																				



$44 + 56, 27 + 27$
Number facts
Single digit decimals
Doubles
Bonds of 1 and 100

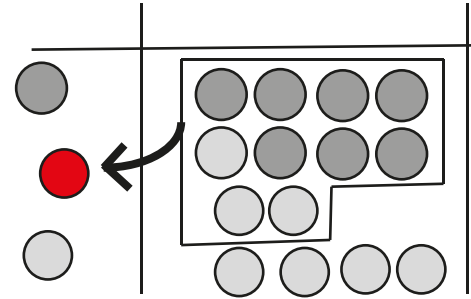
I just knew it!

Rapid fluency of
2 digit add 2 digit numbers

$17 + 17$
Use known facts

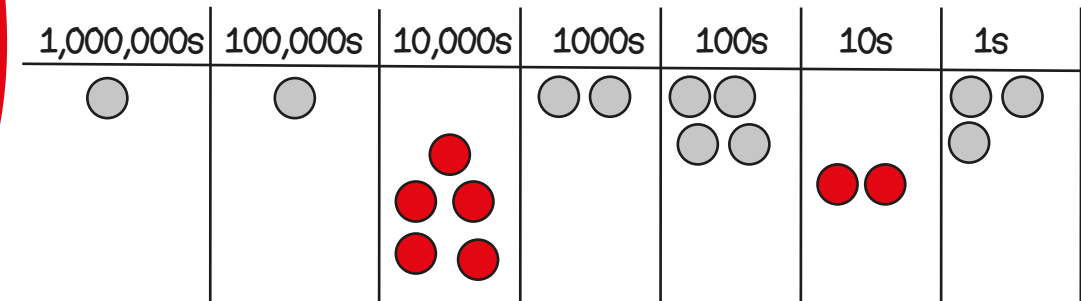
If I know $17 + 17 = 34$
then I know
 $1.7 + 1.7 = 3.4$

$$\begin{aligned} 17,000 + 17,000 &= 34,000 \\ 170,000 + 170,000 &= 340,000 \\ 1,700,000 + 1,700,000 &= 3,400,000 \end{aligned}$$

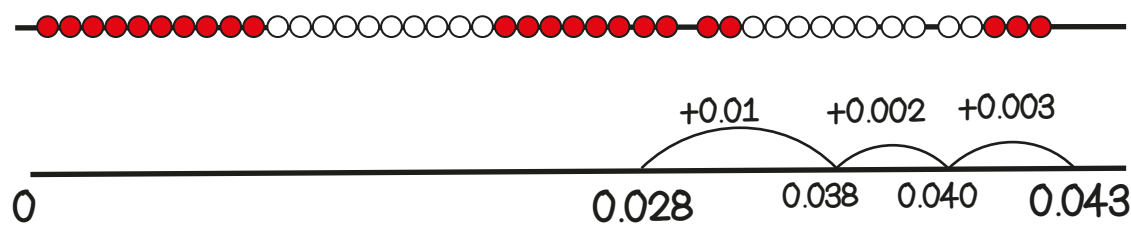


$1,102,403 + 50,020$
Use place value to add

I have noticed,
one number has no
hundreds or ones, the
other has no tens.



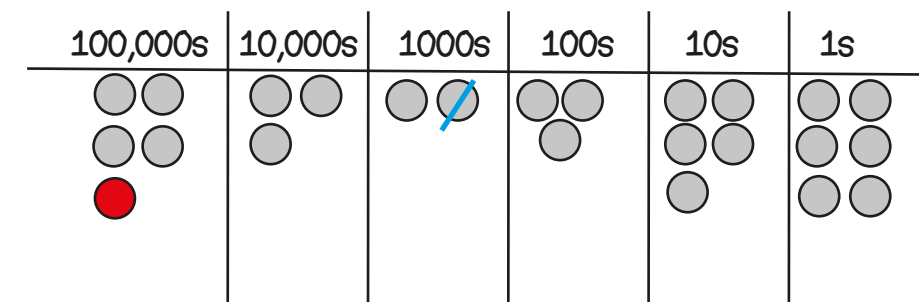
$0.028 + 0.015$
Bridge through boundaries
by counting in efficient steps



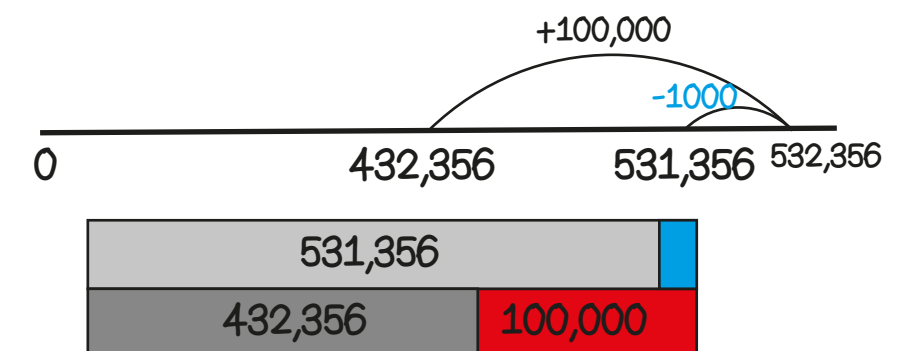
How shall I add?



$432,356 + 99,000$
Round then adjust



Add **100,000** then **take away 1,000**

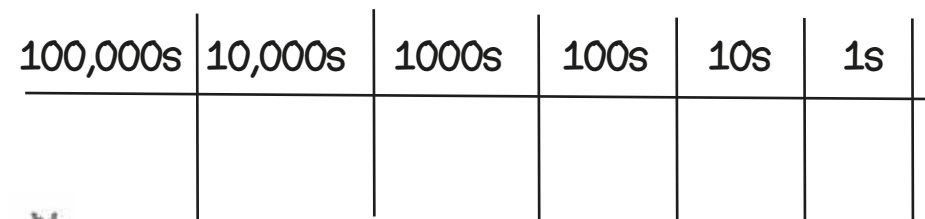


$325,748 + 246,374$
Formal written method

Exchange ten of
these for one of
those!

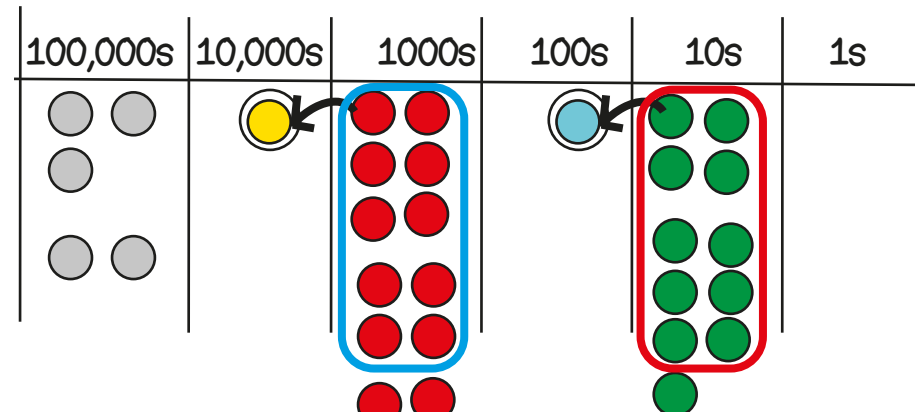
$$\begin{array}{r} 325,748 \\ + 246,374 \\ \hline 572,122 \end{array}$$

Regroup and rename



$307,040 + 206,070$
Partition and recombine

$$\begin{aligned} &300,000 + 7,000 + 40 + 200,000 + 6,000 + 70 \\ &500,000 + 13,000 + 110 = 513,110 \end{aligned}$$

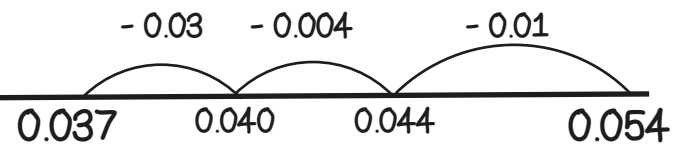


0.9 - 0.4, 100 - 65
Number facts
Single digit decimals
Halves
Bonds of 1 and 100

I just knew it!

Rapid fluency of
2 digit subtract
2 digit numbers

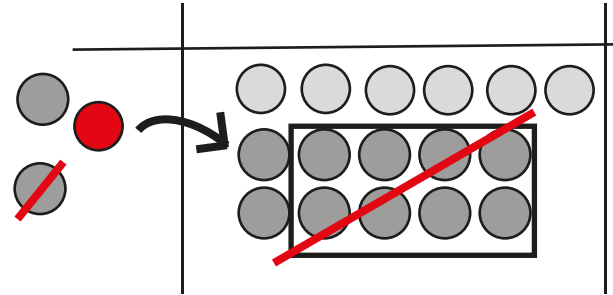
0.054 - 0.017
Bridge through boundaries
by counting in efficient steps



36 - 18 = 18
Use known facts

If I know 36 - 18 = 18
then I know
3.6 - 1.8 = 1.8

$$\begin{aligned} 36,000 - 18,000 &= 18,000 \\ 360,000 - 180,000 &= 180,000 \\ 3,600,000 - 1,800,000 &= 1,800,000 \end{aligned}$$



400,032 - 30,005
Use place value to subtract

5 less than 32 is 27

400,000 = 4 hundreds of thousands
or 400 thousands

$$400 - 30 = 370 \text{ so } 400,000 - 3,000 = 370,000$$

400,032 = 400 thousands and 32 ones
take away 30 thousands and 5 ones
= 370,027

How shall I subtract?



445,748 - 126,374
Formal written method

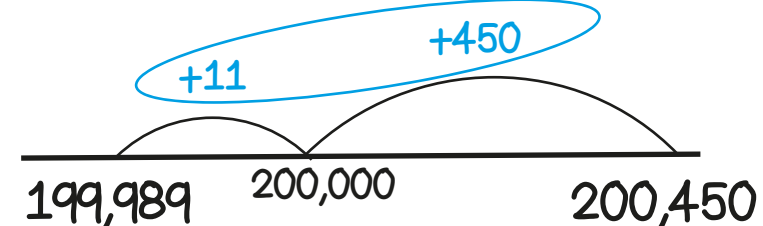
Exchange ten of
these for one of
those!

$$\begin{array}{r} 445,748 \\ + 126,374 \\ \hline 319,374 \end{array}$$

Regroup and rename

100,000s	10,000s	1000s	100s	10s	1s

200,450 - 199,989
Find the difference between
two numbers

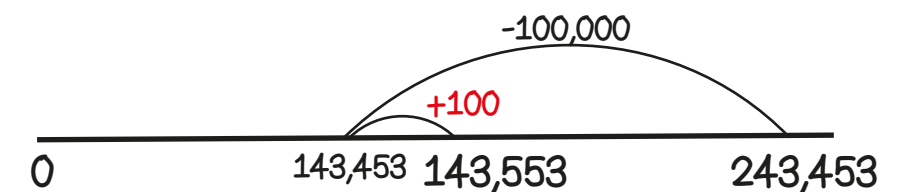


200,450
199,989
461

243,453 - 99,900
Round then adjust

100,000s	10,000s	1000s	100s	10s	1s

Take away 100,000 then add 100



Known facts:
Rapid recall of all
multiplication tables
up to 12 x 12

6 x 4
Use known facts
and place value

40 is ten times
greater than 4

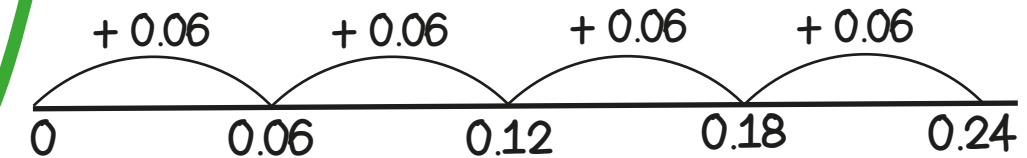
$$\begin{aligned} 60 \times 40 &= 2400 \\ 600 \times 400 &= 240,000 \\ 6000 \times 4000 &= 24,000,000 \end{aligned}$$

$$\begin{aligned} 6 \times 10 \times 4 \times 10 \\ = 24 \times 100 \end{aligned}$$

0.6 is ten times
smaller than 6

6 x 4
Use known facts
and place value

$$\begin{aligned} 0.06 \times 4 &= 0.24 \\ 4 \text{ jumps of } 0.06 \end{aligned}$$



2.34 x 1000
Multiply by 10, 100, 1000

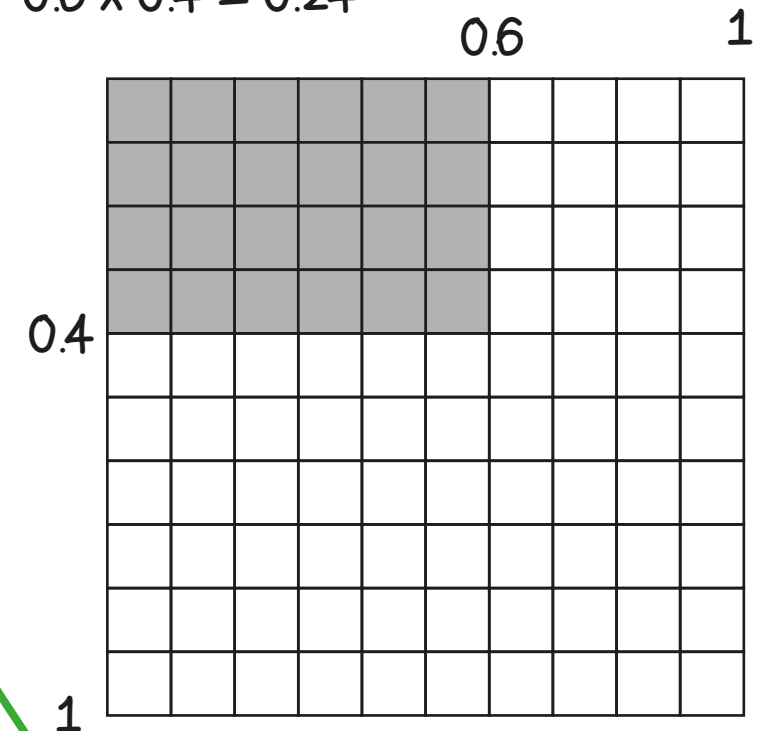
1000s	100s	10s	1s	$\frac{1}{10}$ s	$\frac{1}{100}$ s
			● ●	● ● ●	● ● ●
		● ●	● ● ●	● ● ●	
	● ●	● ● ●	● ● ●		
● ●	● ● ●	● ● ●			

$$\begin{aligned} 2.34 &\xrightarrow{\times 10} 23.4 \\ &\xrightarrow{\times 10} 234 \\ &\xrightarrow{\times 10} 2340 \end{aligned}$$

How shall I multiply?

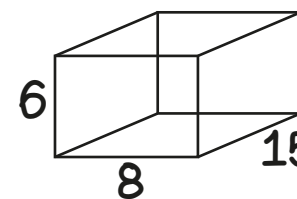


$$\begin{aligned} 0.6 \times 0.4 &= 24 \text{ hundredths} \\ 0.6 \times 0.4 &= 0.24 \end{aligned}$$

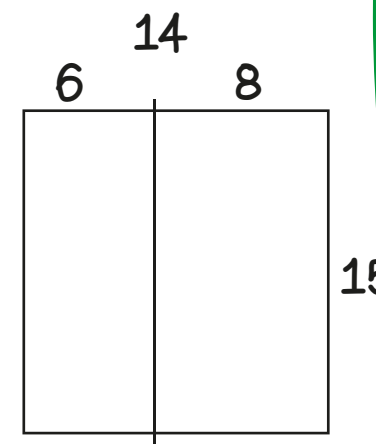


15 x 42
Using factors and
distributive law

$$\begin{aligned} 15 \times 48 \\ = 15 \times 6 \times 8 \\ = 90 \times 8 \\ = 720 \end{aligned}$$



$$\begin{aligned} 15 \times 14 \\ = 15 \times 6 + 15 \times 8 \\ = 90 + 120 \\ = 210 \end{aligned}$$



4203 x 4
Partition and recombine

$$\begin{aligned} 4203 \times 4 \\ \begin{array}{|c|c|c|c|} \hline 4 & 0 & 0 & 0 \\ \hline \end{array} \times 4 & \begin{array}{|c|c|c|} \hline 2 & 0 & 0 \\ \hline \end{array} \times 4 & \begin{array}{|c|} \hline 3 \\ \hline \end{array} \times 4 \\ 16,000 & + 800 & + 12 = 16,812 \end{aligned}$$

2427 x 38
Formal written method

$$\begin{array}{r} 2427 \\ \times 38 \\ \hline 19416 \\ 72810 \\ \hline 92226 \end{array}$$

Known facts:
Use recall of all multiplication tables up to 12 x 12 to derive division facts

Include calculations where remainders occur

$24 \div 4$
Use known facts and place value

240 is ten times greater than 24

$$\begin{aligned} 240 \div 40 &= 6 \\ 2400 \div 400 &= 6 \\ 24,000 \div 4000 &= 6 \\ 240,000 \div 40,000 &= 6 \\ 2,400,000 \div 400,000 &= 6 \end{aligned}$$

24 biscuits shared between 4 people means they will get 6 biscuits each.
If there are 10 times as many people and 10 times as many biscuits, how many biscuits each now?

$$240,000 \div 400 = \frac{24 \times 10,000}{4 \times 100}$$

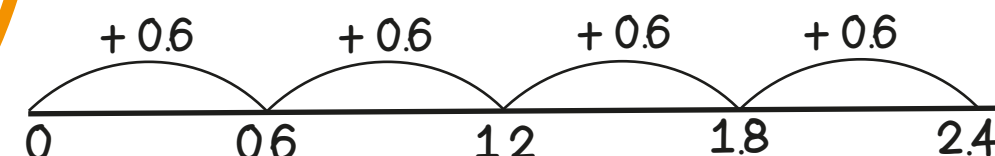
$$\frac{2400}{4} = 600$$

$2.4 \div 0.6$
Use known facts and place value

0.6 is ten times smaller than 6

$$2.4 \div 0.6 = 4$$

How many steps of 0.6 make 2.4?



$24 \div 1000$
Divide by 10, 100, 1000

100s	10s	1s	$\frac{1}{10}$ s	$\frac{1}{100}$ s	$\frac{1}{1000}$ s
	● ●	● ● ● ●			
		● ● ● ●	● ● ● ●		
		● ●	● ● ● ●		
			● ●	● ● ● ●	
				● ●	● ● ● ●

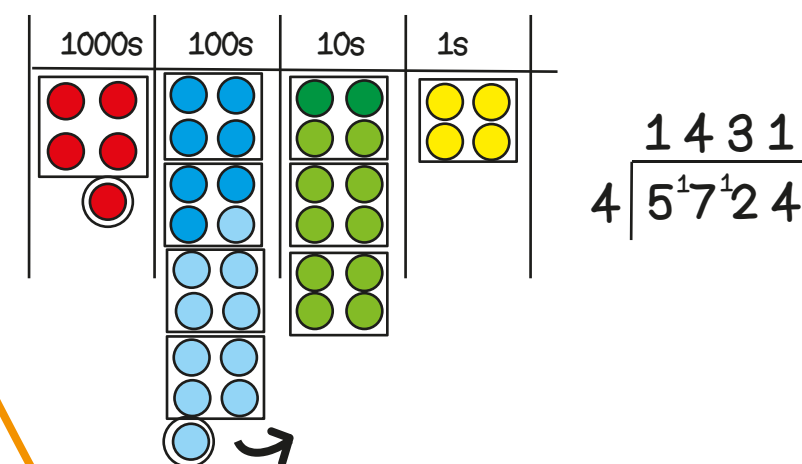
$$\begin{aligned} 24 &\xrightarrow{\div 10} 2.4 \\ 2.4 &\xrightarrow{\div 10} 0.24 \\ 0.24 &\xrightarrow{\div 10} 0.024 \end{aligned}$$

$\div 1000$

How shall I divide?



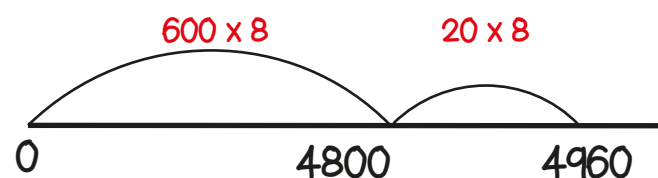
$7182 \div 21$
Formal written method



$1512 \div 24$
Using factors

$4960 \div 8$
Partition and recombine

$$\begin{aligned} 4960 \div 8 &= 4800 \div 8 + 160 \div 8 \\ &= 600 + 20 = 620 \end{aligned}$$



$$1512 \div 6 \div 4$$

1512																							
252				252				252				252				252				252			
63	63	63	63																				

$$\begin{array}{r} 342 \\ 21 \overline{) 7182} \\ \underline{63} \\ 88 \\ \underline{84} \\ 42 \\ \underline{42} \\ 0 \end{array}$$