Year 3: Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)

Year 4: Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens ones)

Recognising the place value of digits (3 or 4 digit number - Years 3 and 4)

Eg. What is the value of 5 in 7592?

① Children are to write the number out, under labelled place value column titles:

1000s Thous.	100s Hundr.	10s Tens	0s Units
7	5	9	2

.

② Identify which column the digit falls under. Here, the 5 is in the hundreds column, therefore, we know that we have five hundreds.

③ Convert 'five hundreds' into digital form:
Keep the 5 in the hundreds column and replace digits in any column to the right with 0's. Ignore any digits to the left.

100s Hundr.	10s Tens	0s Units
5		

. Place the 5 in a blank grid under the correct column.

100s Hundr.	10's Tens	0s Units
5	0	0

. Add 0's in any empty column to the right.

Year 5: Read, write, order and compare number to at least 1,000,000 and determine the value of each digit

Year 6: Read, write, order and compare number to at least 10,000,000 and determine the value of each digit

① All numbers can be read if you can read a three digit number and if you know what the commas mean! All numbers are blocked into chunks of three.

Start by writing out your number:

5 4 6 2 9 8 3

② Place the decimal place in your number and then count to the left of the decimal place in blocks of 3:

0 0 5 | 4 6 2 | 9 8 3 .

Block of 3 | Block of 3

③ Place commas between your blocks of 3:

H	T	U		H	T	U		H	T	U
0	0	5	,	4	6	2	,	9	8	3.

④ Learn what the commas mean:

H	T	U		H	T	U		H	T	U
0	0	5	, Million	4	6	2	, Thousand	9	8	3.

⑤ Read aloud the blocks of three in terms of hundreds, tens and units, saying the words attached to the commas when you reach them:

H	T	U		H	T	U		H	T	U
0	0	5	, Million	4	6	2	, Thousand	9	8	3.
Five				Four hundred and sixty-two				Nine hundred and eighty-three.		

Writing large numbers in numeric form.

E.g. Write nine million one hundred and twenty thousand four hundred and three in numeric form.

① Write out the number in words and underline the words million and thousand where they occur:

Nine million one hundred and twenty thousand four hundred and three.

② Attach the words before 'million' with million and attach the words before 'thousand' to thousand (stop when you hit million!)

Nine million one hundred and twenty thousand four hundred and three.

③ Remember, place value operates in groups of three. Create a place value grid in blocks of three:

Millions			Thousands			Units		
Hund.	Ten	U	Hund.	Ten	U	Hund.	Ten.	U
100	10	0	100	10	0	100	10	0
Mill.	Mill.	Mill.	Thous.	Thous.	Thous.	Hund.	Ten	Unit

④ Place your millions block in words (nine million) into its place value block:

Millions			Thousands			Units		
H	T		H	T				
Mill.	Mill.	Mill	Thou	Thou	Thou	H	T	U
0	0	9						

⑤ Place your thousands block in words (one hundred and twenty thousand) into its place value block:

Millions			Thousands			Units		
H Mill.	T Mill.	Mill	H Thou.	T Thou	Thou.	H	T	U
0	0	9	1	2	0			

⑥ Place your remaining block - your units block - in words (four hundred and three) into its place value block.

Millions			Thousands			Units		
H Mill.	T Mill.	Mill.	H Thou.	T Thou.	Thou.	H	T	U
0	0	9	1	2	0	4	0	3

Remember, blocks should always contain three. Therefore, if you are putting a one or two digit number in, you must put 0 in front of it to create a block of three.

Eg. twenty-nine thousand:

Thousands		
H	T	
Thou.	Thou	Thou
0	2	9

Ordering and comparing whole numbers.

Eg Write these numbers in ascending order (least to greatest):

15,428 15,842 15,284
51,782 105,827

① Firstly, you need to write out a blank place value grid:

100,000s Hundr. Thous.	10,000's Ten Thous.	1,000s Thous.	100s Hundreds	10s Tens	0's Units .

② Then, place all of the numbers into the place value grid:

100,000s Hundr. Thous.	10,000s Ten Thous.	1,000s Thous.	100s Hundreds	10s Tens	0s Units .
0	1	5	4	2	8
0	1	5	8	4	2
0	1	5	2	8	4
0	5	1	7	8	2
1	0	5	8	2	7

↑ →

③ Now we can compare the numbers. It is easiest to list the biggest first and work down to the smallest (may need to reverse the order for the answer).
Start in the column furthest to the left. (hundred thousands)
The biggest digit in the leftmost column gives us the biggest number.

④ Only one number has a digit in our left most column (hundred thousands) therefore, this is our greatest number.

Greatest: ① 105,827.
②
③
④
Least: ⑤

⑤ Cross the used number out from your place value grid and write it down on your ranking list.

⑥ Go back to your place value grid:

	HTh	TTh	Th	H	T	U
	0	1	5	4	2	8
	0	1	5	8	4	2
	0	1	5	2	8	4
②	0	(5)	1	7	8	2
①	(1)	0	5	8	2	7

Starting in the next left most column, find the greatest digit. This is your next greatest number. Record in your ranking list and cross out.

Greatest: ① 1 0 5, 8 2 7
② 5 1, 7 8 2
③
④
Least: ⑤

⑦ Go back to your place value grid:

	HTh	TTh	Th	H	T	U
	0	1	5	4	2	8
③	0	1	5	(8)	4	2
	0	1	5	2	8	4
②	0	(5)	1	7	8	2
①	(1)	0	5	8	2	7
		↑same	↑same	↑		

Repeat - go to the left most column containing digits. Find the greatest digit. If they are the same, move to the column to the right. Continue this until you have found the next greatest number. Record it, cross it out and repeat.

The same process is followed for ordering decimals

Year 5: Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10000 and 100000

Year 6: Round any whole number to a required degree of accuracy

Eg. round 256,813 to the nearest thousand.
round 531,846 to the nearest hundred thousand

100 Th | 10 Th | Th | H | T | U

Step 1
Write out number (with place value columns if necessary)

256,813

531,846

Step 2
Underline the column you are rounding to (eg. nearest 10, underline tens column).

256,813 (nearest thousand)

531,846 (nearest hundred thousand)

Step 3
Indicate column to the right (highlight, draw arrow, circle etc)

256,813

531,846

Step 4
If 4 or lower, we stay the same.
If 5 or more, we go up

256,813 Eight takes us up

531,846 Three stays the same

If staying the same:
⑤ Keep the underlined number the same

531,846
stays
500,000

⑥ Turn remaining digits after to zeros

500,000

⑦ Write out digits before if there are any.

If going up:
⑤ Add 1 to the underlined digit (if already 9, you will need to exchange into next column)

256,813
+1
7

⑥ Zero all the digits after

7000

⑦ Copy any digits before.

Rounding Decimals

Exactly the same success criteria for rounding whole numbers but remember your decimal point!

Eg. Round 6.278 to one decimal place (nearest tenth)

U.t h th

① 6.278 (Write out number)

② 6.2̲78 (Underline column rounding to)

③ 6.2̲78 (Indicate column to right)

④ 6.2̲78 (Decide if going up or staying the same)

7 takes us up

⑤ Up
6.2̲78
↓ +1
3
(If going up, add 1 to underlined column
If staying the same, keep underlined column the same)

⑥ 3.00 (Zero everything after)

⑦ 6.300 (Insert any digits from before)

Eg. Round 13.42 to nearest whole number

① 13.42
② 13.42
③ 13.42

④ 4 stays same
⑤→⑦
13.42
13.00

Year 5: Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero

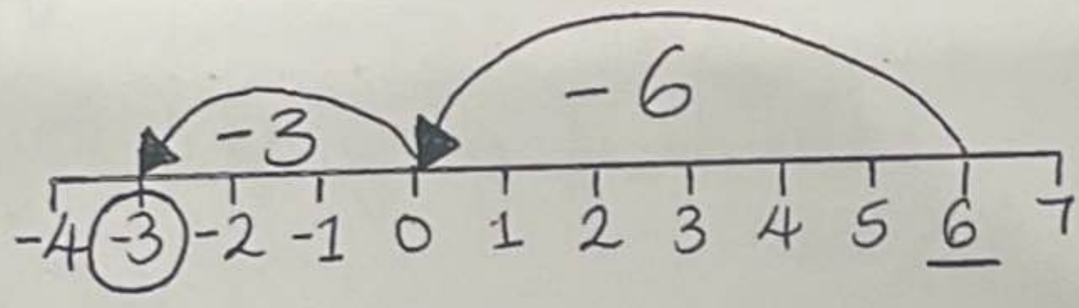
Year 6: Use negative numbers in context, and calculate intervals across zero

Negative Numbers

* Starting with a number line and moving beyond in years 5 and 6.

If adding, count right on your numberline.
If subtracting, count left on your numberline.

If counting through zero, count to zero and then count on.
Eg. 6 − 9 =



→ Positive number − bigger positive number = find difference and make it negative.

6 − 9 = Difference is 3
Answer is − 3

→ Negative number + bigger number = find difference and keep it positive.

− 4 + 7 = Difference is 3
Answer is + 3

→ Negative number + smaller number = find difference and make it negative

− 11 + 3 = Difference is 8.
Answer is − 8

→ Negative number − any number = find the total of the two numbers and make it negative.

− 2 − 4 = Total is 6
Answer is − 6

Negative numbers 2

* Finding the difference between numbers where one or more is negative.

When one number is negative

Ignore the positive/negative symbols and add the two numbers together → answer is your difference.

E.g. Find the difference between:
− 3 and 4.

* Add 3 and 4 together = 7
* 7 is the difference.

When both numbers are negative.

Find the difference between the two numbers.

E.g. Find the difference between:
− 3 and − 9

* Difference between 3 and 9 = 6
* 6 is the difference.

Remember - The difference is always written as a positive number.

Year 5: Multiply numbers up to 4 digits by a one- or two-digit number using formal written methods, including long multiplication for two-digit numbers

Year 6: Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication

Multiplication- Year 6

Children will progress to completing ThHTU x TU calculations involving exchanging using column method below:

	TTh	Th	H	T	U
		2	6	3	8
X				2	4
	1	0	5	5	2
+	5	2	7	6	0
	6	3	3	1	2

Decimal multiplication

e.g. 1.2 x 0.34

1) Children will count the amount of digits after the decimal place in the calculation. They will save this number for later

1.2 x 0.34 — 1.2 has 1dp and 0.34 has 2dp which totals 3dps

2) Remove the decimal point from the numbers

12 x 034 = 12 x 34

3) Line up in column method as whole numbers

```
  34
x 12
----
```

4) Calculate

```
  34
x 12
----
  68
+340
----
 408
----
```

5) Add the total amount of decimal places you started with back into the number, counting in from the digit furthest to the right

```
  34
x 12
----
  68
+340
----
.408
~~~
```

Answer = 0.408

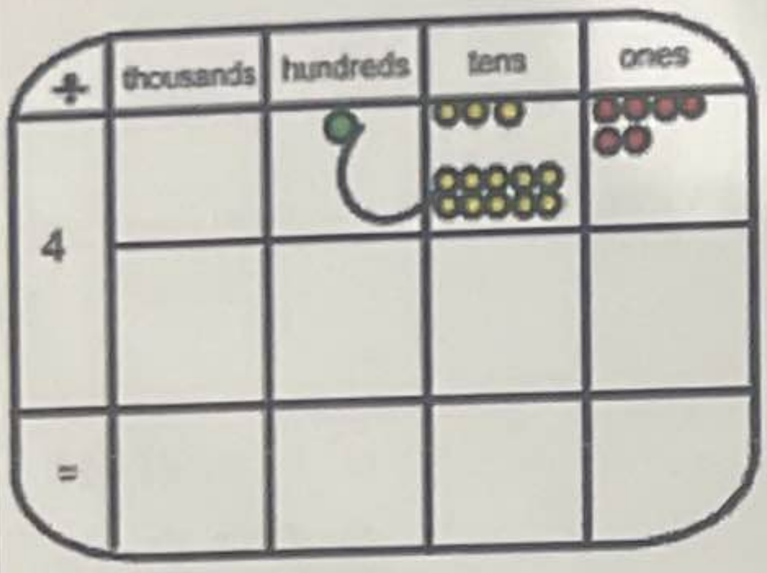
Year 5: Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context

Year 6: Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context

Short division — dividing by a single digit

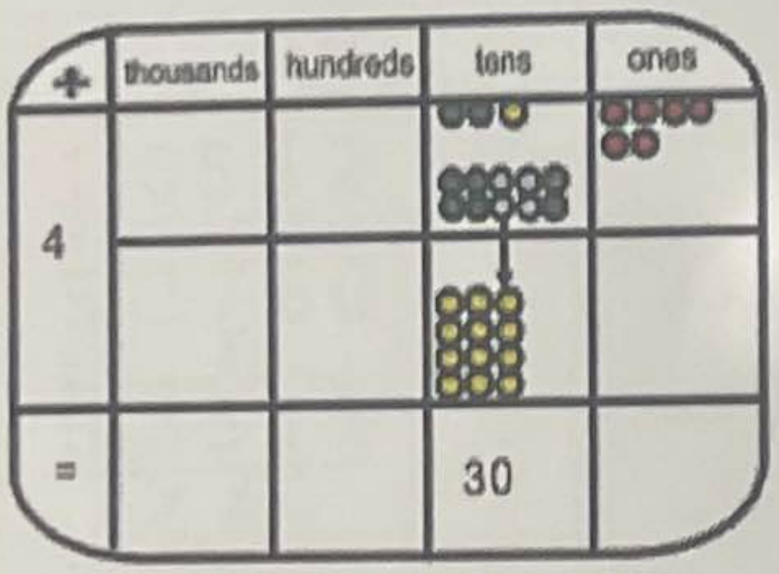
We can begin to group counters into an array to show short division working

136 ÷ 4



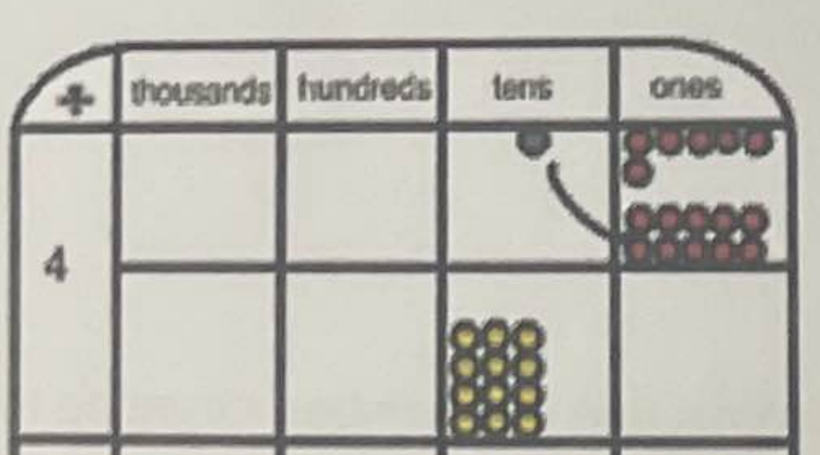
$$\begin{array}{r} 0 \\ 4\overline{)\,{}^{0}\cancel{1}36} \end{array}$$

Starting from left:
1 in hundreds column cannot be shared equally into four groups so exchange it for ten 10's counters.
Record a 0 in the hundreds column.



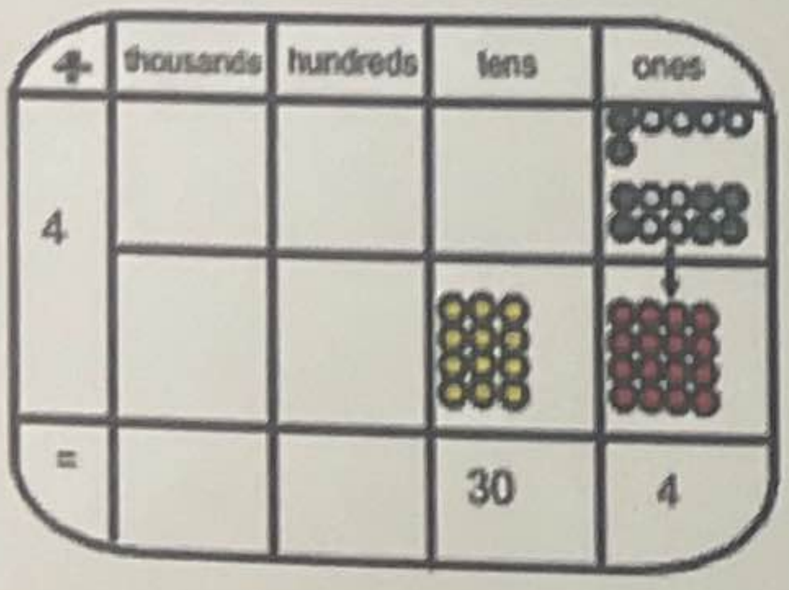
$$\begin{array}{r} 0\,3 \\ 4\overline{)\,{}^{0}\cancel{1}36} \end{array}$$

Organise tens counters into four equal groups/rows.
There are 3 in each row- record this in the tens column above the bus stop.



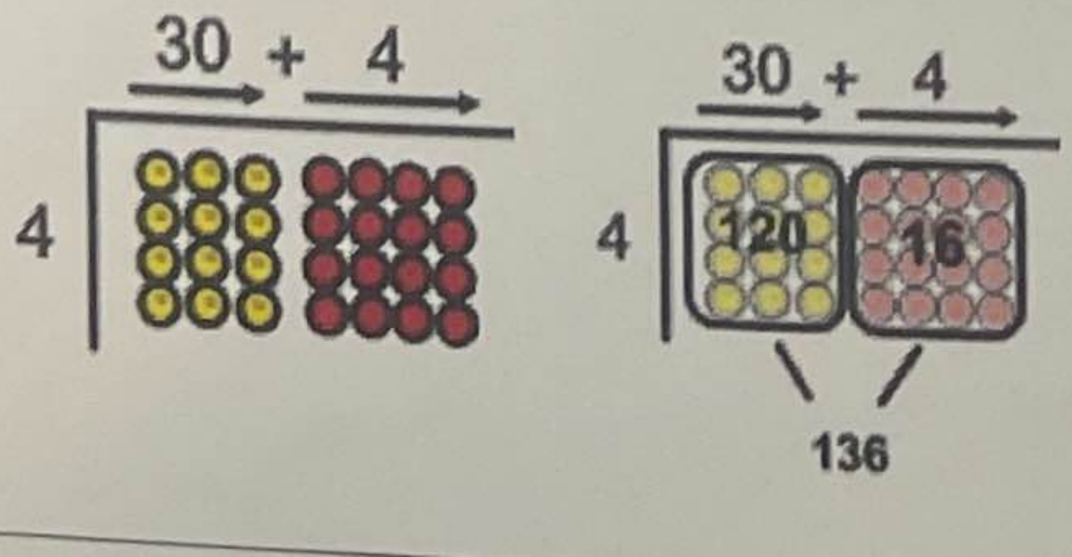
$$\begin{array}{r} 0\,3 \\ 4\overline{)\,{}^{0}\cancel{1}{}^{1}36} \end{array}$$

There is one tens counter left which cannot be shared in the tens column- exchange it for ten units.



$$\begin{array}{r} 0\,3\,4 \\ 4\overline{)\,{}^{0}\cancel{1}{}^{1}{}^{1}36} \end{array}$$

Share units counters into 4 equal groups/rows.
There are 4 in each group- record this on top of the bus stop in the units column.



Division- Year 6

Long division —dividing by more than one digit

Children should be reminded about partitioning numbers into multiples of 10, 100 etc. before recording as either:-

1. Chunking model of long division using Base 10 equipment
2. Sharing model of long division using place value counters

See the following pages for exemplification of these methods.

The vertical method- 'chunking' leading to long division

To be completed before long division if teaching chunking method.

This can be modelled as an array using place value counters.

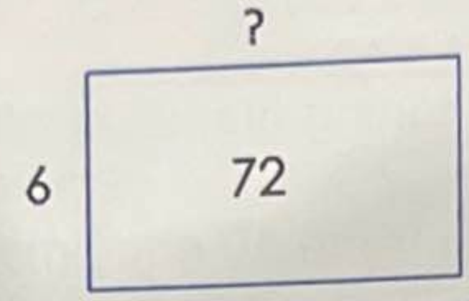
78 ÷ 3 =

	78	
-	30	(10 x 3)
	48	
-	30	(10 x 3)
	18	
-	18	(6 x 3)
	0	

So 78 ÷ 3 = 10 + 10 + 6 =26

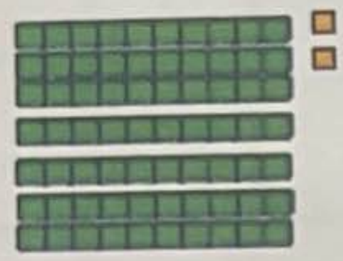
Chunking model of long division using Base 10 equipment

This model links strongly to the array representation; so for the calculation 72 ÷ 6 = ? - one side of the array is unknown and by arranging the Base 10 equipment to make the array we can discover this unknown. The written method should be written alongside the equipment so that children make links.



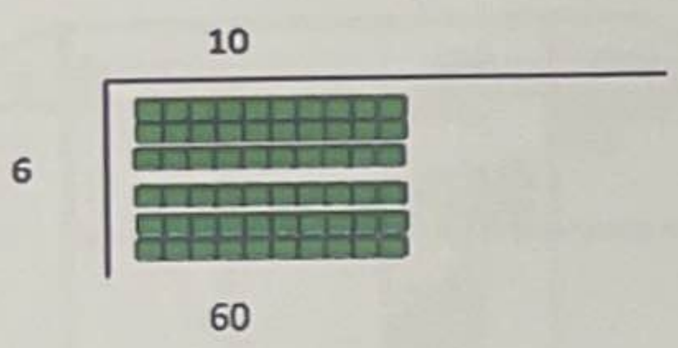
Begin with divisors that are between 5 and 9

72 ÷ 6 = 12



$$6 \overline{)\ 72}$$

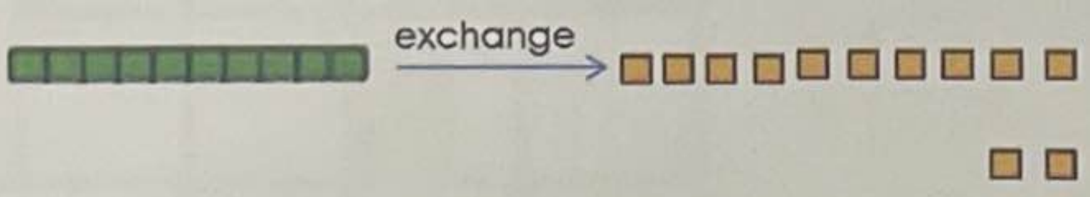
1. Make a rectangle where one side is 6 (the number dividing by) – grouping 6 tens



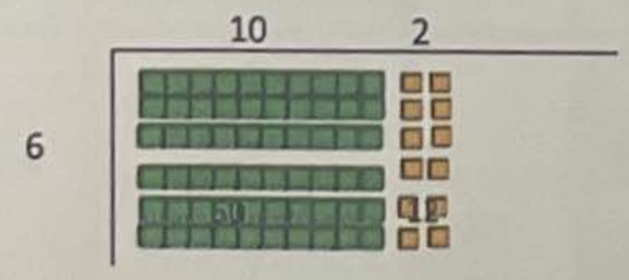
$$\begin{array}{r} 1 \\ 6 \overline{)\ 72} \\ \underline{-\ 60} \quad (10\ x) \\ 12 \end{array}$$

After grouping 6 lots of 10 (60) we have 12 left over

2. Exchange the remaining ten for ten ones



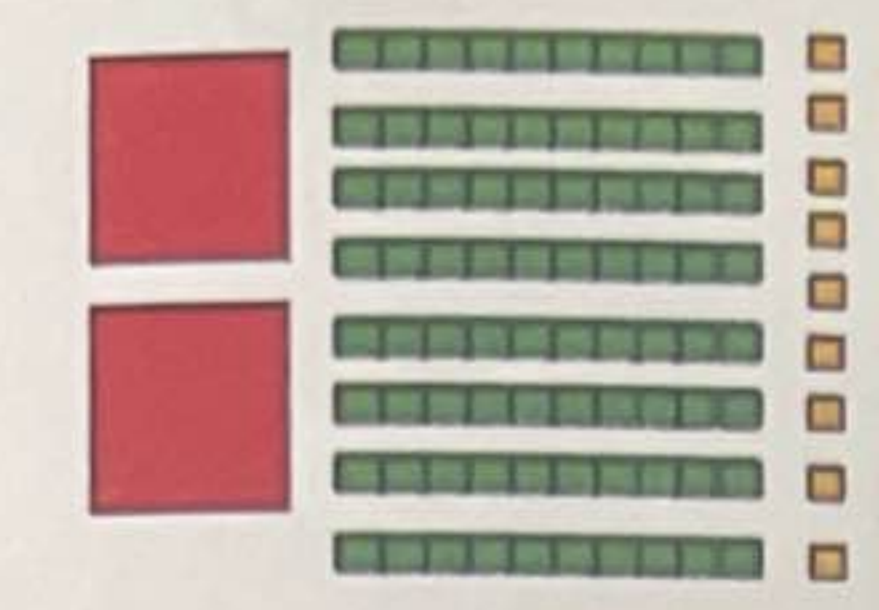
3. Complete the rectangle by grouping the remaining ones into groups of 6



$$\begin{array}{r} 1\ 2 \\ 6 \overline{)\ 72} \\ \underline{-\ 60} \quad (10\ x) \\ 12 \\ \underline{-\ 12} \quad (2\ x) \\ 0 \end{array}$$

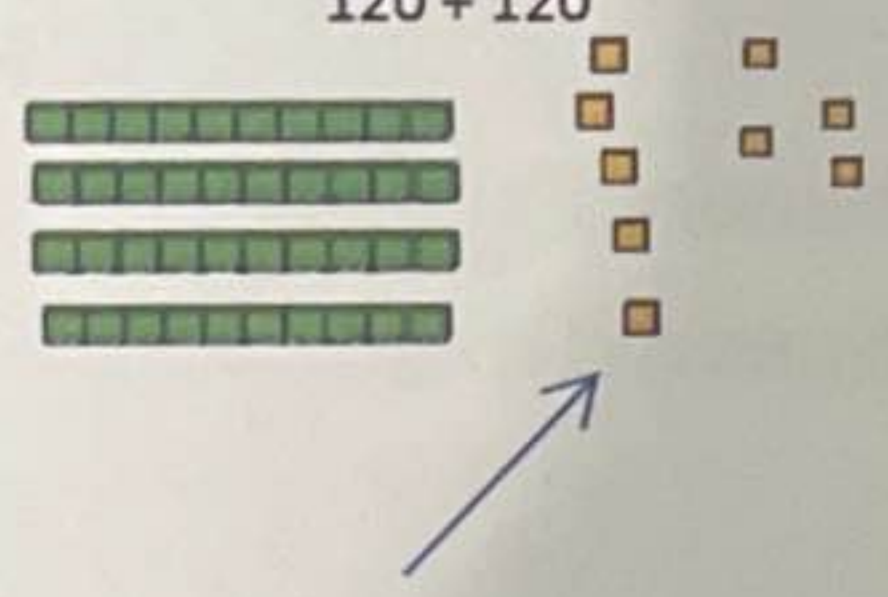
Move onto working with divisors between 11 and 19

Children may benefit from practise to make multiples of tens using the hundreds and tens and tens and ones.



12 | 289

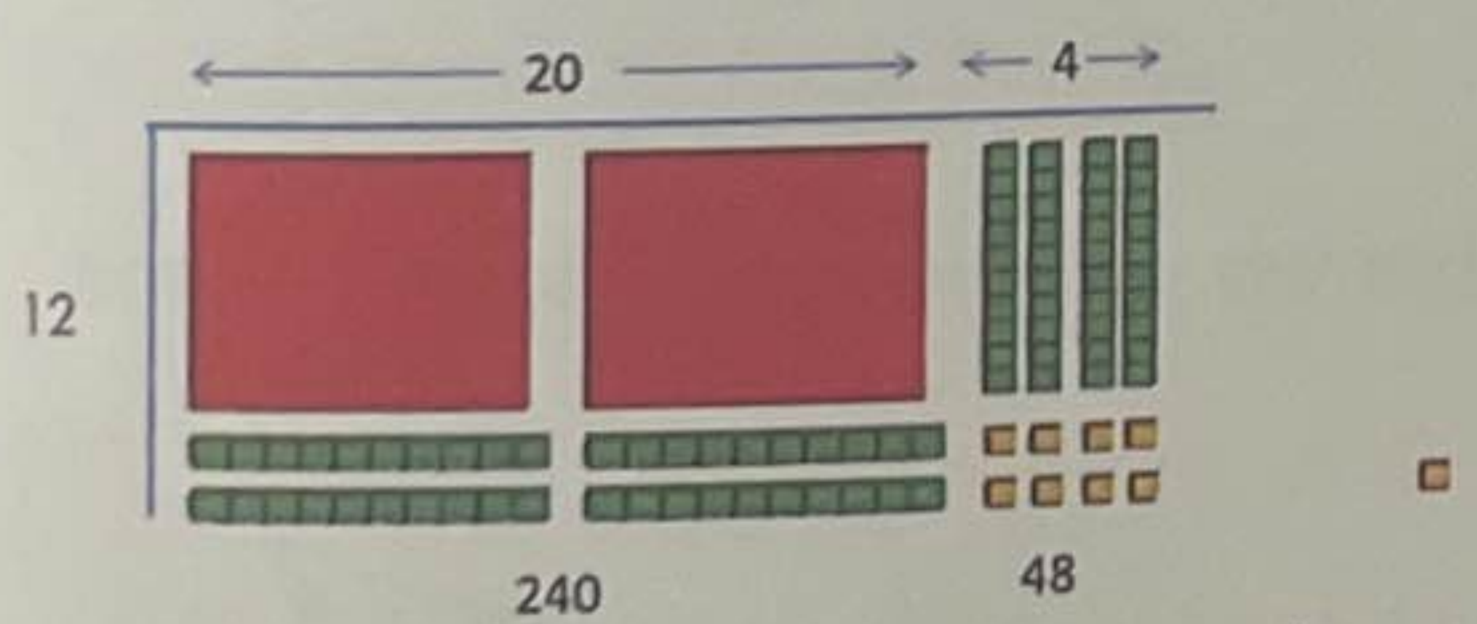
1. Make a rectangle where one side is 12 (the number dividing by) using hundreds and tens



With 49 remaining

```
      2
12 | 289
   - 240    (20 x )
      49
```

2. Make groups of 12 using tens and ones



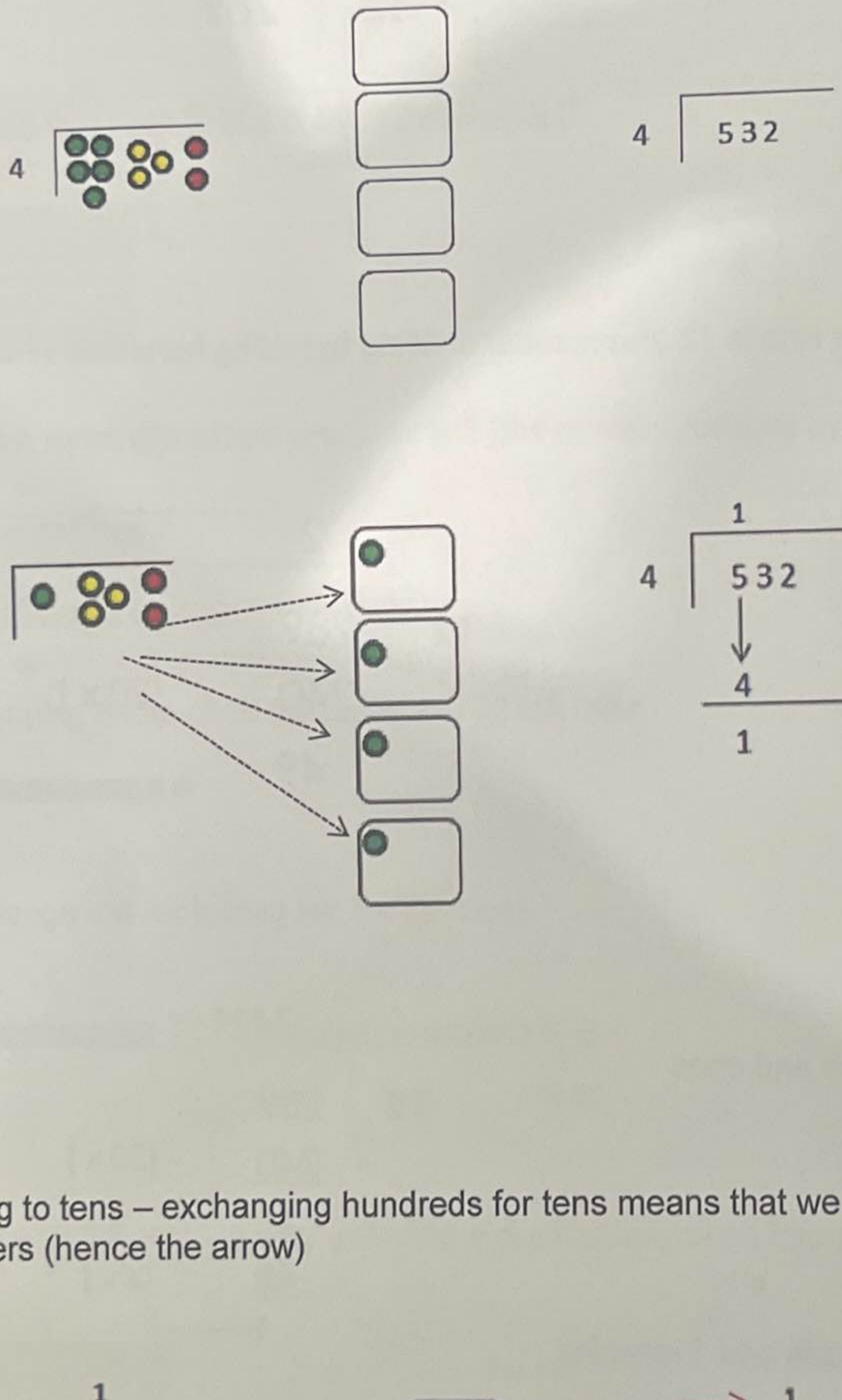
No more groups of 12 can be made and 1 remains

```
     24 r1
12 | 289
   - 240    (20 x )
      49
   -  48    (4 x )
       1
```

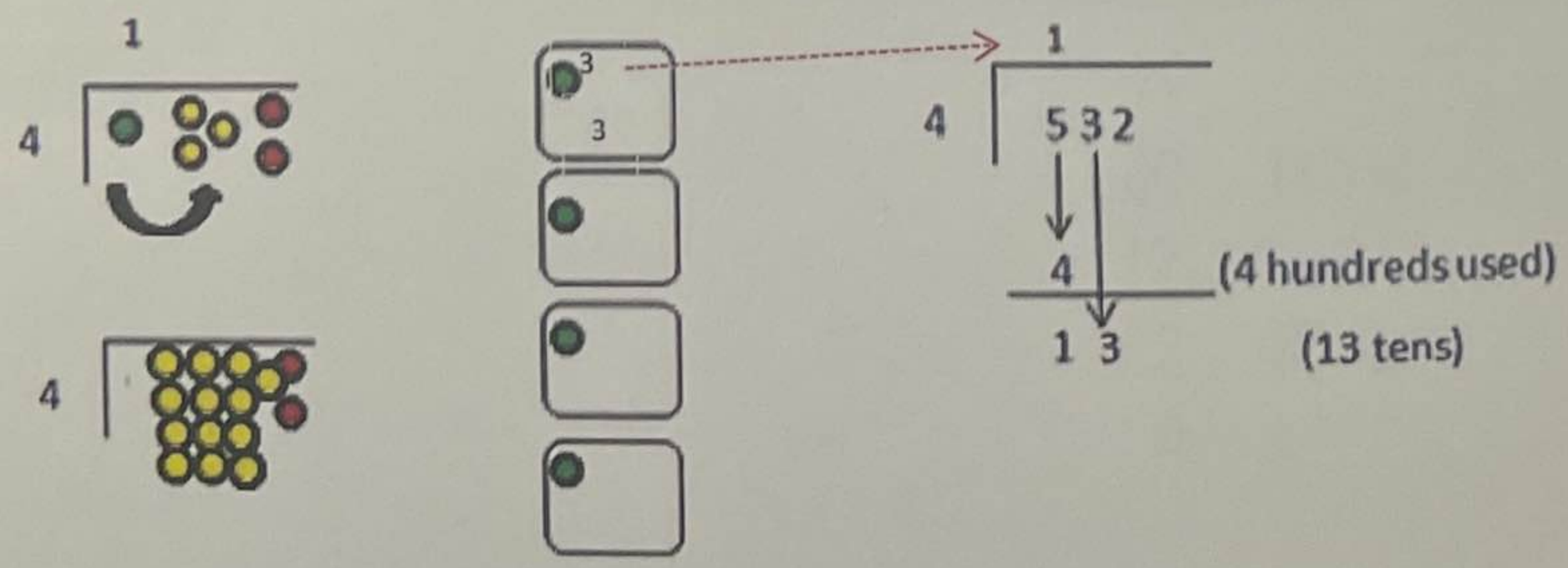
Sharing model of long division using place value counters

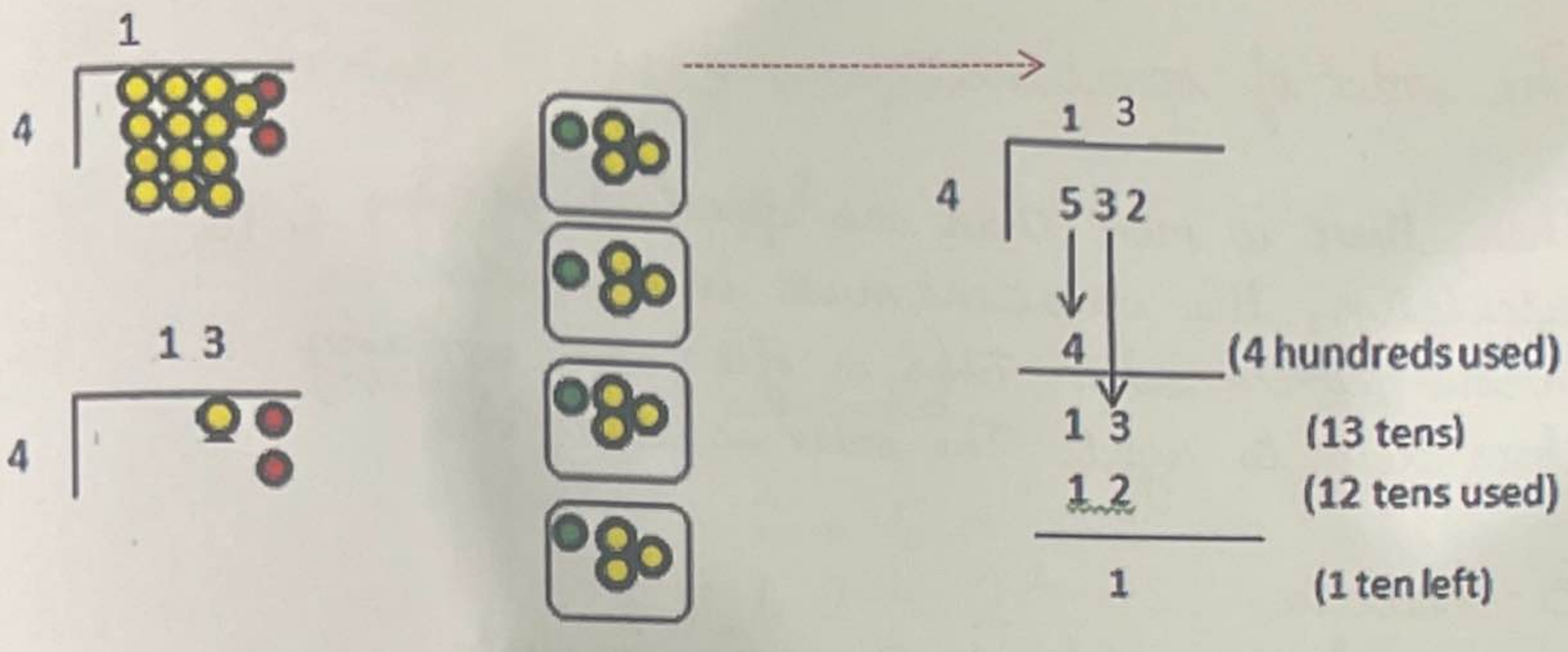
Starting with the most significant digit, share the hundreds. The writing in brackets is for verbal explanation only.

532 ÷ 4

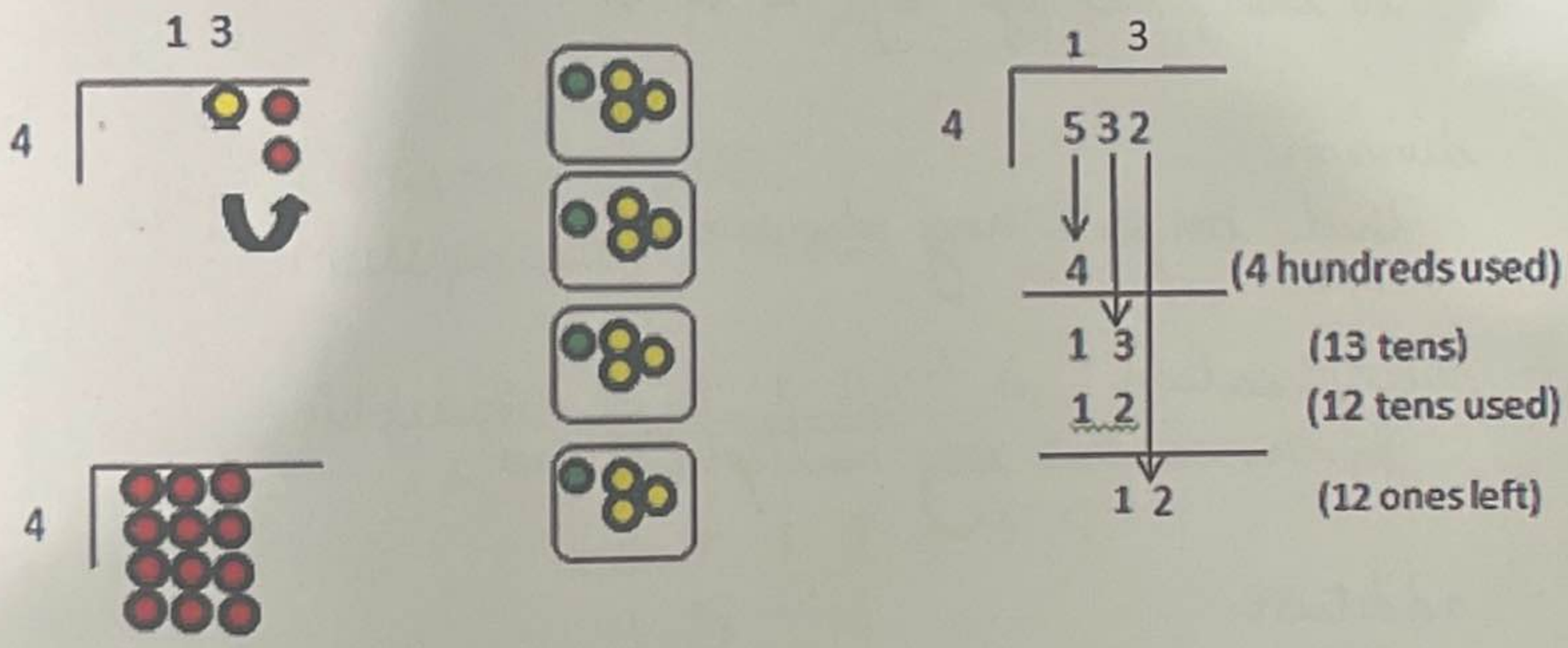


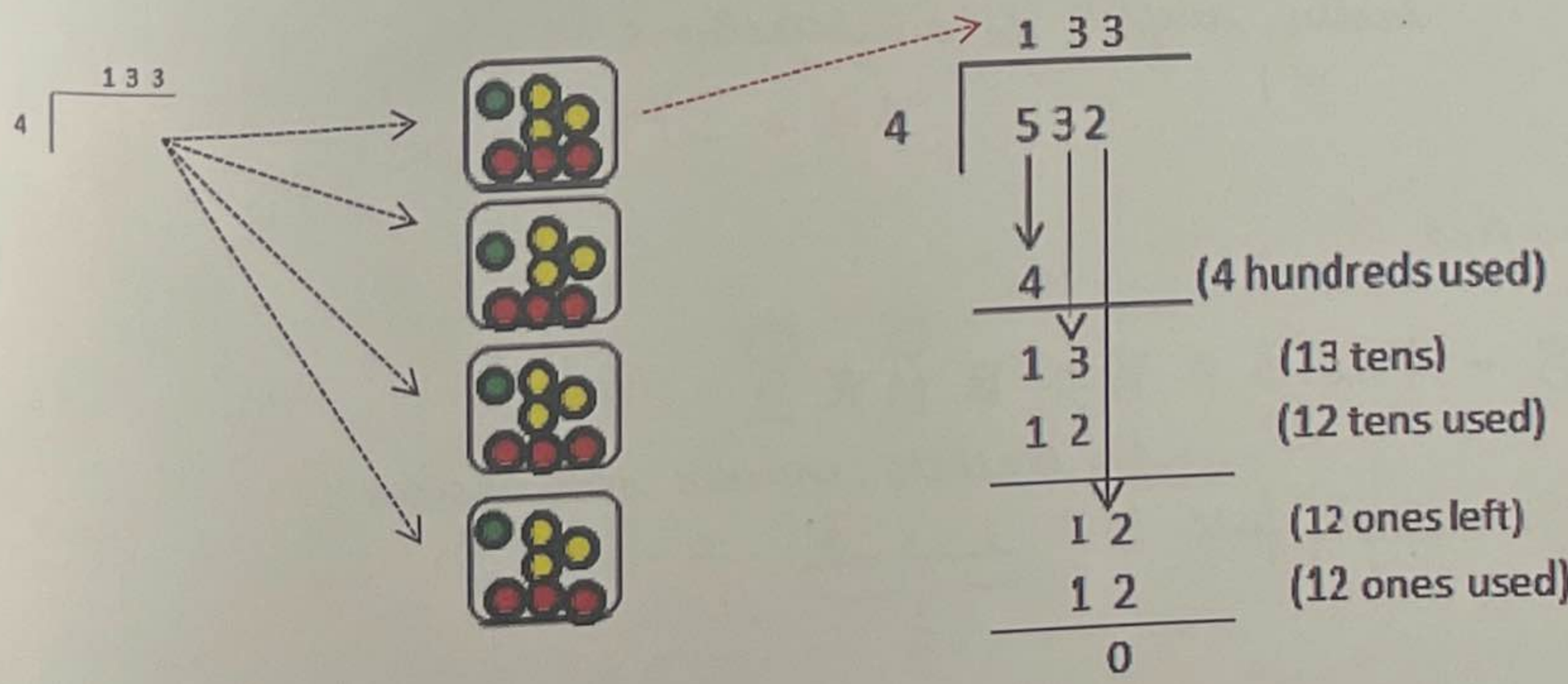
Moving to tens – exchanging hundreds for tens means that we now have a total of 13 tens counters (hence the arrow)





Moving to ones, exchange tens to ones means that we now have a total of 12 ones counters (hence the arrow)





The order of operations

When there is more than one operation in a calculation, the operations must be completed in the correct order.- This is often not working from left to right. The order is BIDMAS

B - brackets
first, complete anything in brackets

I - indices
second, complete any numbers being multiplied to the power of eg. 2^4 or 5^2

D - division
third, complete any divisions

M - multiplication
fourth, complete any multiplications

A - addition
fifth, complete any additions

S - subtractions
lastly, complete any subtractions.

Examples:

a) $8 - 1 \times 3 = 8 \times 3$ (① M, ② S)

No brackets, indices or division

So multiply first $8 - \underbrace{1 \times 3}_{3} = 8 - 3$

Then complete subtraction $8 - 3 = 5$

So. $8 - 1 \times 3 = 5$

Further BIDMAS examples:

b) $3 + (2 \times 6) - 2^2 =$

Brackets $3 + \underline{\underline{(2 \times 6)}} - 2^2$

$2 \times 6 = 12$

$3 + 12 - 2^2$

Indices $3 + 12 - \underline{\underline{2^2}}$

$2^2 = 2 \times 2 = 4$

$3 + 12 - 4$

Division - NONE

Multiplication - NONE

Addition $\underline{\underline{3 + 12}} - 4$

$3 + 12 = 15$

$15 - 4$

Subtraction $\underline{\underline{15 - 4}} = 11$

So, $3 + (2 \times 6) - 2^2 = 11$

Year 5: Identify factors including all factor pairs of a number, and common factors of two numbers

Year 6: Identify common factors

Factors

To find factors:
Eg. List all of the factors of 30.

① Write the number you are trying to find the factors of at the top.

30

② Start from 1, listing all of the factor pairs (even above 12 times table). Cross out any that don't go into it. Stop when the numbers start repeating themselves.

30

1	30
2	15
3	10
~~4~~	
5	6
~~6~~ ← repeat	

To find common factors:
① Complete steps to find factors for both numbers.
② Circle all of the common factors.
③ Write out list of common factors.
Look for highest / lowest if necessary.

Eg. Find the common factors of 30 and 18.

30

(1)	30
(2)	15
(3)	10
~~4~~	
5	(6)

18

(1)	18
(2)	9
(3)	(6)
~~4~~	
~~5~~	

Common factors: 1, 2, 3, 6
Highest common factor = 6

Year 5: Identify multiples

Year 6: Identify common multiples

Common Multiples

Eg. Find the lowest common multiple of 5 and 4.

① Starting with the bigger number, list the first 5 multiples of each number.

② Circle any numbers which appear in both lists.

③ If you do not have any common multiples yet, list the next 5 multiples for each and repeat. Continue until you find a common multiple.

Eg:

5: 5, 10, 15, (20), 25

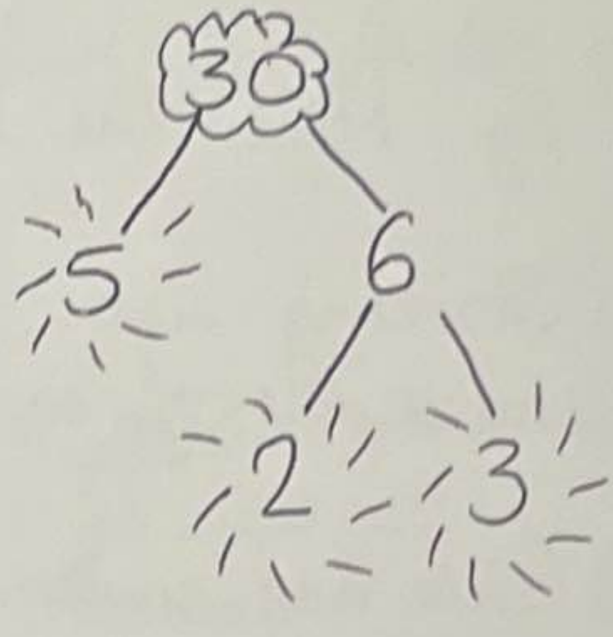
4: 4, 8, 12, 16, (20)

Year 5: Know and use the vocabulary of prime numbers, prime factors and composite (non-prime numbers)

Eg. Find the prime factors of 30.

① Put the number at the top of your tree.

② List two multiple pairs underneath (each one is a branch)



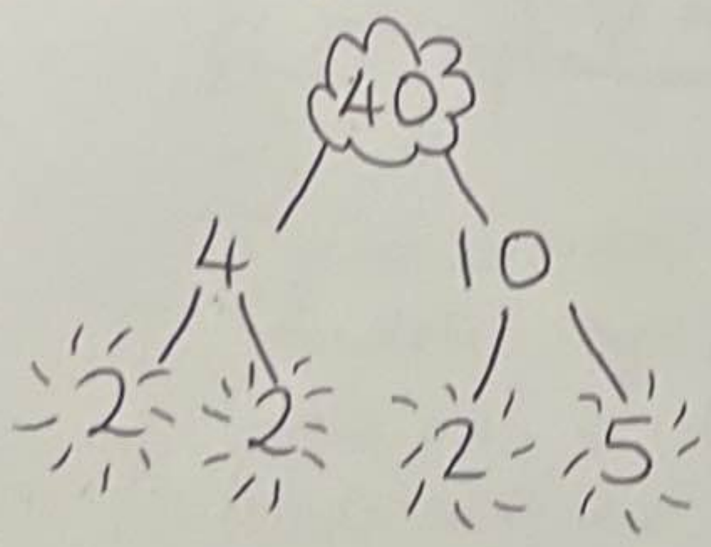
③ If the number is prime, leave it.

④ If a number is not prime, continue finding multiple pairs until your only answers are prime.

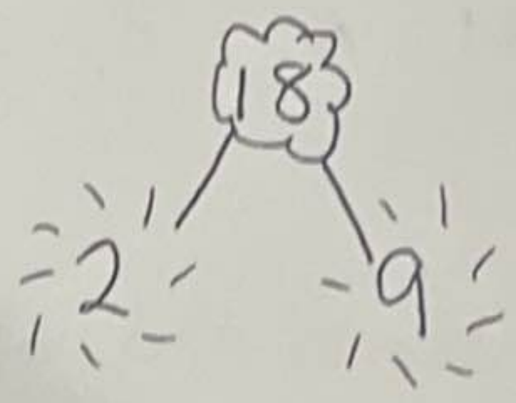
⑤ Write the primes into a number sentence. Multiply them together to check your answer is correct.

30 =
5 x 2 x 3

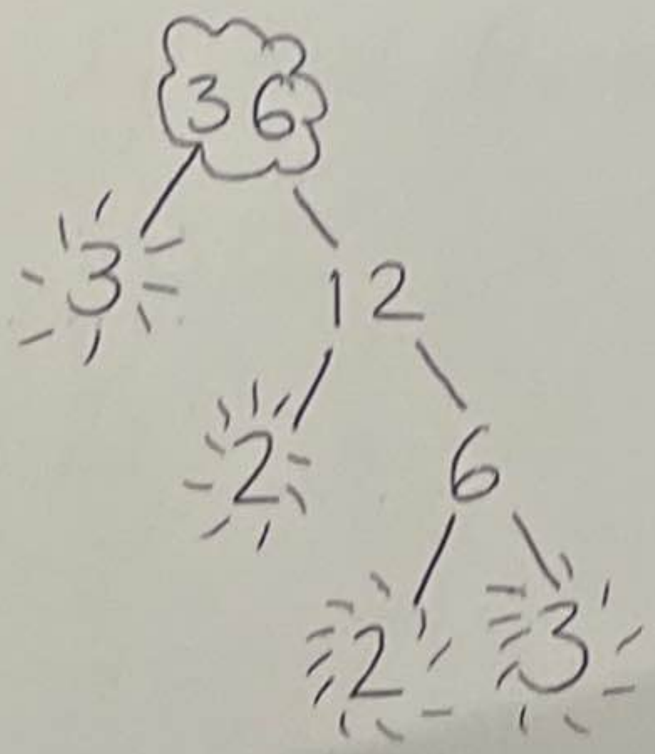
Examples



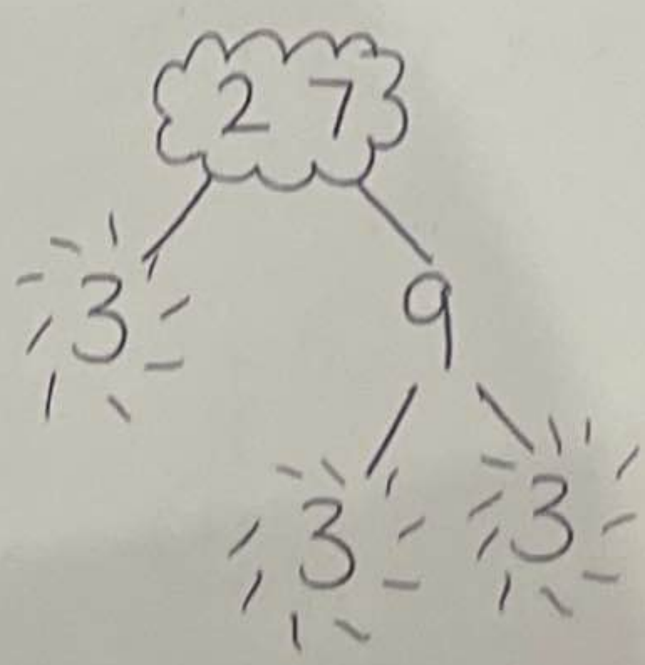
40 = 2 x 2 x 2 x 5



18 = 2 x 9



36 = 2 x 2 x 3 x 3



Square Numbers

A square number is the product of a number multiplied by itself.

The instruction to square a number is indicated by the notation ^{2}.

$1^2 = 1 \times 1 = 1$
$2^2 = 2 \times 2 = 4$
$3^2 = 3 \times 3 = 9$
$4^2 = 4 \times 4 = 16$
$5^2 = 5 \times 5 = 25$
$6^2 = 6 \times 6 = 36$
$7^2 = 7 \times 7 = 49$
$8^2 = 8 \times 8 = 64$
$9^2 = 9 \times 9 = 81$
$10^2 = 10 \times 10 = 100$

So, 1, 4, 9, 16, 25, 36, 49, 64, 81 and 100 are all square numbers.

The number you multiplied by itself is called the square root.
The instruction to find a square root is $\sqrt{\ }$

$\sqrt{4} = 2$ $\quad\quad$ $\sqrt{49} = 7$

$\sqrt{16} = 4$ $\quad\quad$ $\sqrt{81} = 9$

Cube Numbers

A cube number is the product of multiplying a number by itself and then multiply it by itself again.

The instruction to cube a number is indicated by the notation ^{3}.

$1^3 = 1 \times 1 \times 1 = 1$
$2^3 = 2 \times 2 \times 2 = 8$
$3^3 = 3 \times 3 \times 3 = 27$
$4^3 = 4 \times 4 \times 4 = 64$
$5^3 = 5 \times 5 \times 5 = 125$

So, 1, 8, 27, 64 and 125 are all cube numbers.

The number you multiplied by itself is called the cube root.

The instruction to find a cube root is $\sqrt[3]{\ }$

$\sqrt[3]{8} = 2$ $\sqrt[3]{64} = 4$

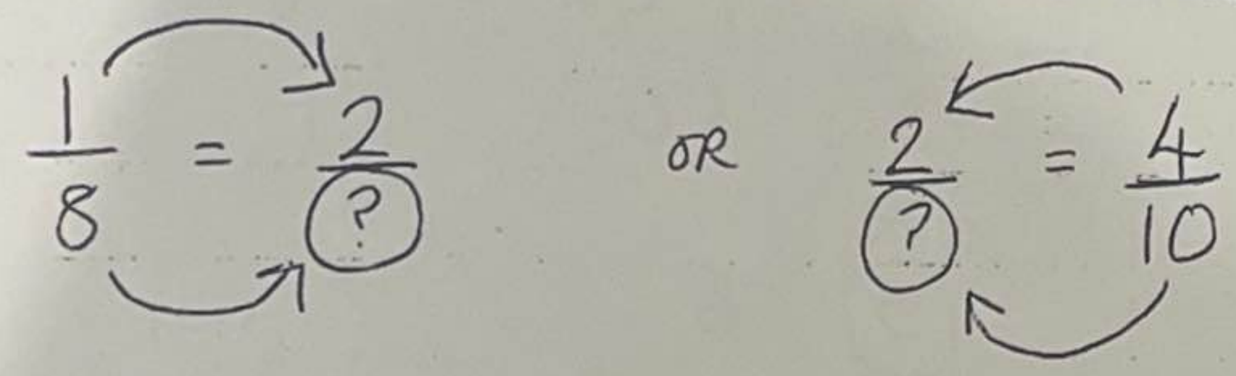
$\sqrt[3]{27} = 3$ $\sqrt[3]{125} = 5$

Year 5: Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths

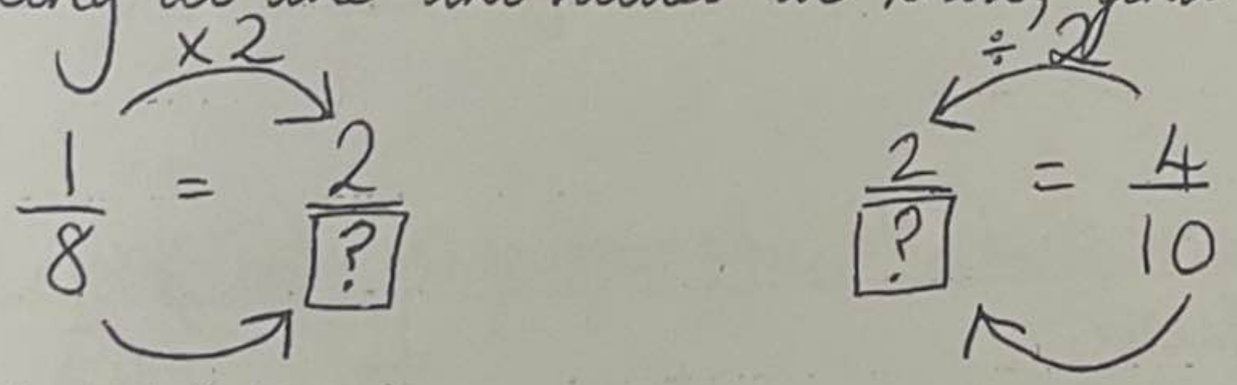
Finding Equivalent Fractions

Eg $\frac{1}{8} = \frac{2}{?}$ OR $\frac{2}{?} = \frac{4}{10}$

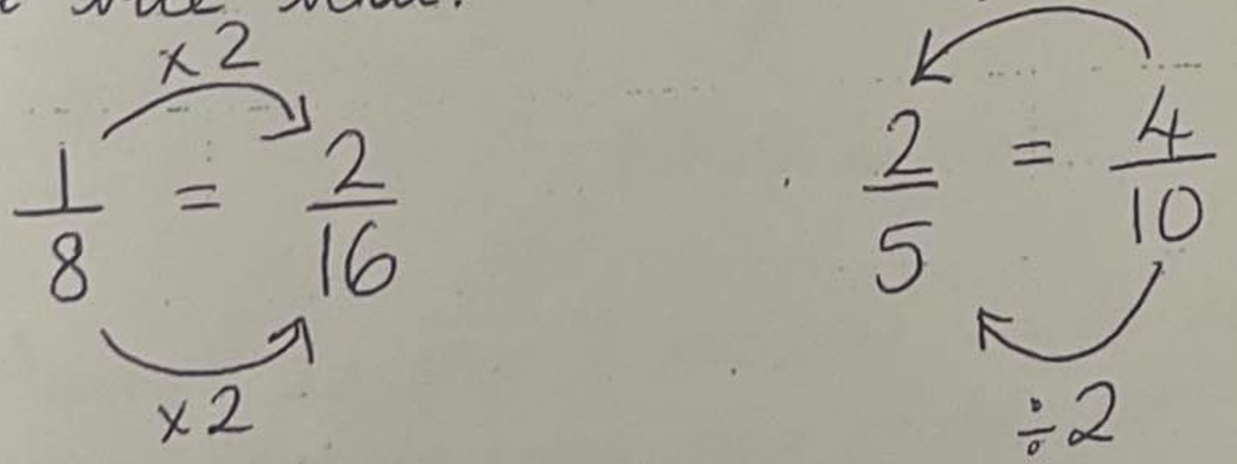
① Write out your numbers, drawing arrows from the known fraction, to the fraction I do not fully know
(denominator → denominator and numerator → numerator)



② Looking at the two values we know, find the scale factor.



③ Whatever you have done to the top, you do to the bottom and vice versa.



Simplifying fractions

Eg. Simplify $\frac{5}{30}$

① List all of the factors of your numerator and denominator

5

1 × 5

~~2~~ ~~× 2~~

30

1	30
2	15
3	10
~~4~~	
5	6

② Circle the common factors. Find the highest.
5 is the HCF

③ Divide the numerator and the denominator by your highest common factor.

$$\frac{5}{30} \begin{matrix}(\div 5)\\(\div 5)\end{matrix} = \frac{1}{6}$$

Converting mixed numbers to improper fractions

Eg. $2\frac{3}{4}$

① Do Whole number × denominator
$2 \times 4 = 8$

② Add numerator to answer from step 1.
$8 + 3 = 11$

③ Answer from step 2 is your new numerator!

$\frac{11}{?}$

④ Your denominator stays the same.

$\frac{11}{4}$

Converting improper fractions to mixed numbers

Eg. $\frac{11}{4}$

① Numerator ÷ denominator
$11 \div 4 = 2$ remainder 3.
↑ Whole number ↑ Numerator.

② Answer to step 1 becomes whole number and the remainder becomes your numerator.

$2\ ^{3}$

③ Denominator stays the same

$2\frac{3}{4}$

Creating Common Denominators

Eg. $\frac{1}{4}$ and $\frac{2}{5}$

If one denominator is a multiple of the other:

① Find the scale factor (how many times it goes into the other denominator)

$\frac{1}{4}$ and $\frac{3}{8}$ (×2)

② Multiply your numerator by the scale factor

$\frac{1}{4}\ (\times 2) = \frac{2}{8}$

If the denominators are not multiples/factors of one another and you only have 2 fractions

① Multiply the denominators by each other.

$\frac{1}{4}\ (\times 5) = \frac{\ }{20}$ $\frac{2}{5}\ (\times 4) = \frac{\ }{20}$

② Whatever you do to the top, do to the bottom.

$\frac{1}{4}\ ^{(\times 5)}_{(\times 5)} = \frac{5}{20}$ $\frac{2}{5}\ ^{(\times 4)}_{(\times 4)} = \frac{8}{20}$

Common denominators of 3 or more fractions.

Eg. $\frac{1}{3}$ $\frac{2}{5}$ $\frac{8}{10}$

① Check they are not multiples of each other.
If they are, follow Success Criteria for 'If they are multiples of each other'.

② If not, find a common multiple of all the denominators.
List them, starting with the greatest; tick if they are common:

$\frac{1}{3}$ $\frac{2}{5}$ $\frac{8}{10}$

Common multiples:

10:	10,	20,	30,	40,	50
5:	✓	✓	✓	✓	✓
3:	×	×	✓	×	×

③ Work out the scale factor to get each of your denominators to be the common multiple (same as finding an equivalent fraction).

$\frac{1}{3}$ ×10 → $\frac{?}{30}$

$\frac{2}{5}$ ×6 → $\frac{?}{30}$

$\frac{8}{10}$ ×3 → $\frac{?}{30}$

④ Whatever you do to the bottom, you do to the top.

$\frac{1}{3}$ ×10 → $\frac{10}{30}$

$\frac{2}{5}$ ×6 → $\frac{12}{30}$

$\frac{8}{10}$ ×3 → $\frac{24}{30}$

Year 5: Compare and order fractions whose denominators are all multiples of the same number

Year 6: Compare and order fractions, including fractions greater than one

When you have two fractions

Eg. $\frac{1}{5}$ and $\frac{2}{6}$ Which is greater?

① Find a common denominator using the common denominator success criteria.

$\frac{1}{5} \overset{(\times 6)}{(\times 6)} = \frac{6}{30}$ $\frac{2}{6} \overset{(\times 5}{(\times 5)} = \frac{10}{30}$

② Compare your two fractions, looking at the numerators

$\frac{6}{30} < \frac{10}{30}$

When you have more than two fractions

Eg. $\frac{1}{3}$ $\frac{2}{5}$ $\frac{1}{10}$ Order from smallest to greatest.

① Find a common denominator using 'common denominators of 3 or more fractions' success criteria.

	$\frac{1}{3}$	$\frac{2}{5}$	$\frac{1}{10}$		
10:	10,	20,	30,	40,	50
5:	✓	✓	✓	✓	✓
3:	×	×	✓	×	×

$\frac{1}{3} \xrightarrow{\times 10} \frac{10}{30}$ $\frac{2}{5} \xrightarrow{\times 6} \frac{12}{30}$ $\frac{1}{10} \xrightarrow{\times 3} \frac{3}{30}$

② Order and convert back if necessary

smallest $\frac{3}{30}$ $\frac{10}{30}$ $\frac{12}{30}$ largest.

$\frac{1}{10}$ $\frac{1}{3}$ $\frac{2}{5}$

Year 5: Add and subtract fractions with the same denominator and multiples of the same number

Year 6: Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions

Adding or subtracting fractions with the same denominator.

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

① The denominator always stays the same $\frac{2}{4} + \frac{1}{4} = \frac{?}{4}$

② Add the numerators (2 + 1) $\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$

Eg $\frac{5}{6} - \frac{3}{6} = \frac{2}{6}$

Adding or subtracting fractions with different denominators

① Make the denominators the same
(See finding common denominators Success Criteria)

② Add or subtract the numerators, keeping the denominators the same.

Adding mixed numbers

① Convert to improper fractions

② Ensure the denominators are the same.

③ Add the numerators; keep the denominator the same.

④ Convert back to a mixed number if asked.

Year 5: Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams

Year 6: Multiply simple pairs of proper fractions, writing the answer in its simplest form; divide proper fractions by whole numbers

Multiplying simple pairs of proper fractions.

Eg. $\frac{1}{5} \times \frac{2}{3} =$

① Multiply the numerator by the numerator

$\frac{1}{5} \times \frac{2}{3} = \frac{1 \times 2}{} = \frac{2}{}$ ← This is your new numerator.

② Multiply the denominator by the denominator

$\frac{1}{5} \times \frac{2}{3} = \frac{1 \times 2}{5 \times 3} = \frac{2}{15}$ ← This is your new denominator

③ Simplify the answer if possible

Divide proper fractions by whole numbers

E.g. $\frac{1}{3} \div 2 =$

① Multiply the denominator by the whole

$3 \times 2 = 6$ ← This becomes your new denominator

② The numerator stays the same as before (1)

So, $\frac{1}{3} \div 2 = \frac{1}{3 \times 2} = \frac{1}{6}$

Multiplying proper fractions by whole numbers

E.g $\frac{2}{8} \times 3 =$

① Multiply the numerator by the whole number

$2 \times 3 = 6$

This becomes your new numerator $\frac{6}{}$

② The denominator stays the same. $\frac{6}{8}$

$$\frac{2}{8} \times 3 = \frac{6}{8}$$

Multiplying mixed numbers by whole numbers

E.g $4\frac{1}{2} \times 3 =$

① Convert the mixed number into an improper fraction:

$$4\frac{1}{2} = \frac{(4 \times 2) + 1}{2} = \frac{9}{2}$$

② Complete as above

$$\frac{9}{2} \times 3 = \frac{9 \times 3}{2} = \frac{27}{2}$$

③ Convert back to a mixed number:

$$\frac{27}{2} = 27 \div 2 = 13 \text{ r } 1$$
$$= 13\frac{1}{2}$$

Eg. Find 67% of £1 20.

① To find 10%, divide the whole number by 10
So...
10% = 120 ÷ 10
= 12

② To find 1%, divide the whole number by 1.
So...
1% = 120 ÷ 100
= 1.2

③ Partition the percentage you are looking for.

67
↙ ↘
60 + 7

④ Scale your 10% and 1%

60 7

×6 (10% = 12) ×6 ×7 (1% = 1.2) ×7
60% = 72 7% = 8.4

⑤ Add your tens and units together:

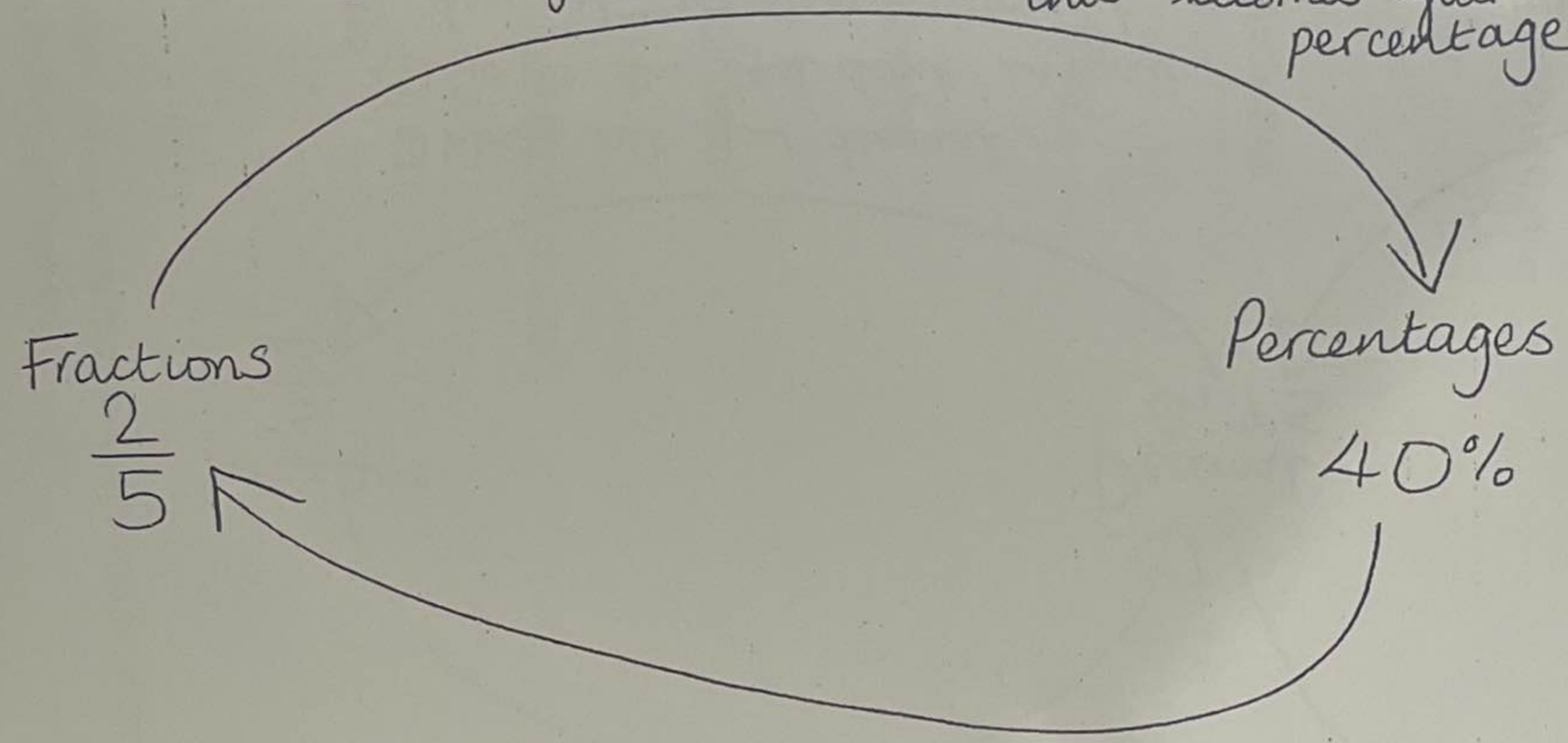
60% = 72 7% = 8.4

67% = 72 + 8.4
= 80.4

⑥ Add in units of measure if necessary.
80.4 = £80.40

Converting fractions, Decimals and Percentages

① Find the equivalent fraction $\frac{\quad}{100}$
② Take your new numerator – this becomes your percentage



So $\frac{2}{5} = \frac{40}{100}$ (×20)

$\frac{40}{100} = 40\%$ (×20)

① Put your percentage as the numerator → $\frac{40}{\quad}$
And 100 as the denominator → $\frac{40}{100}$

② Simplify if necessary.

Year 5: Read and write decimal numbers as fractions
Year 6: Associate a fraction with division and calculate decimal fraction equivalents for a simple fraction

Converting Fractions, Decimals and Percentages.