

# Division

## Key Vocabulary:

share, equal, total, divide, group, short division, long division, halve, partition, place value, remainder, multiply, divide, inverse, fact family, add, subtract, factor, multiple, exchange

**Teachers need to model the language of dividend ÷ divisor = quotient (remainder)**

# Making equal groups

Sort a whole set people and objects into equal groups.



*There are 10 children altogether.*

*There are 2 in each group.*

*There are 5 groups.*

Represent a whole and work out how many equal groups.



*There are 10 in total.*

*There are 5 in each group.*

*There are 2 groups.*

Children may relate this to counting up in steps of 2, 5 or 10.

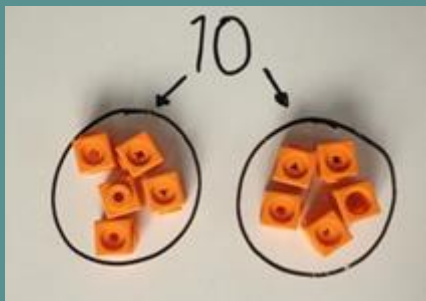


There are \_\_\_ in each group.

There are \_\_\_ groups

# Halving

Share a whole set people and objects between two.



*There are 10 sweets altogether.*

*They are shared between 2 people.*

*There are 5 sweets each.*

Use pictures as representations to halve even numbers up to 10, progressing to even numbers up to 20.



Half of 6 is 3.

3 is half of 6.

If I halve 6 I get 3.

Children to make a link to 2 times tables, and to doubling as inverse facts.

# Sharing equally

\_\_ shared  
into \_\_  
equal parts.

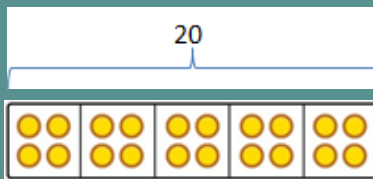
There are  
\_\_ in each  
part.

Start with a whole and  
share into equal parts,  
one at a time.



8 shared equally between 4  
plates.  
There are 2 on each plate.

Represent the objects  
shared into equal parts  
using a bar model.



*20 shared into 5 equal  
parts.  
There are 4 in each part.*

Use a bar model to support  
understanding of the  
division.

$$18 \div 2 = 9$$



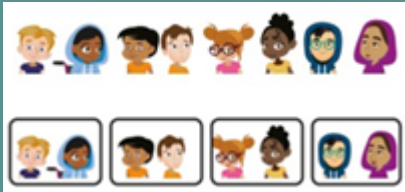
*Introduce language of  
dividend, divisor and  
quotient.*

\_\_\_ divided  
into groups  
of \_\_\_.

There are  
\_\_\_ groups.

# Grouping

Understand how to make  
equal groups from a whole.



*8 divided into groups of 2.  
There are 4 groups.*

Understand the relationship  
between grouping and the  
division statements.

$12 \div 6 = 2$   
 $12 \div 4 = 3$   
 $12 \div 2 = 6$   
 $12 \div 3 = 4$

*12 divided into  
groups of 3.*

$$12 \div 3 = 4$$

*There are 4  
groups.*

# Link sharing and grouping

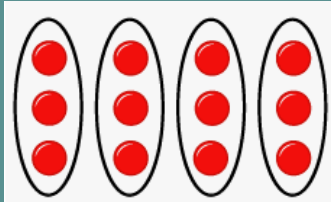
Use pictures to represent grouping and sharing.

What is the same?

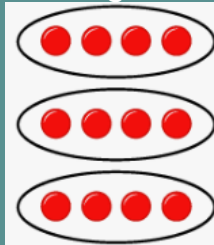
What is different?

$$12 \div 3 = 4$$

Grouping:



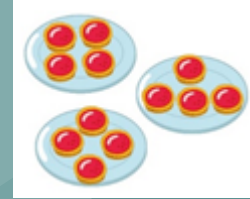
Sharing:



\_\_\_ shared into  
\_\_\_ equal parts  
is \_\_\_.

\_\_\_ into groups  
of \_\_\_ is \_\_\_.

One picture, two stories:



12 cakes shared  
between 3 plates. There  
are 4 on each plate.

$$12 \div 3 = 4$$

12 cakes into groups of  
4. There are 3 groups.

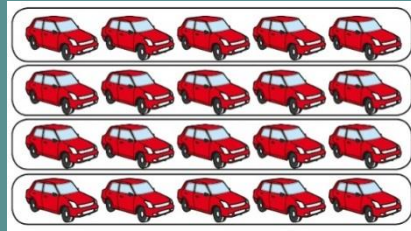
$$12 \div 4 = 3$$

# Using known times-tables to solve divisions

If I know that  
factor  $\times$  factor =  
product

Then I also  
know product  $\div$   
factor = factor  
or  
dividend  $\div$   
divisor =  
quotient

Understand the relationship  
between multiplication facts and  
division.



*4 groups of 5 cars is 20 cars in  
total.*

*20 divided into groups of 5 is 4*

$$20 \div 5 = 4$$

# Dividing whole numbers by 10, 100 and 1,000

To divide by 10, the digits move \_\_\_ spaces to the right.

To divide by 100, the digits move \_\_\_ spaces to the right.

To divide by 1000, the digits move \_\_\_ spaces to the right.

Use place value equipment to support unitising for division.

*15 ones put into groups of 3 ones. There are 5 groups.*

$$15 \div 3 = 5$$



*15 tens put into groups of 3 tens. There are 5 groups.*

$$150 \div 30 = 5$$





# 2-digit number divided by 1-digit number, no remainders (flexible partitioning)

Partition the dividend into tens and ones.

\_\_\_ is \_\_\_ tens and \_\_\_ ones.

Divide the tens.

\_\_\_  $\div$  \_\_\_ = \_\_\_

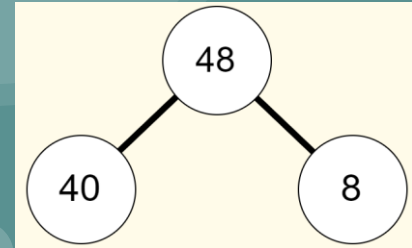
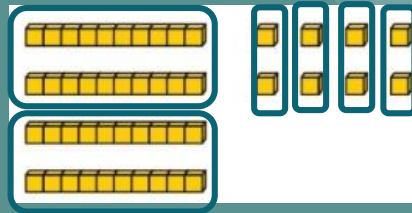
Divide the ones.

\_\_\_  $\div$  \_\_\_ + \_\_\_

\_\_\_ tens + \_\_\_ ones = \_\_\_

Children explore dividing 2-digit numbers

$$48 \div 2 = ?$$



$$40 \div 2 = 20$$

$$8 \div 2 = 4$$

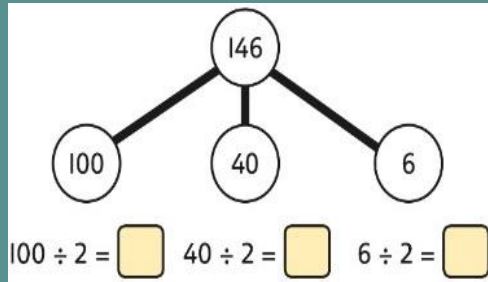
$$20 + 4 = 24$$

$$48 \div 2 = 24$$

# Dividing up to 3-digit numbers by a single digit by partitioning into 100s, 10s and 1s

Partition into 100s, 10s and 1s using a part-whole model to divide where appropriate.

$$142 \div 2 = ?$$



$$100 \div 2 = 50$$

$$40 \div 2 = 20$$

$$6 \div 2 = 3$$

$$50 + 20 + 3 = 73$$

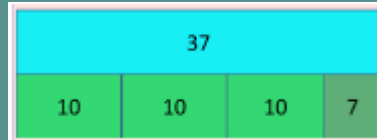
$$142 \div 2 = 73$$

# Understanding remainders

Use equipment to understand that a remainder occurs when a set of objects cannot be divided equally any further.



*There are 13 sticks in total.  
There are 3 groups of 4, with 1 remainder.*



There are \_\_\_ equal groups and \_\_\_ left over (remaining).

Dividend ÷ divisor = quotient and remainder

Understand that the remainder is what cannot be put into an equal group.

$$22 \div 5 = ?$$

5  
10  
15  
20  
25 (25 is more than 22)

*There are 4 equal groups of 5.*

*Count on from 20 to 22.  
There are 2 remainders*

$$22 \div 5 = 4 \text{ r}2$$

# 2-digit number divided by 1-digit number, with remainders

Step 1: partition the dividend into tens and ones.

\_\_\_ = \_\_\_ tens and \_\_\_ ones

Step 2: divide the tens

\_\_\_ ÷ \_\_\_ = \_\_\_

Step 3: divide the ones \_\_\_ ÷ \_\_\_

Write the remainder.

Partition to divide, understanding the remainder in context.

*67 children try to make 5 equal lines.*

$$67 = 60 + 7$$

$$60 \div 5 = 12$$

$$7 \div 5 = 1 \text{ remainder } 2$$

$$67 \div 5 = 13 \text{ r}2$$

*There are 13 children in each line and 2 children left out.*

# Dividing up to four digits by a single digit using short division (no exchange)

Set out the short division.

Divide the tens.

$$\underline{\quad} \div \underline{\quad}$$

Write the quotient in the tens column

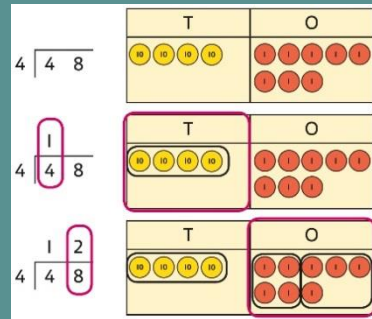
Divide the ones.

$$\underline{\quad} \div \underline{\quad}$$

Write the quotient in the ones column\*

Use place value equipment on a place value grid alongside short division.

$$48 \div 4 = ?$$



*There is 1 group of 4 tens.*

*There are 2 groups of 4 ones.*

$$48 \div 4 = 12$$

Progress to up to 4 digits divided by a single digit as appropriate using short division.

$$\begin{array}{r} 3212 \\ 3 \overline{) 9636} \end{array}$$

Link layout of formal method with language of number sentence.

$$\begin{array}{r} \text{Quotient} \\ \text{Divisor } \overline{) \text{ Dividend}} \end{array}$$

# Dividing up to four digits by a single digit using short division (with exchange)

Set out the short division.

Divide the tens.  $\underline{\quad} \div \underline{\quad}$   
(exchange where necessary)

Write the quotient in the tens column

Divide the ones.  $\underline{\quad} \div \underline{\quad}$   
(exchange where necessary)

Write the quotient in the ones column\*

| $4 \overline{) 92}$   | <table border="1"><thead><tr><th>T</th><th>O</th></tr></thead><tbody><tr><td>9 tens</td><td>2 ones</td></tr></tbody></table>                              | T | O | 9 tens                              | 2 ones                               | First, lay out the problem.  |
|---|---|---|---|-------------------------------------|--------------------------------------|--|
| T   | O   |   |   |                                     |                                      |  |
| 9 tens  | 2 ones  |   |   |                                     |                                      |  |
| $4 \overline{) \overset{2}{9}2}$                              | <table border="1"><thead><tr><th>T</th><th>O</th></tr></thead><tbody><tr><td>2 groups of 4 tens, 1 ten left over</td><td>2 ones</td></tr></tbody></table> | T | O | 2 groups of 4 tens, 1 ten left over | 2 ones                               | How many groups of 4 go into 9 tens?<br>2 groups of 4 tens with 1 ten left over. |
| T   | O   |   |   |                                     |                                      |  |
| 2 groups of 4 tens, 1 ten left over                           | 2 ones  |   |   |                                     |                                      |  |
| $4 \overline{) \overset{2}{9} \overset{10}{2}}$               | <table border="1"><thead><tr><th>T</th><th>O</th></tr></thead><tbody><tr><td>1 ten</td><td>12 ones</td></tr></tbody></table>                              | T | O | 1 ten                               | 12 ones                              | Exchange the 1 ten left over for 10 ones.<br>We now have 12 ones.                |
| T   | O   |   |   |                                     |                                      |  |
| 1 ten   | 12 ones   |   |   |                                     |                                      |  |
| $4 \overline{) \overset{2}{9} \overset{10}{2} \overset{3}{}}$ | <table border="1"><thead><tr><th>T</th><th>O</th></tr></thead><tbody><tr><td>1 ten</td><td>3 groups of 4 ones, 0 ones left over</td></tr></tbody></table> | T | O | 1 ten                               | 3 groups of 4 ones, 0 ones left over | How many groups of 4 go into 12 ones?<br>3 groups of 4 ones.                     |
| T   | O   |   |   |                                     |                                      |  |
| 1 ten   | 3 groups of 4 ones, 0 ones left over  |   |   |                                     |                                      |  |

# Dividing by a 2-digit number using long division with multiples

Step 1: subtract known multiples of the divisor.

Step 2: subtract the remaining multiples until you have reduced all of the dividend.

Step 3: add the total of the multiples.

Write the quotient and any remainders

Use long division. Write the required multiples to support the division process.

$$\begin{array}{r} 13 \overline{) 377} \\ - 130 \quad 10 \\ \hline 247 \\ - 130 \quad 10 \\ \hline 117 \\ - 117 \quad 9 \\ \hline 0 \quad 29 \end{array}$$

$$377 \div 13 = 29$$

# Dividing decimals

Set out the short division.

Divide the ones.  $\underline{\quad} \div \underline{\quad}$   
(exchange where necessary)

Write the remainder in  
the tenths column

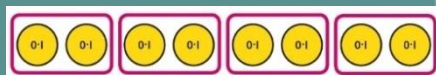
Write the decimal point.

Divide the tenths.  $\underline{\quad} \div$

$\underline{\quad}$   
(exchange where necessary)

Write the remainder in  
the hundredths column\*

Use place value equipment  
to explore division of  
decimals.



*8 tenths divided into 4  
groups.*

*There are 2 tenths in each  
group.*

$$0.8 \div 4 = 0.2$$

|                          |                    |   |   |
|--------------------------|--------------------|---|---|
| 0.8                      |                    |   |   |
| ?                        | ?                  | ? | ? |
| $4 \times 2 = 8$         | $8 \div 4 = 2$     |   |   |
| So, $4 \times 0.2 = 0.8$ | $0.8 \div 4 = 0.2$ |   |   |

Use short division to divide  
decimals with up to 2 decimal  
places.

|   |                                   |
|---|-----------------------------------|
| 8 | 4 . 2 4                           |
| 8 | 4 . <sup>4</sup> 2 4              |
| 8 | 4 . <sup>4</sup> 2 <sup>2</sup> 4 |
| 8 | 4 . <sup>4</sup> 2 <sup>2</sup> 4 |



# Long division (formal method)

1

$$\begin{array}{r} 3 \overline{) 435} \\ \underline{- 3} \phantom{0} \\ 13 \phantom{0} \end{array}$$

1 hundred cannot make a group of 3 so exchange 1 hundred for 10 tens.

1

$$\begin{array}{r} 3 \overline{) 435} \\ \underline{- 3} \phantom{0} \\ 13 \phantom{0} \end{array}$$

1 hundred cannot make a group of 3 so exchange 1 hundred for 10 tens.

$$65 \div 5$$

$$\begin{array}{r} 13 \text{ } \rightarrow \text{quotient} \\ \text{divisor } \leftarrow 5 \overline{) 65} \rightarrow \text{dividend} \\ \underline{-5} \phantom{0} \\ 15 \\ \underline{-15} \\ 0 \text{ } \rightarrow \text{remainder} \end{array}$$

$$\begin{array}{r} 316 \\ 3 \overline{) 948} \\ \underline{- 9} \phantom{00} \leftarrow 3 \text{ groups of 3 (hundreds)} \\ 4 \phantom{0} \\ \underline{- 3} \phantom{0} \leftarrow 3 \text{ groups of 1 (ten)} \\ 18 \\ \underline{- 18} \\ 0 \leftarrow 3 \text{ groups of 6 (ones)} \end{array}$$

# Understanding factors and prime numbers

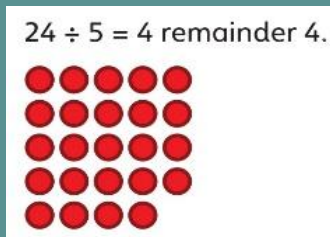
Use equipment to explore the factors of a given number.



$$24 \div 3 = 8$$

$$24 \div 8 = 3$$

*8 and 3 are factors of 24 because they divide 24 exactly.*



5 is not a factor of 24 because there is a remainder.

*I know that 31 is a prime number because it can be divided by only 1 and itself without leaving a remainder.*

*I know that 33 is a composite number (not a prime number) as it can be divided by 1, 3, 11 and 33.*

*I know that 1 is not a prime number, as it has only 1 factor.*