

## LONG DIVISION

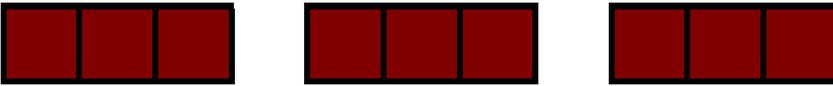
One way of thinking about division is to share something out equally.

Consider  $9 \div 3$

Suppose you had 9 squares of chocolate and you wanted to share these equally between 3 people. Remember each square represents 1 whole unit and there are 9 units in total.



This would mean that each person would get 3 pieces of chocolate each.



$$\begin{array}{r} 3 \\ 3 \overline{)9} \end{array}$$

When working with larger numbers the principle is the same but working out the division is more involved. What if you had 308 squares of chocolate and you wanted to share these out equally amongst 14 people, how many squares would each person have?

The problem would then become  $308 \div 14$

Stage 1: Write out the division as shown.

$$14 \overline{)308}$$

Stage 2: 14 into 3 won't go, 14 into 30 goes 2 times,  $2 \times 14 = 28$ , place the 28 below the 30.

$$\begin{array}{r} 2 \\ 14 \overline{)308} \\ \underline{28} \end{array}$$

Stage 3: Subtract the 28 from the 30, this leaves 2.

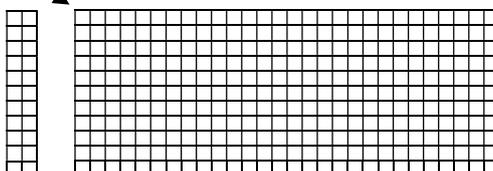
$$\begin{array}{r} 2 \\ 14 \overline{)308} \\ \underline{28} \\ 2 \end{array}$$

Stage 4: 14 into 2 won't go, so bring down the next figure (8). Then divide this new number (28) by 14, 14 into 28 goes 2 times,  $2 \times 14 = 28$  with no remainder.

$$\begin{array}{r} 22 \\ 14 \overline{)308} \\ \underline{28} \downarrow \\ 28 \end{array}$$

This represents 308 pieces of chocolate

Each one of the 14 people gets a block of chocolate that contains 22 squares of chocolate



### What happens when you get a remainder?

Consider  $33 \div 14$  (33 pieces of chocolate share amongst 14 people)

Stage 1: Write out the division as shown.

$$14 \overline{) 33}$$

Stage 2: 14 into 3 won't go, 14 into 33 goes 2 times,  $2 \times 14 = 28$ , place the 28 below the 33.

$$\begin{array}{r} 2 \\ 14 \overline{) 33} \\ \underline{28} \end{array}$$

Stage 3: Subtract the 28 from the 33, this leaves 5.

$$\begin{array}{r} 2 \text{ r}5 \\ 14 \overline{) 33} \\ \underline{28} \\ 5 \end{array}$$

This represents 33 pieces of chocolate

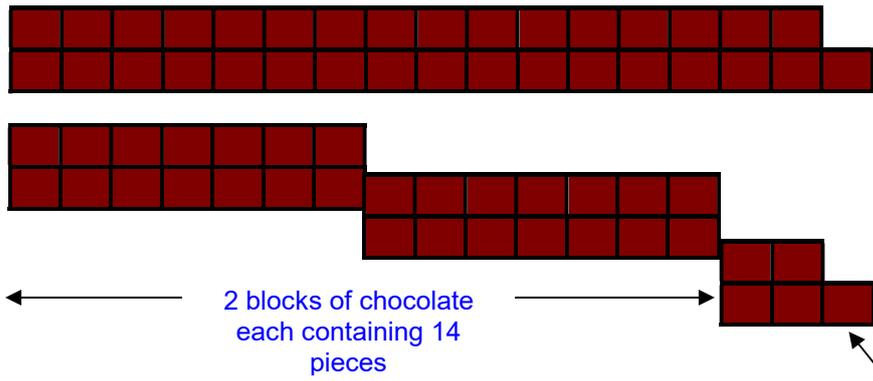


2 blocks of chocolate each containing 14 pieces

5 pieces remaining.

Therefore  $33 \div 14 = 2$  remainder 5, or more specifically  $2 \text{ and } \frac{5}{14}$ .

This represents 33 pieces of chocolate



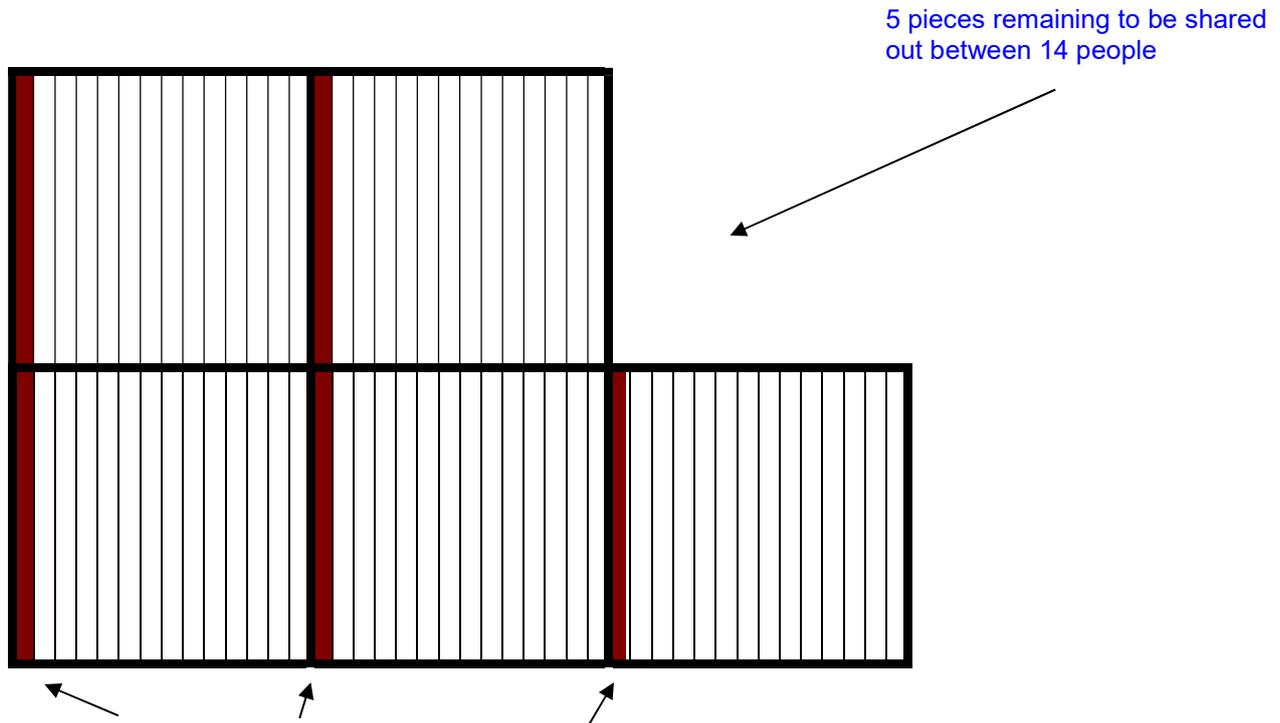
Therefore  $33 \div 14 = 2$  remainder 5, or more specifically 2 and  $\frac{5}{14}$ .

If you were going to share this amount of chocolate between 14 people each person would get 2 squares each plus  $\frac{1}{14}$  of the last 5 remaining pieces.

The remainder of  $\frac{5}{14}$  means you are trying to take the last 5 pieces and continue to share these out equally amongst 14 people.

I've redrawn the 5 remaining pieces a bit bigger so that you can see them each cut into 14 equal pieces.

Note that  $\frac{1}{14} + \frac{1}{14} + \frac{1}{14} + \frac{1}{14} + \frac{1}{14} = \frac{5}{14}$  and those 5 left over pieces must be each cut into 14 smaller parts so they can be shared out equally amongst the 14 people.



Each one of the 14 people would get  $\frac{1}{14}$  th of each of the 5 remaining pieces of chocolate

When all 14 people have taken their small portions of what was left over, all of the chocolate would have been consumed... happy times ☺

Suppose you wanted to share 339 peices of chocolate amongst a group of people and you wanted each person to have at least 14 squares of chocolate, how many blocks of 14 sqaures would you have to give out.

To find out how many 14's you can get into 339 your would need to solve the division  $339 \div 14$ .

Stage 1: Write out the division as shown.

$$14 \overline{) 339}$$

Stage 2: 14 into 3 won't go, 14 into 33 goes 2 times,  $2 \times 14 = 28$ , place the 28 below the 33.

$$\begin{array}{r} 2 \\ 14 \overline{) 339} \\ \underline{28} \end{array}$$

Stage 3: Subtract the 28 from the 33, this leaves 5.

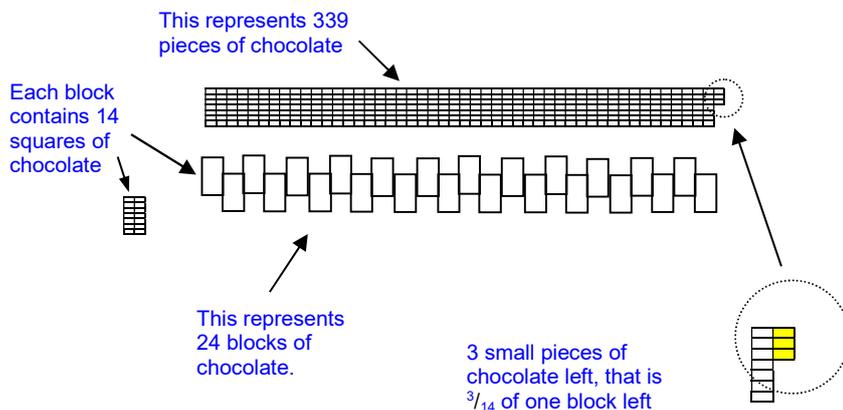
$$\begin{array}{r} 2 \\ 14 \overline{) 339} \\ \underline{28} \\ 5 \end{array}$$

Stage 4: 14 into 5 won't go so bring down the next figure (9). Then divide this new number (59) by 14, 14 into 59 goes 4 times.  $4 \times 14 = 56$ .

$$\begin{array}{r} 24 \\ 14 \overline{) 339} \\ \underline{28} \downarrow \\ 59 \end{array}$$

Stage 5: Subtract the 56 from the 59, this leaves 3.

$$\begin{array}{r} 24_{r3} \\ 14 \overline{) 339} \\ \underline{28} \\ 59 \\ \underline{56} \\ 3 \end{array}$$



Consider  $3392 \div 14$

Stage 1: Write out the division as shown.

$$14 \overline{)3392}$$

Stage 2: 14 into 3 won't go, 14 into 33 goes 2 times,  $2 \times 14 = 28$ , place the 28 below the 33.

$$\begin{array}{r} 2 \\ 14 \overline{)3392} \\ 28 \end{array}$$

Stage 3: Subtract the 28 from the 33, this leaves 5.

$$\begin{array}{r} 2 \\ 14 \overline{)3392} \\ 28 \\ 5 \end{array}$$

Stage 4: 14 into 5 won't go, so bring down the next figure (9). Then divide this new number (59) by 14, 14 into 59 goes 4 times.  $4 \times 14 = 56$ .

$$\begin{array}{r} 24 \\ 14 \overline{)3392} \\ 28 \downarrow \\ 59 \end{array}$$

Stage 5: Subtract the 56 from the 59, this leaves 3. 14 into 3 won't go, so bring down the next figure (2). Then divide this new number (32) by 14. 14 into 32 goes 2 times, with a remainder of 4.  $2 \times 14 = 28$ .

$$\begin{array}{r} 242_{r4} \\ 14 \overline{)3392} \\ 28 \downarrow \\ 59 \downarrow \\ 56 \downarrow \\ 32 \\ 28 \\ 4 \end{array}$$