

# Division as Repeated Subtraction \* (extra)

Multiplication is repeated addition. Division is the opposite of multiplication. You can think of **division as repeated subtraction**.

**Example.** Bag 771 apples so there are 3 apples in one bag. How many bags are needed? You can start by putting 3 apples to one bag, which leaves you 768 apples. Then for each bag you subtract 3 apples and keep counting the bags you use, until you hit zero apples.

$$771 - 3 - 3 - 3 - 3 - 3 - 3 \dots \textit{keep subtracting!}$$

$$1 \text{ bag } 1 \text{ bag } 1 \text{ bag } 1 \text{ bag } 1 \text{ bag } 1 \text{ bag } \dots \textit{keep counting bags!}$$

It just takes quite a long time, doesn't it? Instead you can take a 'shortcut' and initially subtract 300 apples (taking 100 bags) or some other big multiple of 3.

$$771 - 300 - 300 - 30 \dots$$

$$100 \text{ bags } 100 \text{ bags } 10 \text{ bags } \dots$$

Let's figure it out and keep count of the bags as we subtract (put in bags) the apples.

Method 1 - slower

Apples	Bags
771	
<u>- 300</u>	100 bags
471	
<u>- 300</u>	100 bags
171	
<u>- 30</u>	10 bags
141	
<u>- 30</u>	10 bags
111	
<u>- 30</u>	10 bags
81	
<u>- 30</u>	10 bags
51	
<u>- 30</u>	10 bags
21	
<u>- 21</u>	7 bags
0	

Method 2 - quicker

Apples	Bags
771	
<u>- 600</u>	200 bags
171	
<u>- 150</u>	50 bags
21	7 bags
<u>- 21</u>	
0	

It's over 700 apples.  
 In 100 bags would have 300 apples.  
 In 200 bags would have 600 apples.  
 In 300 bags would have 900 apples; too many bags.  
 Subtracting the 600 apples from 771 leaves 171 still to be bagged.

It's over 170 apples still.  
 In 10 bags I'll have 30 apples.  
 In 20 bags I'd have 60 apples.  
 In 50 bags I'd have 150 apples.  
 In 60 bags I'd have 180 apples; that's too many.  
 Subtract 150 apples from 171; 21 apples are left.

Need 7 bags for the last 21 apples.

So total needed  $200 + 50 + 7 = 257$  bags to bag all the apples. And it all went even - no apples left over! In other words,  $771 \div 3 = 257$ .