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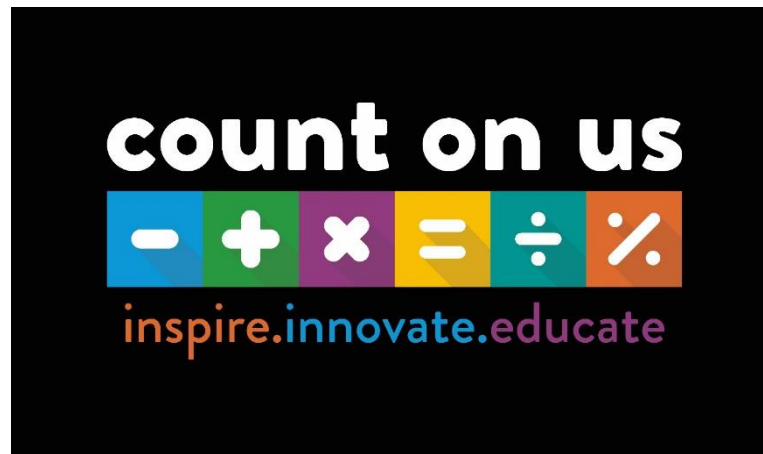
# Learning Together

**Online Numeracy and Mathematics sessions for  
parents to support Learning at Home**

*With support from Education Scotland and Scottish Government,  
building on themes emerging from the 'Making Maths Count'  
Group report*



**MAKING  
MATHS  
COUNT**



## Learning Together Session 3

Thursday 11<sup>th</sup> June 10:00

Multiplication and Division

**#npfsmaths**

Twitter : @CountOnUsEd

All slides and resources can be found at

[www.countonus.org.uk/learning-together](http://www.countonus.org.uk/learning-together)

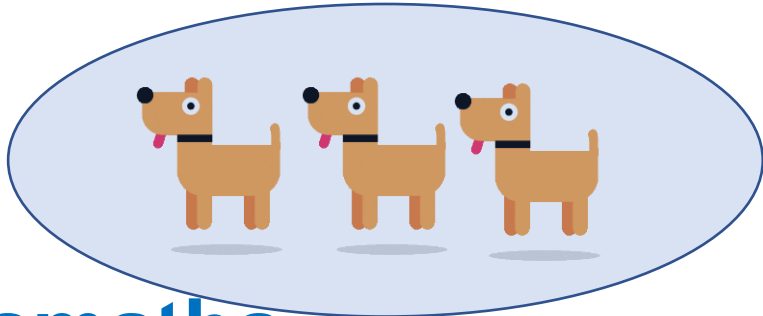
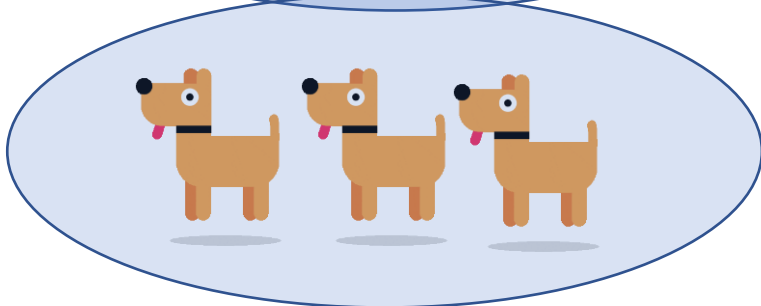
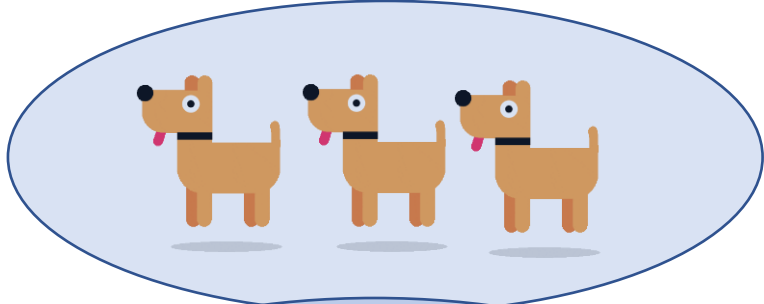
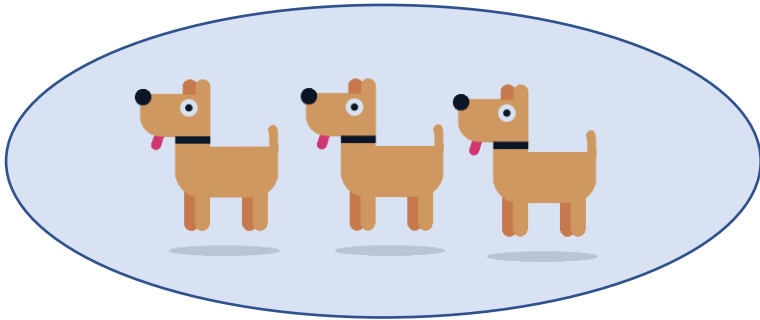
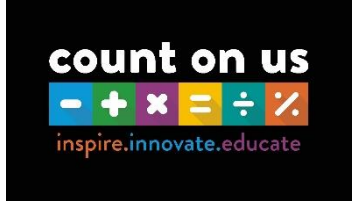
#npfsmaths

## Learning Together Session 3

### Multiplication and Division:

- What is multiplication?
- What is division?
- Multiplying through arrays
- Link to 100 square – patterns
- Link to Bar model
- Division linked to arrays
- Division linked to 100 square
- Bar model

# What do you see?



12 dogs = 3 dogs + 3 dogs + 3 dogs + 3 dogs  
Repeated addition

3 dogs in each of the 4 groups

$3 \times 4$

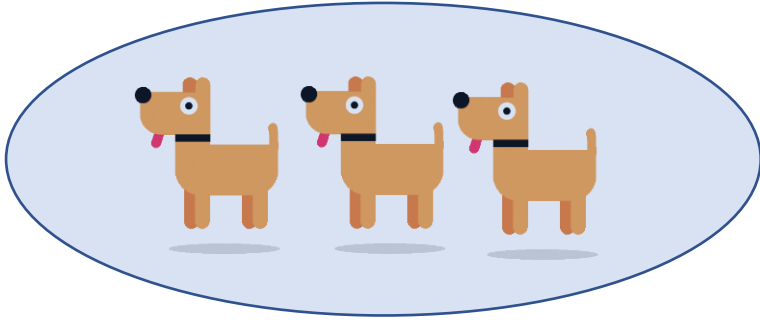
3 is being multiplied by 4

4 groups of 3 dogs

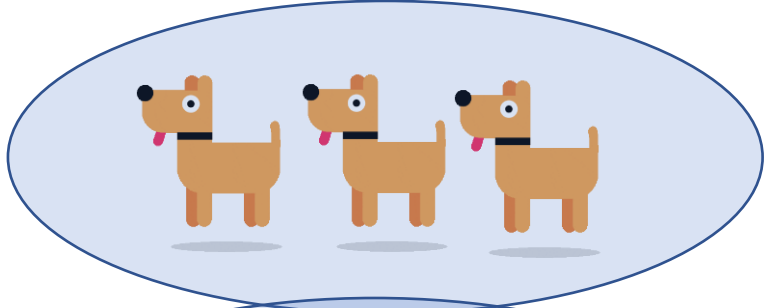
$4 \times 3$

4 multiples of 3

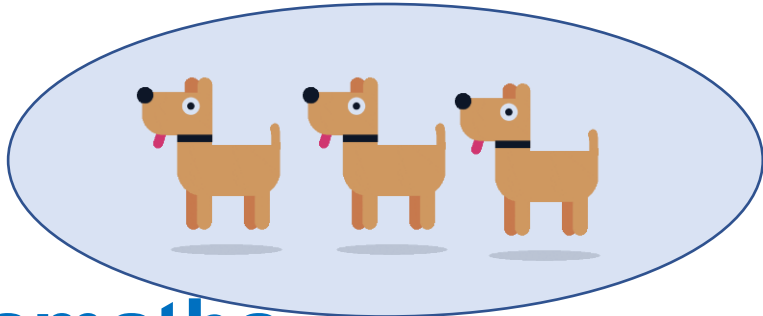
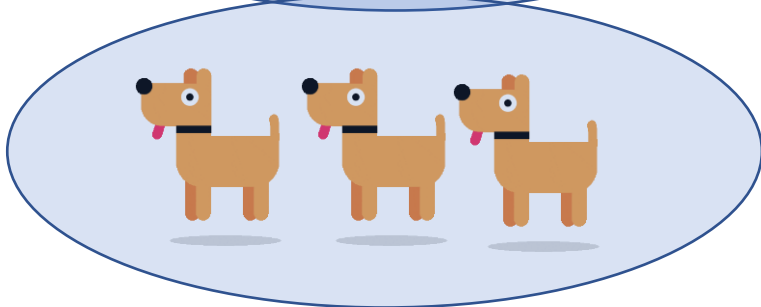
# What do you see?



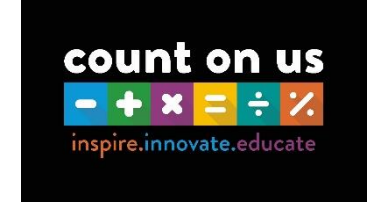
Multiple groups of 3



Multiple means many or lots

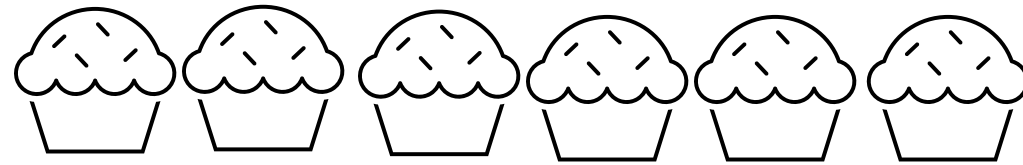


# Sharing and grouping



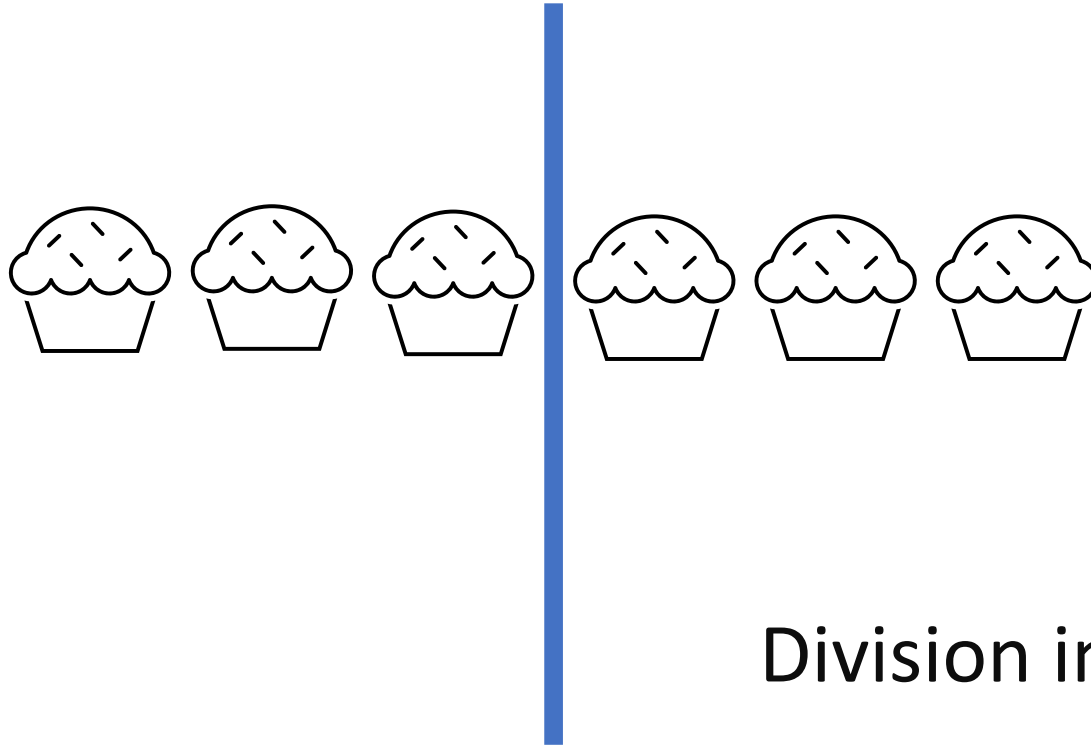
**#npfsmaths**

Share 6 cakes between 2 people



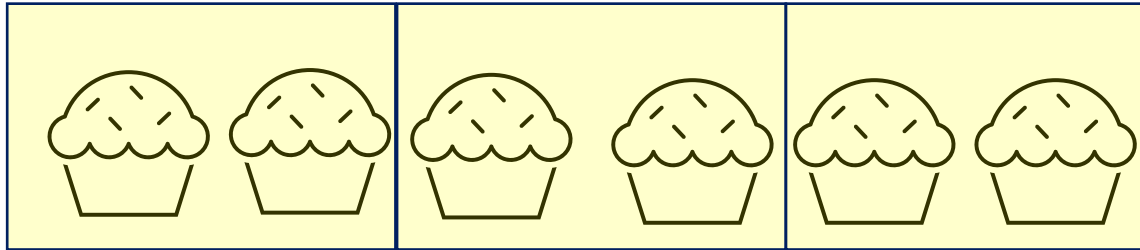


# Share 6 cakes between 2 people



Division in the context of sharing

Split the 6 cakes into packets of 2



Division in the context of  
grouping.

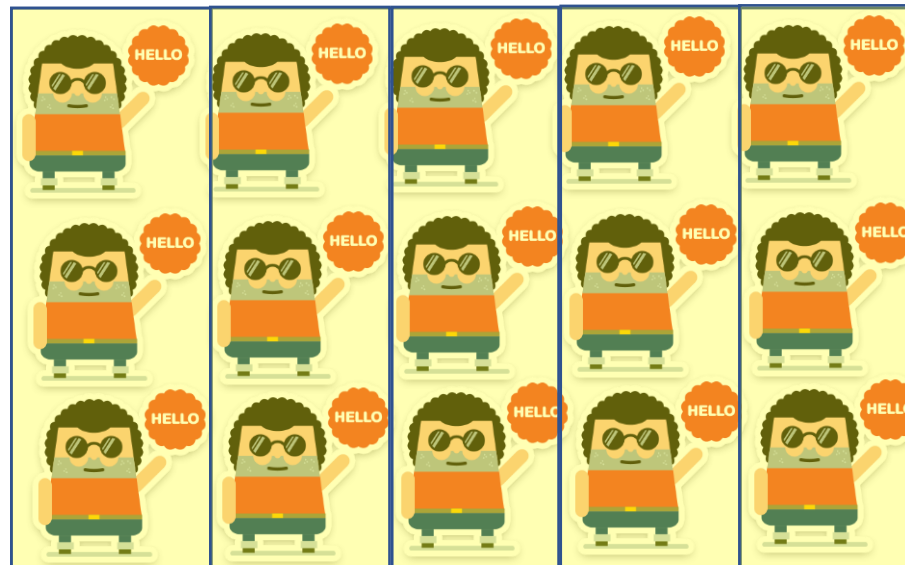
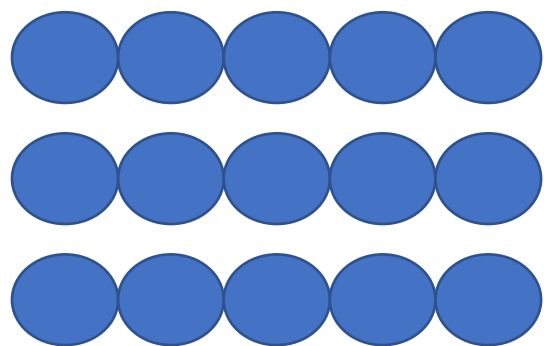
Draw a picture that represents

$3 \times 5$

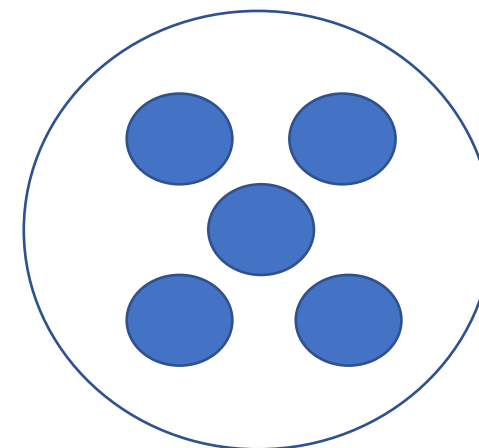
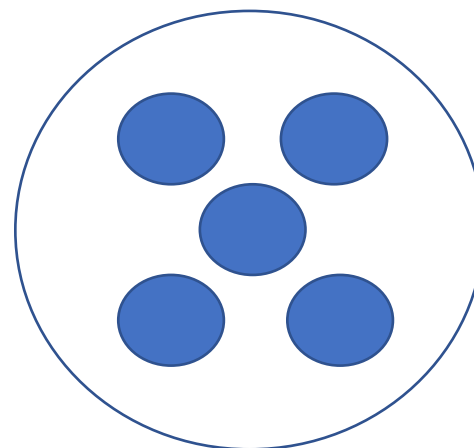
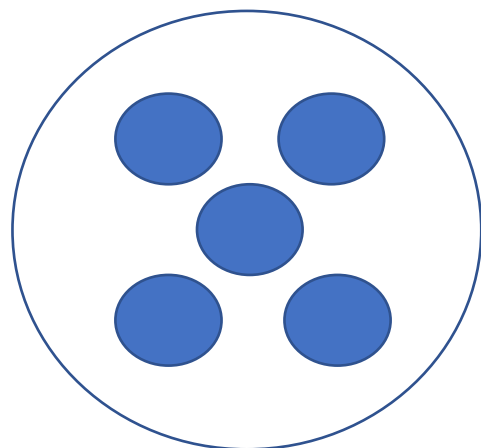
3 multiples of 5       $= 5 + 5 + 5$

Or

3 multiplied by 5       $= 3 + 3 + 3 + 3 + 3$



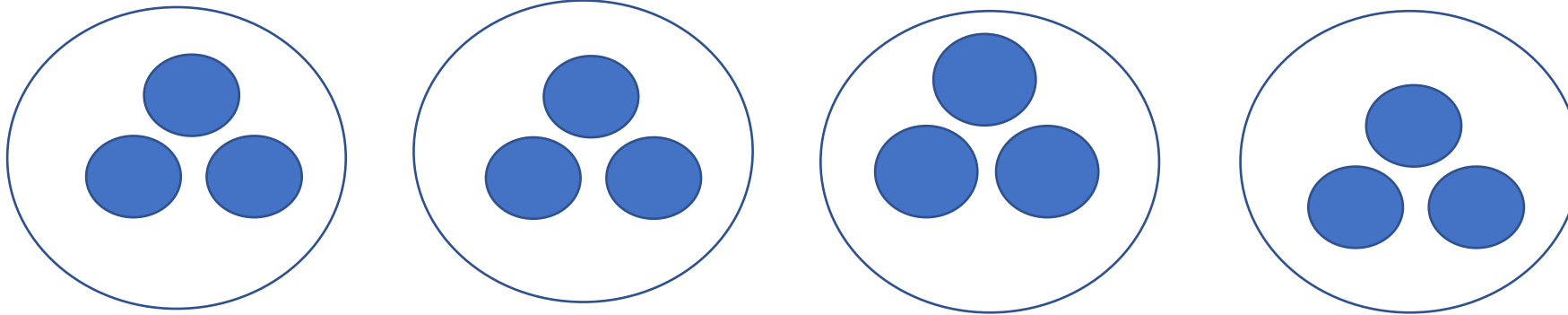
$$3 \times 5 = 5 \times 3$$



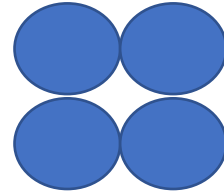
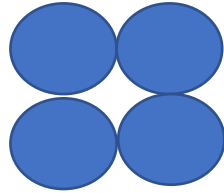
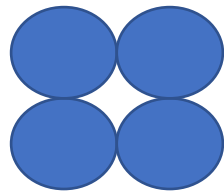
subitising

Draw a picture that represents  $12 \div 4$

$12 \div 4$  means 12 split up into 4 groups



$12 \div 4$  means 12 split up into groups of 4  
How many 4s in 12. Counting up in 4s.



# Task 1

Draw at least 1 picture for each of the following

- 1) Susan has 3 boxes of lol dolls. Each box has 6 dolls.
- 2) Tilly has 5 packets of football cards. Each pack contains 4 cards.
- 3)  $4 \times 2$
- 4)  $3 \times 4$
- 5)  $5 \times 2$
- 6)  $2 \times 6$
- 7) Share 10 sweets between 5 people
- 8) Split 18 marbles into bags of 6 marbles each
- 9)  $6 \div 3$
- 10)  $8 \div 2$
- 11)  $15 \div 5$
- 12)  $24 \div 4$



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## Session 3

11th June 10am - 10.45am

Multiplication and  
Division

Slides

## Session 3

11th June 10am - 10.45am

Multiplication and  
Division

Tasks

## Session 3

11th June 10am - 10.45am

Multiplication and  
Division

YouTube

Twitter : [@CountOnUsEd](#)

## The Big Grid

3	●	●	●						
6	●	●	●						
9	●	●	●						
12	●	●	●						
15	●	●	●						
18	●	●	●						
21	●	●	●						
24	●	●	●						
27	●	●	●						
30	●	●	●						

What are we doing?

Adding on 3 each time

Counting up in 3s

Skip counting in 3s

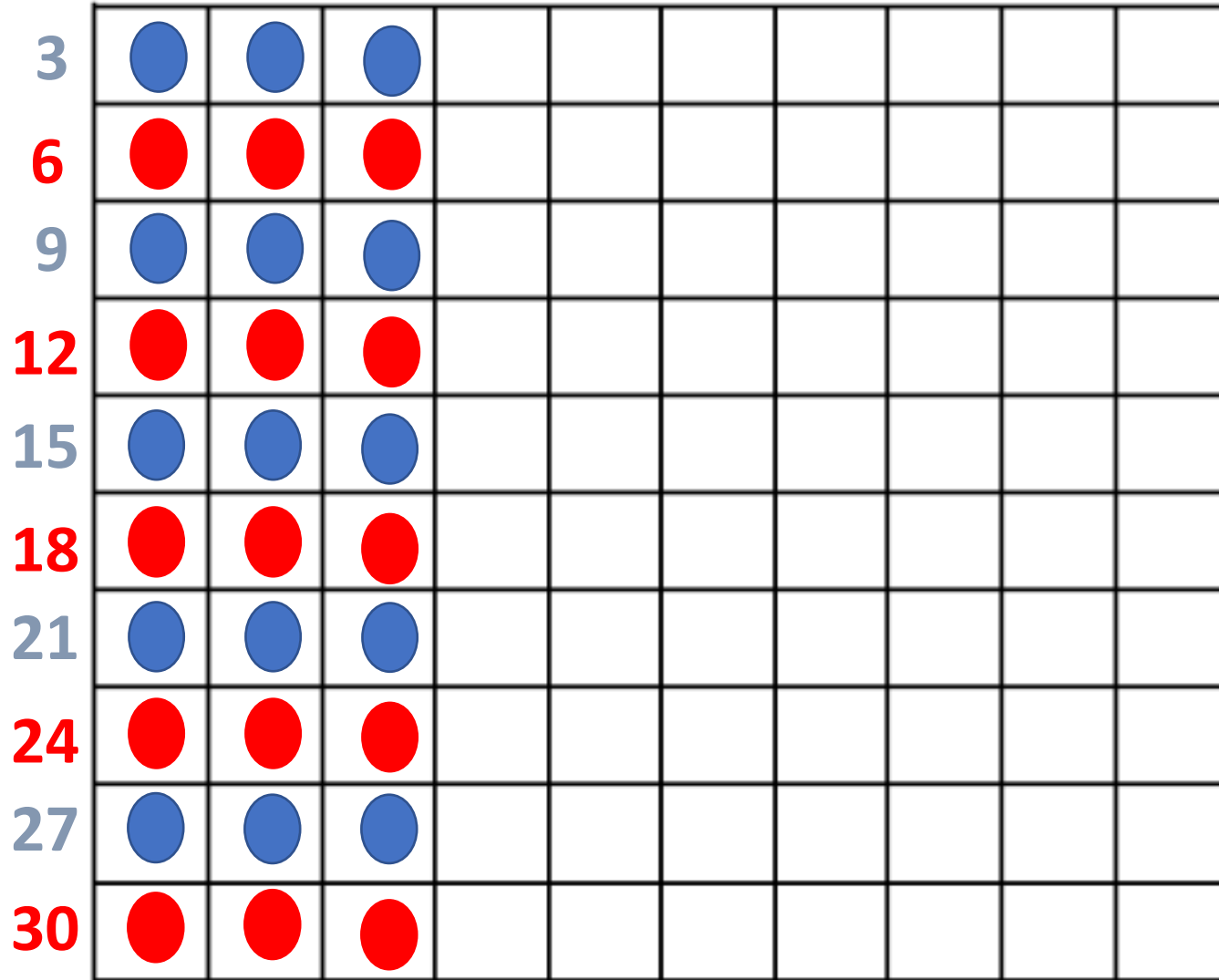
Drawing multiples of 3

Drawing the 3 x table

How many groups of 3  
are there?

How many dots are  
there?

## The Big Grid

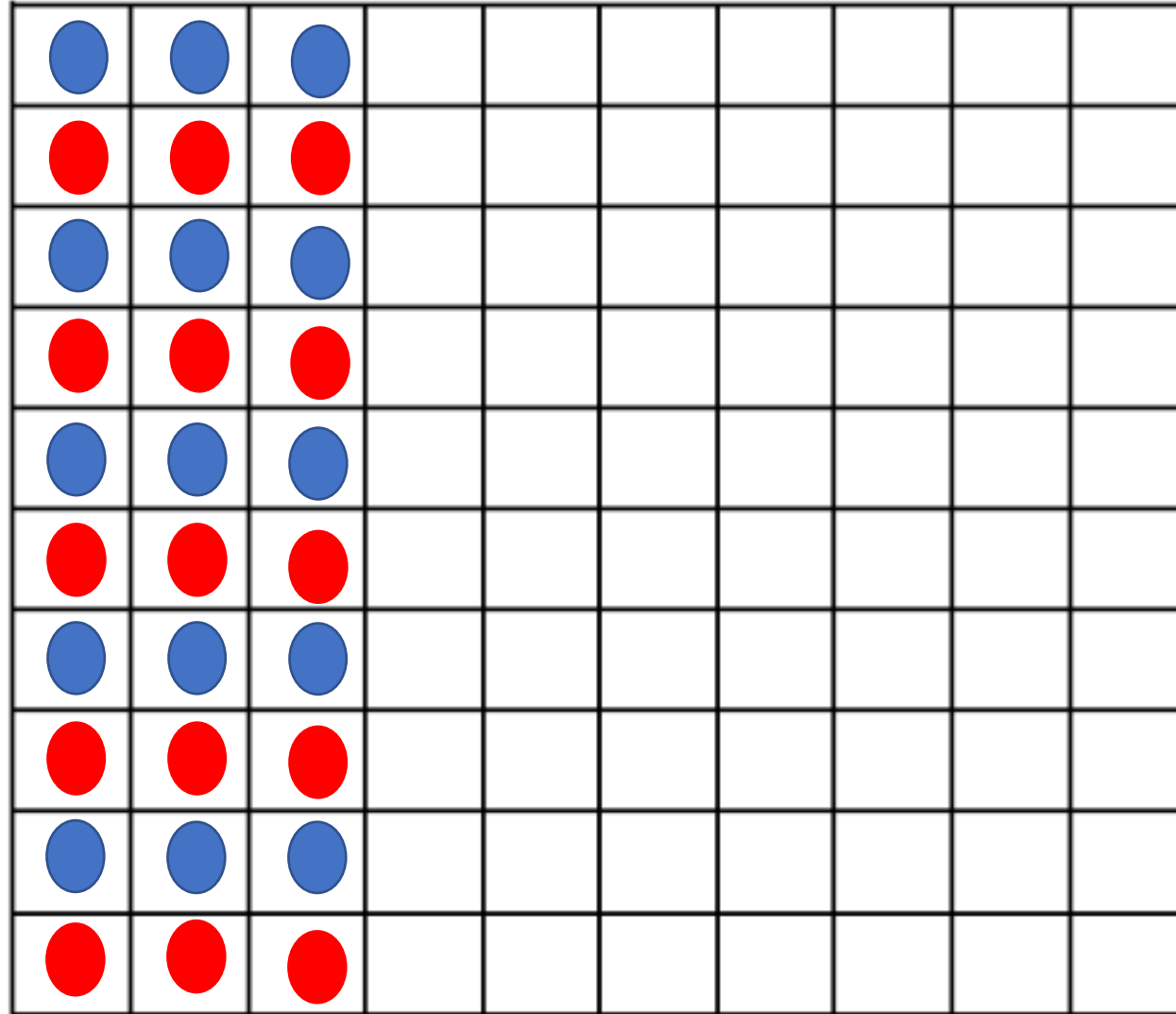


Count forwards in 3s

Count backwards in 3s

## The Big Grid

$1 \times 3 = 3$   
 $2 \times 3 = 6$   
 $3 \times 3 = 9$   
 $4 \times 3 = 12$   
 $5 \times 3 = 15$   
 $6 \times 3 = 18$   
 $7 \times 3 = 21$   
 $8 \times 3 = 24$   
 $9 \times 3 = 27$   
 $10 \times 3 = 30$



## The Big Grid

$1 \times 3 = 3$   
 $2 \times 3 = 6$   
 $3 \times 3 = 9$   
 $4 \times 3 = 12$   
 $5 \times 3 = 15$   
 $6 \times 3 = 18$   
 $7 \times 3 = 21$   
 $8 \times 3 = 24$   
 $9 \times 3 = 27$   
 $10 \times 3 = 30$

●	●	●							
●	●	●							
●	●	●							
●	●	●							
●	●	●							
●	●	●							
●	●	●							
●	●	●							
●	●	●							
●	●	●							

1 group of 3  
2 groups of 3

The number of groups is changing but the amount of 3 in each group is remaining the same

## The Big Grid

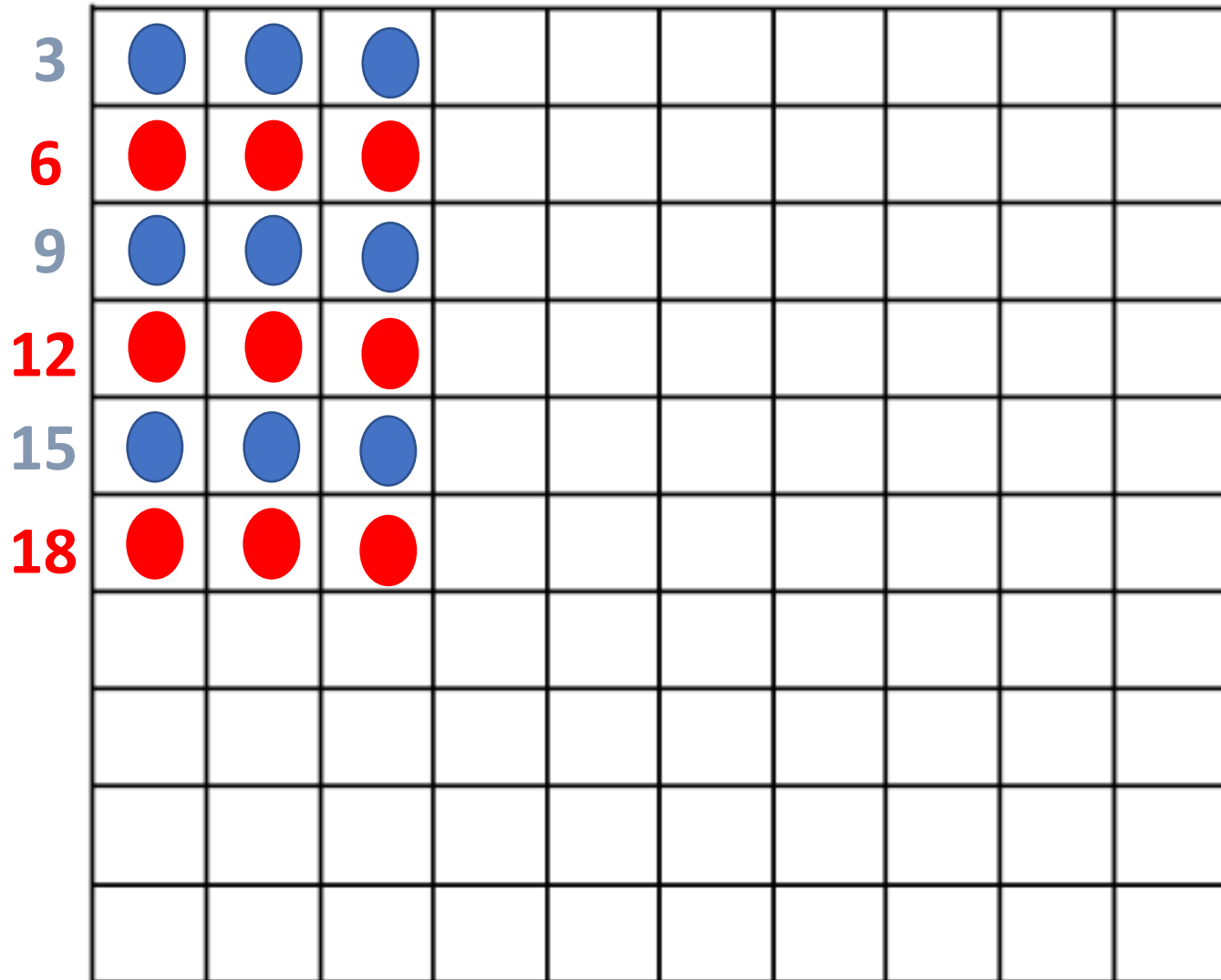
3	●	●	●						
6	●	●	●						
9	●	●	●						
12	●	●	●						
15	●	●	●						
18	●	●	●						
21	●	●	●						
24	●	●	●						
27	●	●	●						
30	●	●	●						

- 1) What is  $7 \times 3$
- 2) What is  $9 \times 3$
- 3) What is  $4 \times 3$
- 4) What is  $6 \times 3$
- 5) What is  $8 \times 3$
- 6) What is  $3 \times 3$

Keep repeatedly asking yourself more Qs about the 3 times table

- 1) How many 3s make 15
- 2) What is  $30 \div 3$
- 3) What is  $6 \div 3$
- 4) What is  $3 \div 3$

## The Big Grid

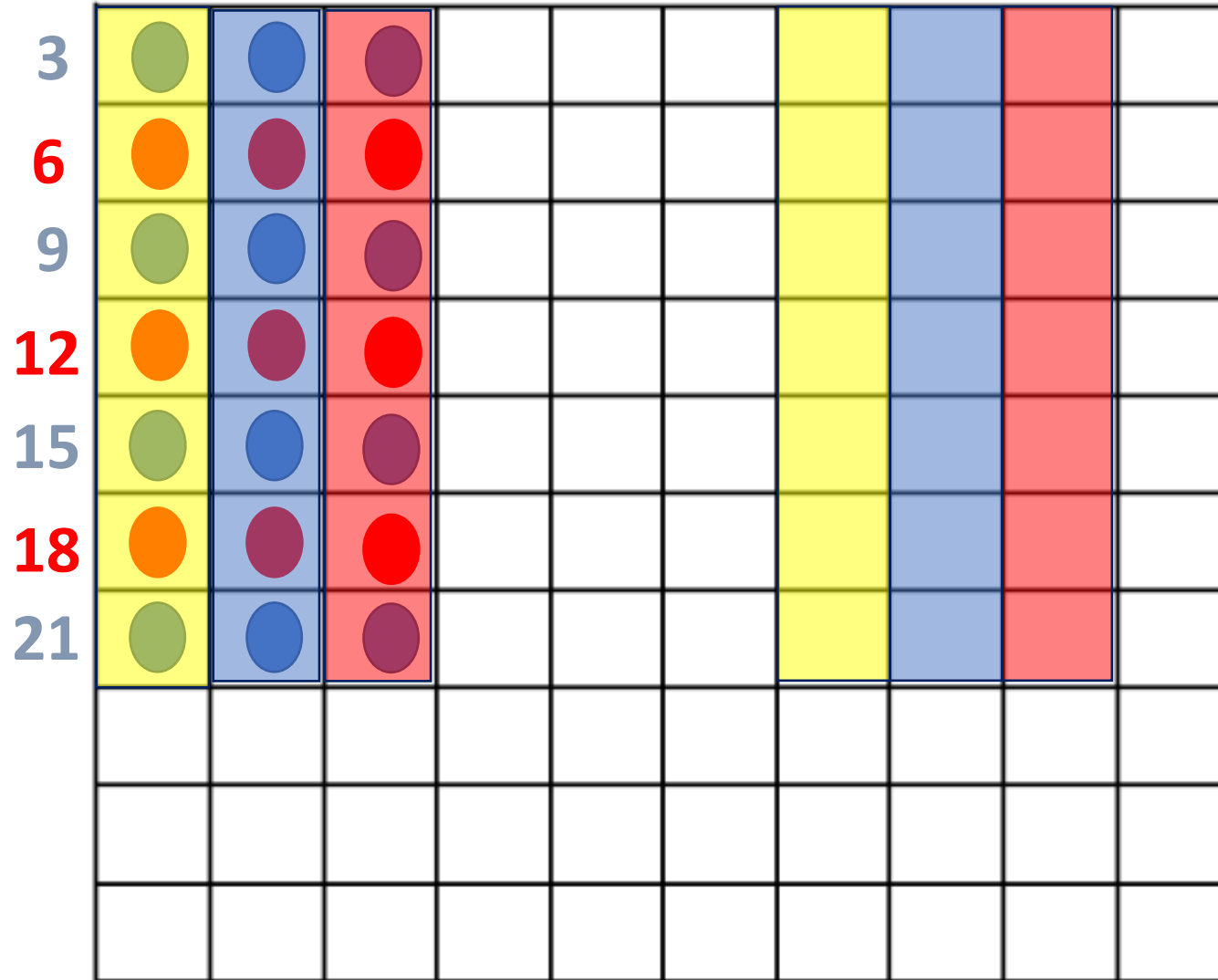


1) What is  $18 \div 3$

Relate to the multiplication

$$? \times 3 = 18$$

## The Big Grid



1) What is  $7 \times 3$

It is the same as  
 $3 \times 7$

Commutative law

$$7 \times 3 = 21$$

$$3 \times 7 = 21$$

$$21 \div 3 = 7$$

$$21 \div 7 = 3$$



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

You can map the stations on the 100 square to see the pattern of the 3 x table

You could continue the pattern as far as you can in the 100 square.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

You can map the stations on the 100 square to see the pattern of the 3 x table

You could continue the pattern as far as you can in the 100 square.

Practice drawing out the 3 x table over and over again.

Look at links:

What does 7 x 3 look like?

$$5 \times 3$$

+

$$2 \times 3$$

$$15 + 6$$

15, 18, 21

Practice drawing out the 3 x table over and over again.

Look at links:

What does  $8 \times 3$  look like?

It is double  $4 \times 3$     Double  $12 = 12 + 12 = 24$

Practice drawing out the 3 x table over and over again.

Look at links:

What does  $9 \times 3$  look like?

$10 \times 3$  with a group of 3 missing

$$= 30 - 3 = 27$$

## The Big Grid

$1 \times 4 = 4$

$2 \times 4 = 8$

$3 \times 4 = 12$

$4 \times 4 = 16$

$5 \times 4 = 20$

$6 \times 4 = 24$

$7 \times 4 = 28$

$8 \times 4 = 32$

$9 \times 4 = 36$

$10 \times 4 = 40$

●	●	●	●						
●	●	●	●						
●	●	●	●						
●	●	●	●						
●	●	●	●						
●	●	●	●						
●	●	●	●						
●	●	●	●						
●	●	●	●						
●	●	●	●						

Count forwards in 4s

Count backwards in 4s

## The Big Grid

4	●	●	●	●						
8	●	●	●	●						
12	●	●	●	●						
16	●	●	●	●						
20	●	●	●	●						
24	●	●	●	●						
28	●	●	●	●						
32	●	●	●	●						
36	●	●	●	●						
40	●	●	●	●						

- 1) What is  $7 \times 4$
- 2) What is  $9 \times 4$
- 3) What is  $4 \times 4$
- 4) What is  $6 \times 4$
- 5) What is  $8 \times 4$
- 6) What is  $3 \times 4$

Keep repeatedly asking yourself more Qs about the 4 times table

- 1) How many 4s make 20
- 2) What is  $40 \div 4$
- 3) What is  $8 \div 4$
- 4) What is  $4 \div 4$

## **TASKS**

### **Questions in Context(word problems)**

#### **Question 1**

There are 8 people in the rugby club. Each week they pay the rugby coach £4.

How much money does the rugby coach collect each week?

#### **Question 2**

A golf shop has collects 18 golf balls. They sell them in packs of 3.

How many packs of 3 do they have to sell?



What next?

What if you have learned all your tables?

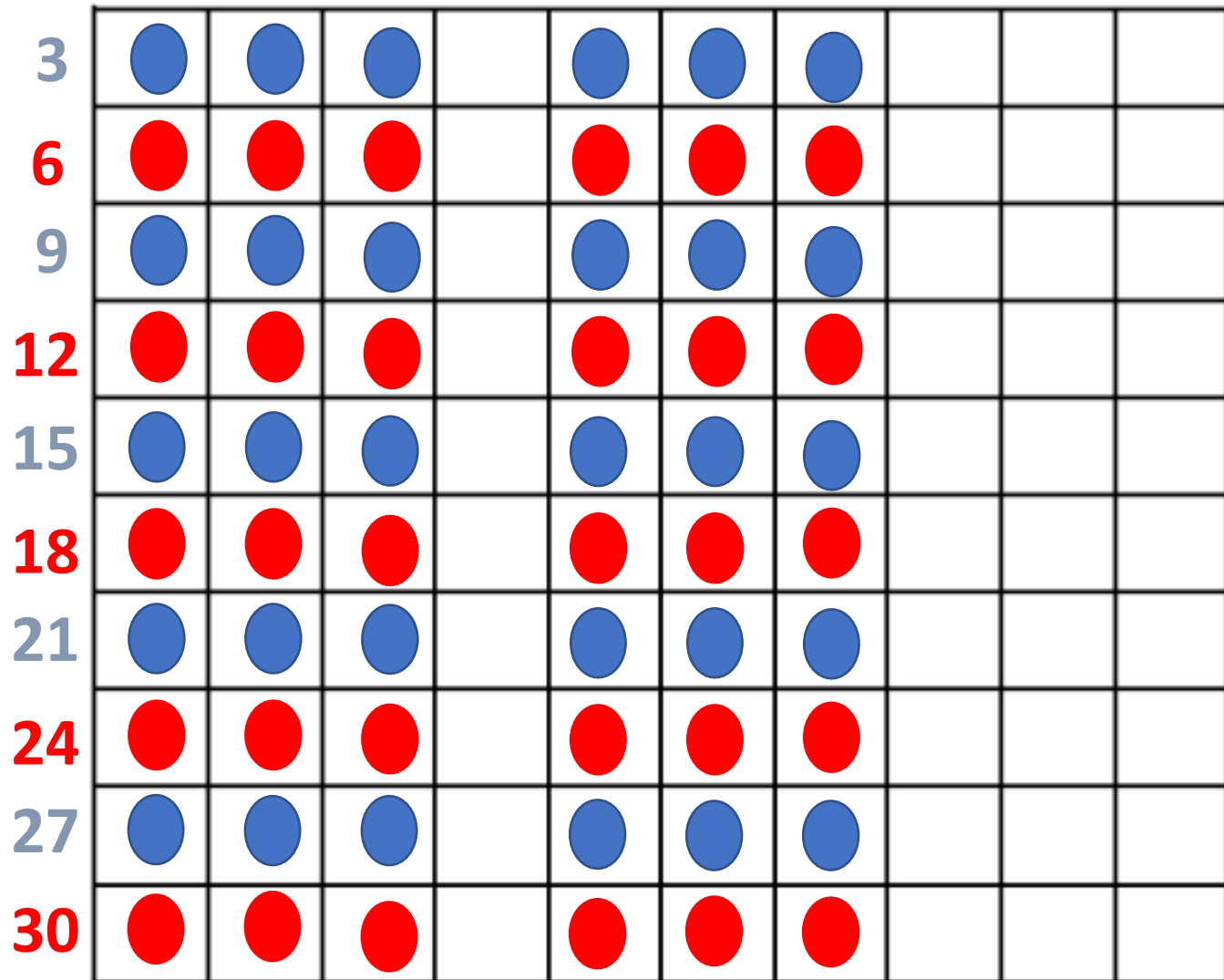
What can you do with this knowledge to make more complex multiplication questions easier?

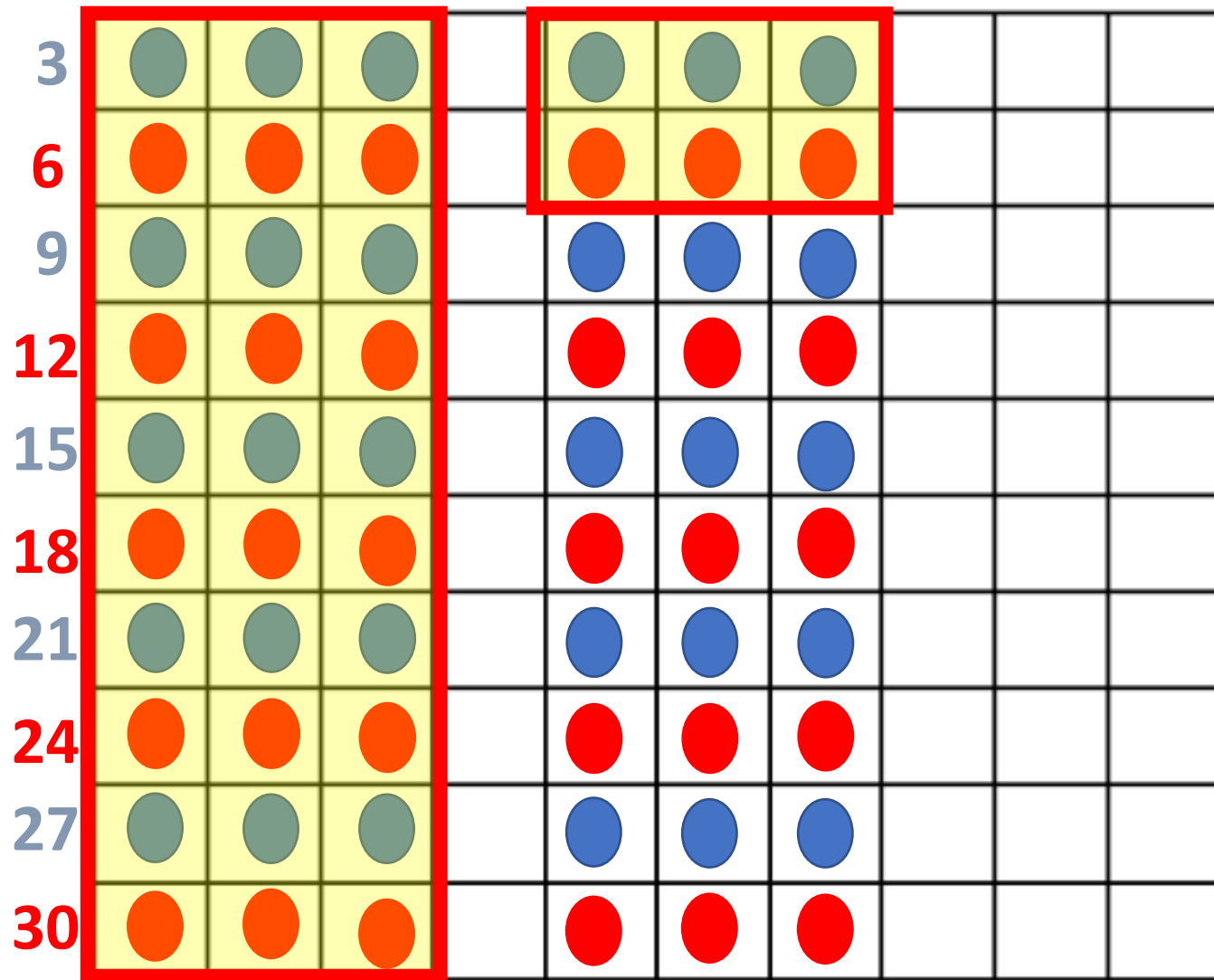
## The Big Grid

3	●	●	●						
6	●	●	●						
9	●	●	●						
12	●	●	●						
15	●	●	●						
18	●	●	●						
21	●	●	●						
24	●	●	●						
27	●	●	●						
30	●	●	●						

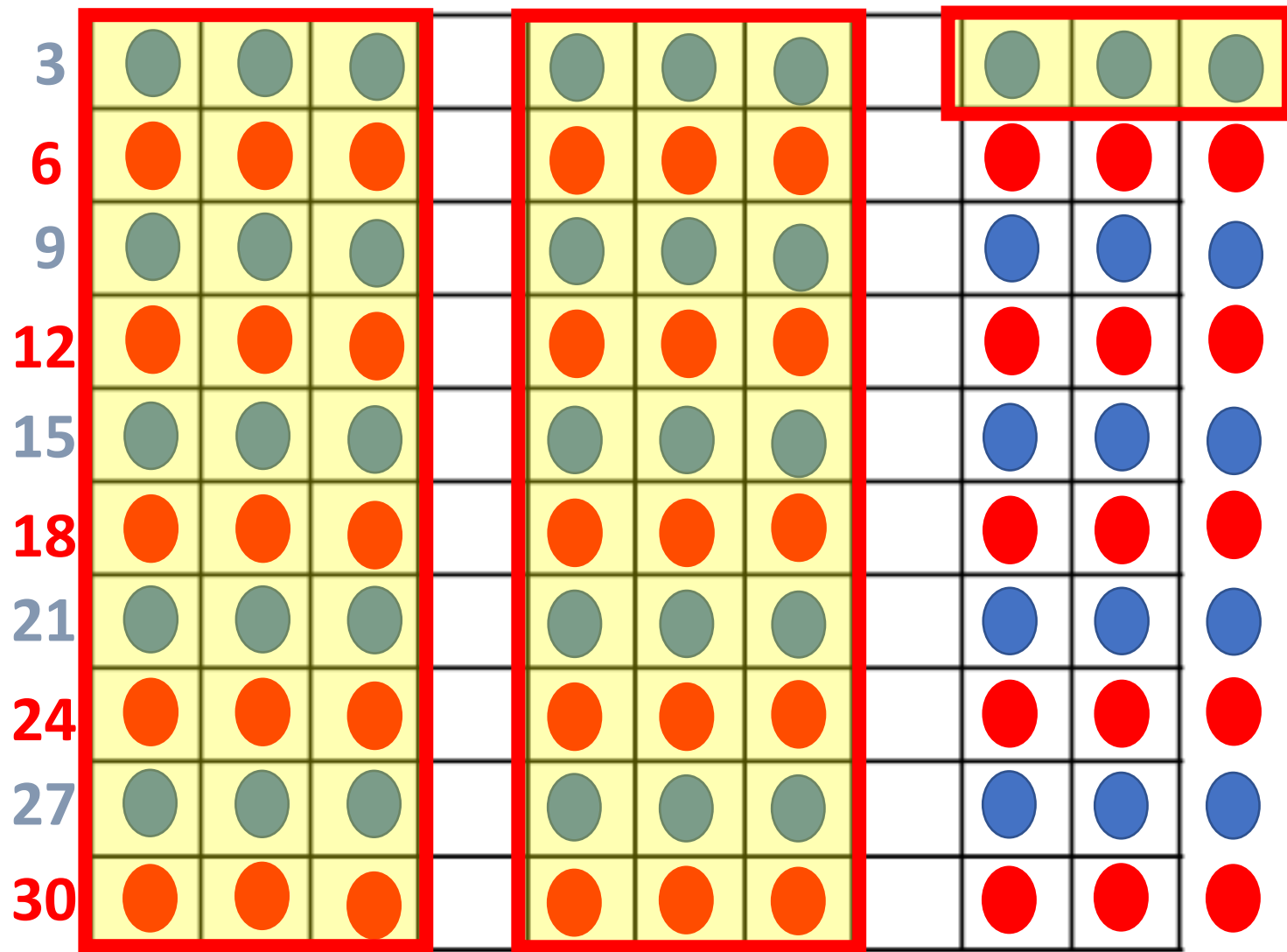
Lets look into the  
3 x table in more  
depth.

# The Big Grid





- 1) How many groups of 3 are there?
- 2) How many dots are there?
- 3) What is  $20 \times 3$ ?
- 4) What is  $60 \div 3$ ?
- 5) How many 3s are in 36?

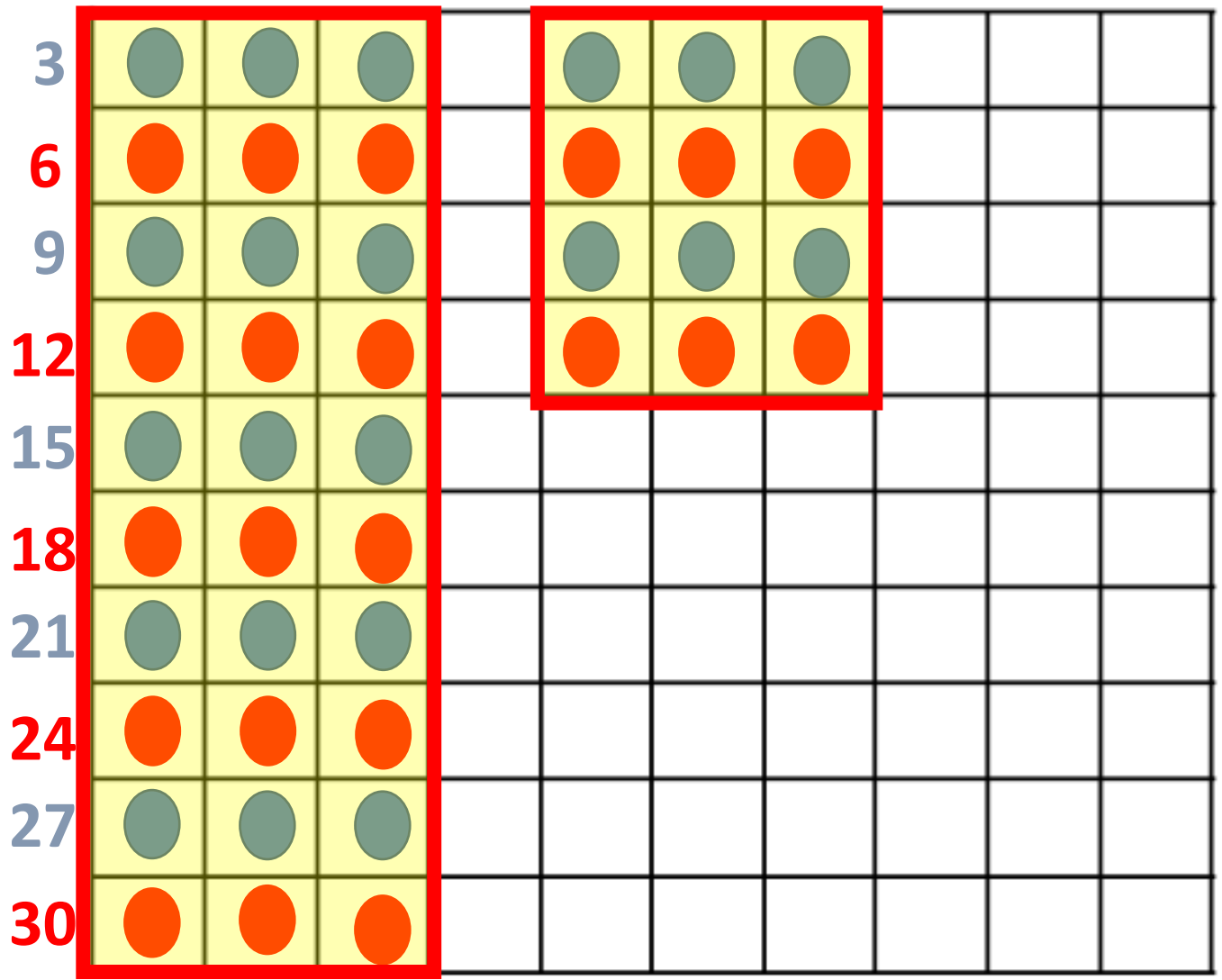


- 1) How many groups of 3 are there?
- 2) How many dots are there?
- 3) What is  $30 \times 3$ ?
- 4) What is  $90 \div 3$ ?
- 5) How many 3s are in 63?

$10 \times 3 = 30$

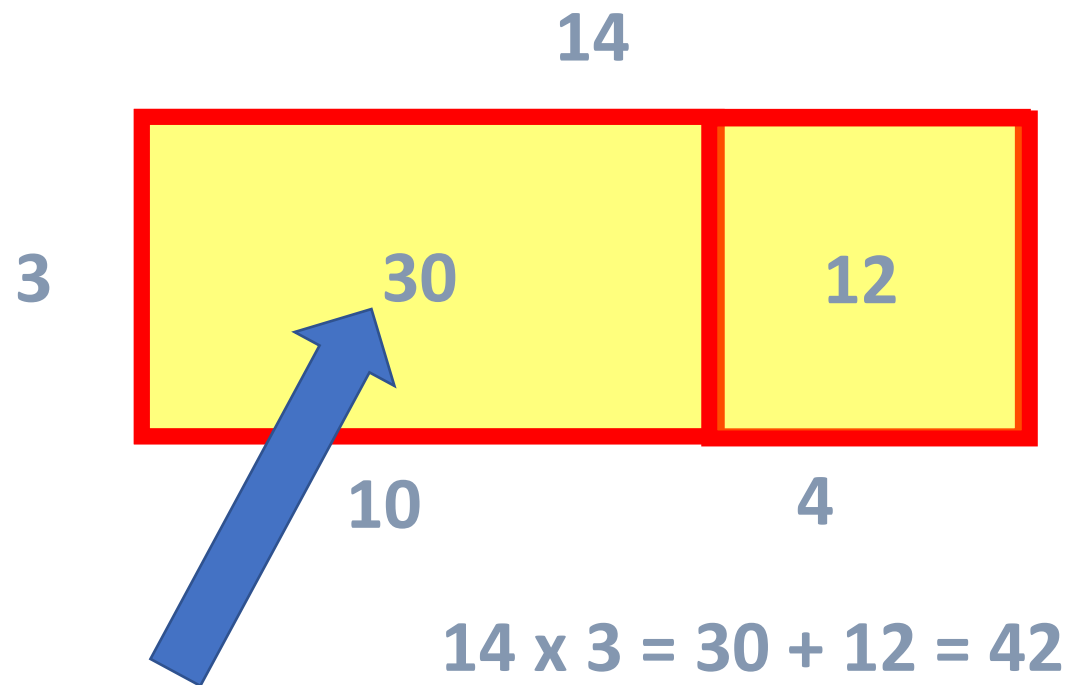
$4 \times 3 = 12$

Use this to work out  $14 \times 3$



$$= 30 + 12$$
$$= 42$$

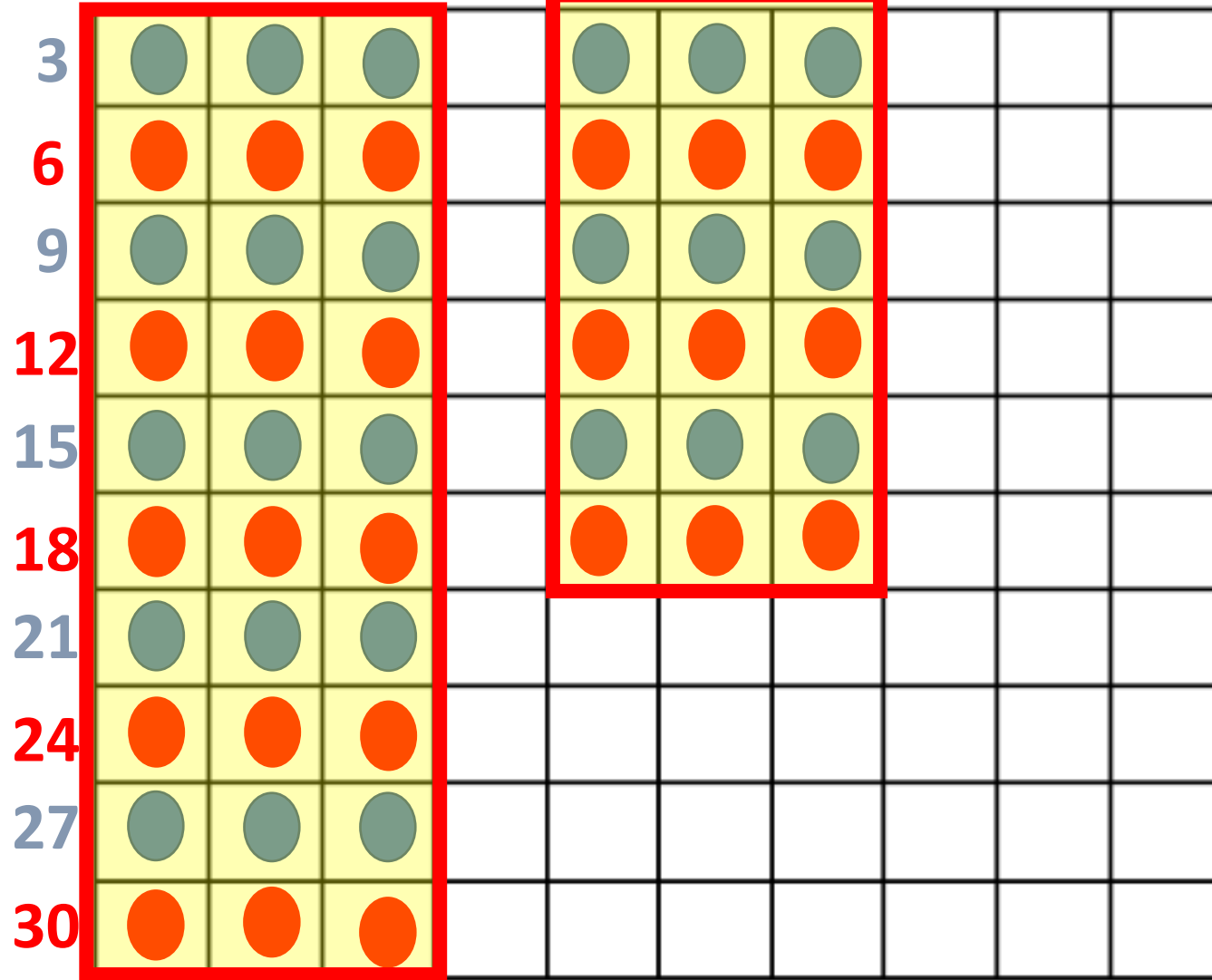
Let's represent that strategy for  $14 \times 3$  ← called a 'bar model'



Partitioning to make the multiplication easier  
Place Value Partitioning

The Big Grid

Use this to work out  $16 \times 3$



So  $16 \times 3$   
 $= 30 + 18$   
 $= 48$

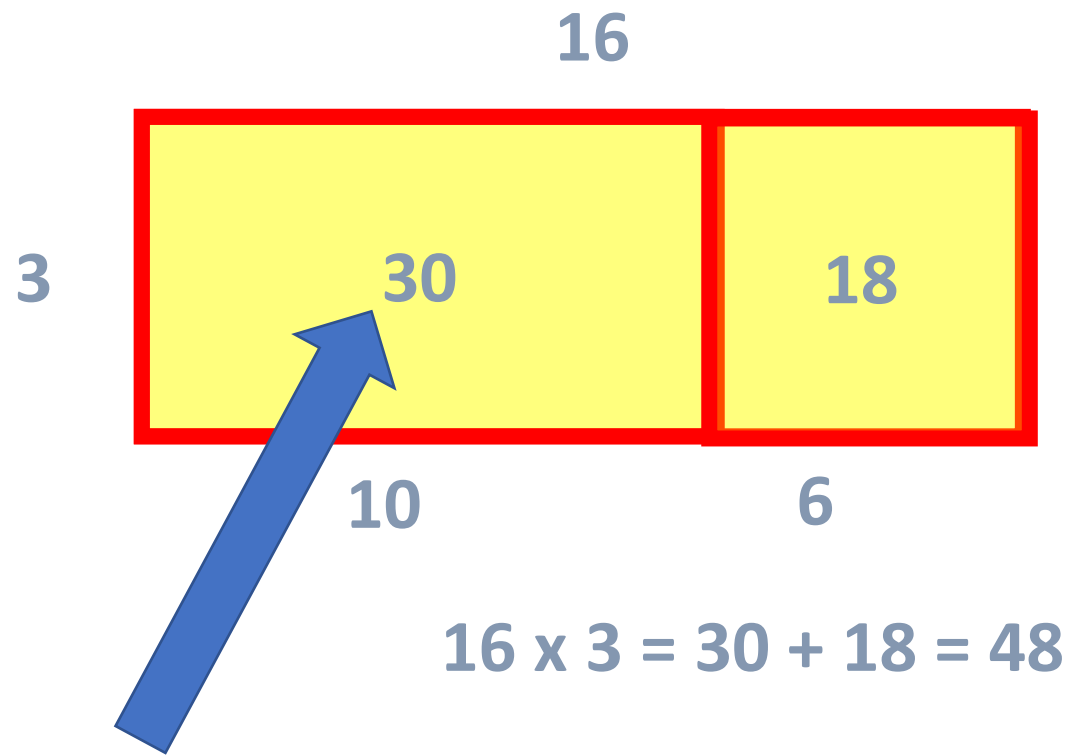
Other ways to do  
 $16 \times 3$  ?

$10 \times 3$   
 $= 30$

$6 \times 3$   
 $= 18$



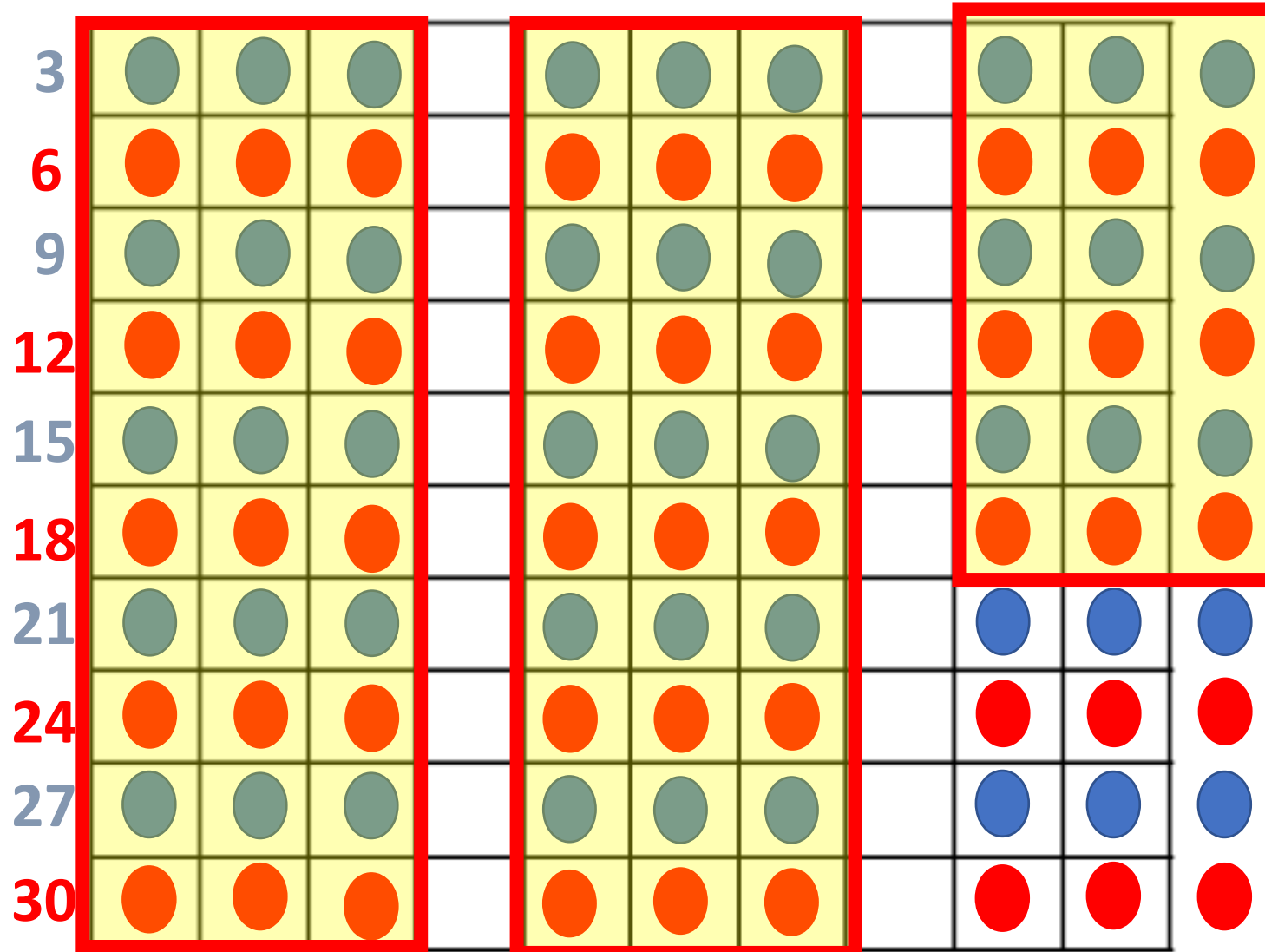
Let's represent that strategy for  $16 \times 3$  is called a 'bar model'



Partitioning to make the multiplication easier  
Place Value Partitioning

The Big Grid

Use this to work out  $26 \times 3$



So  $26 \times 3$   
 $= 30 + 30 + 18$   
 $= 78$

$10 \times 3$   
 $= 30$

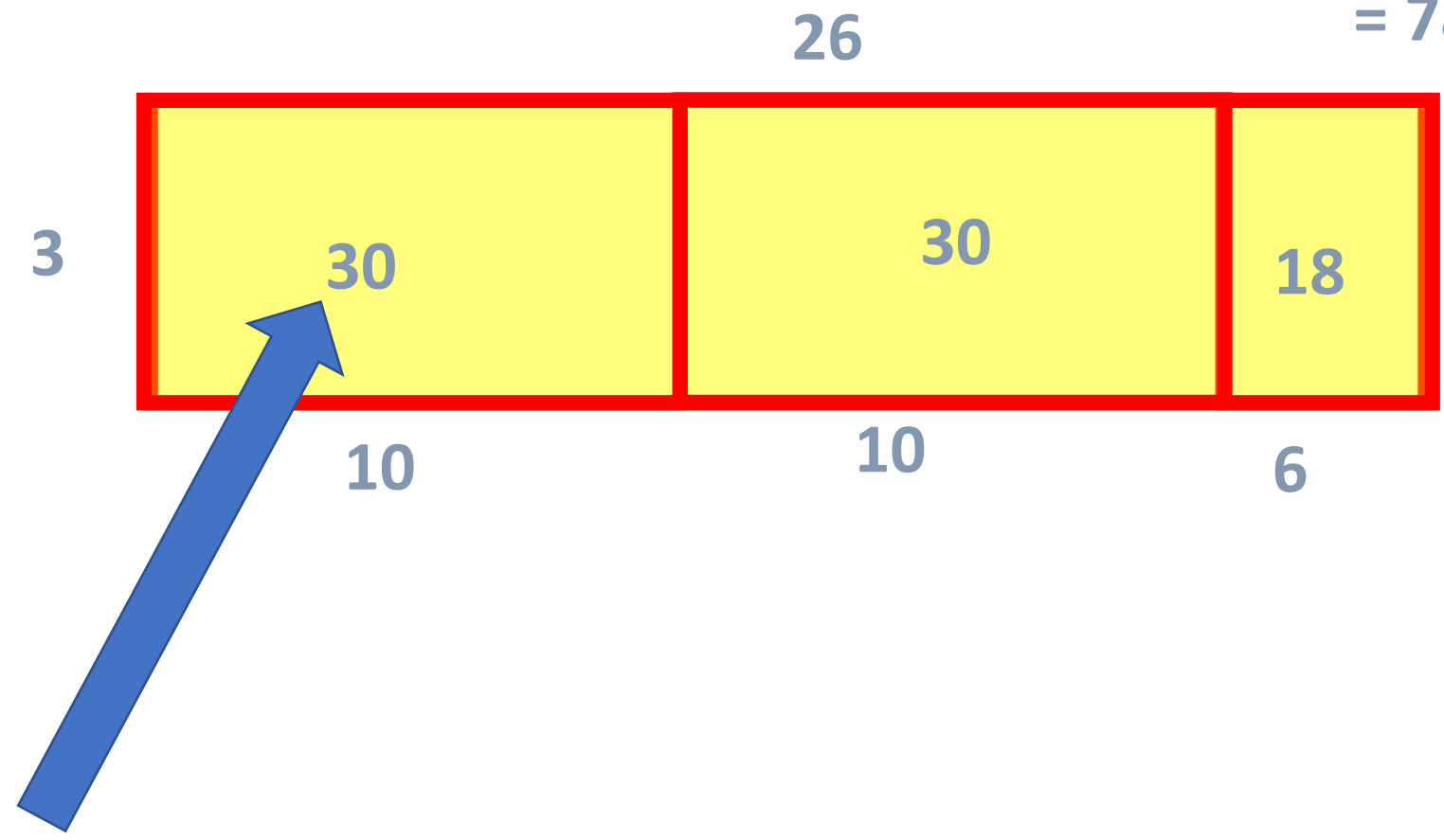
$10 \times 3$   
 $= 30$

$6 \times 3$   
 $= 18$

$26 \times 3$  ←

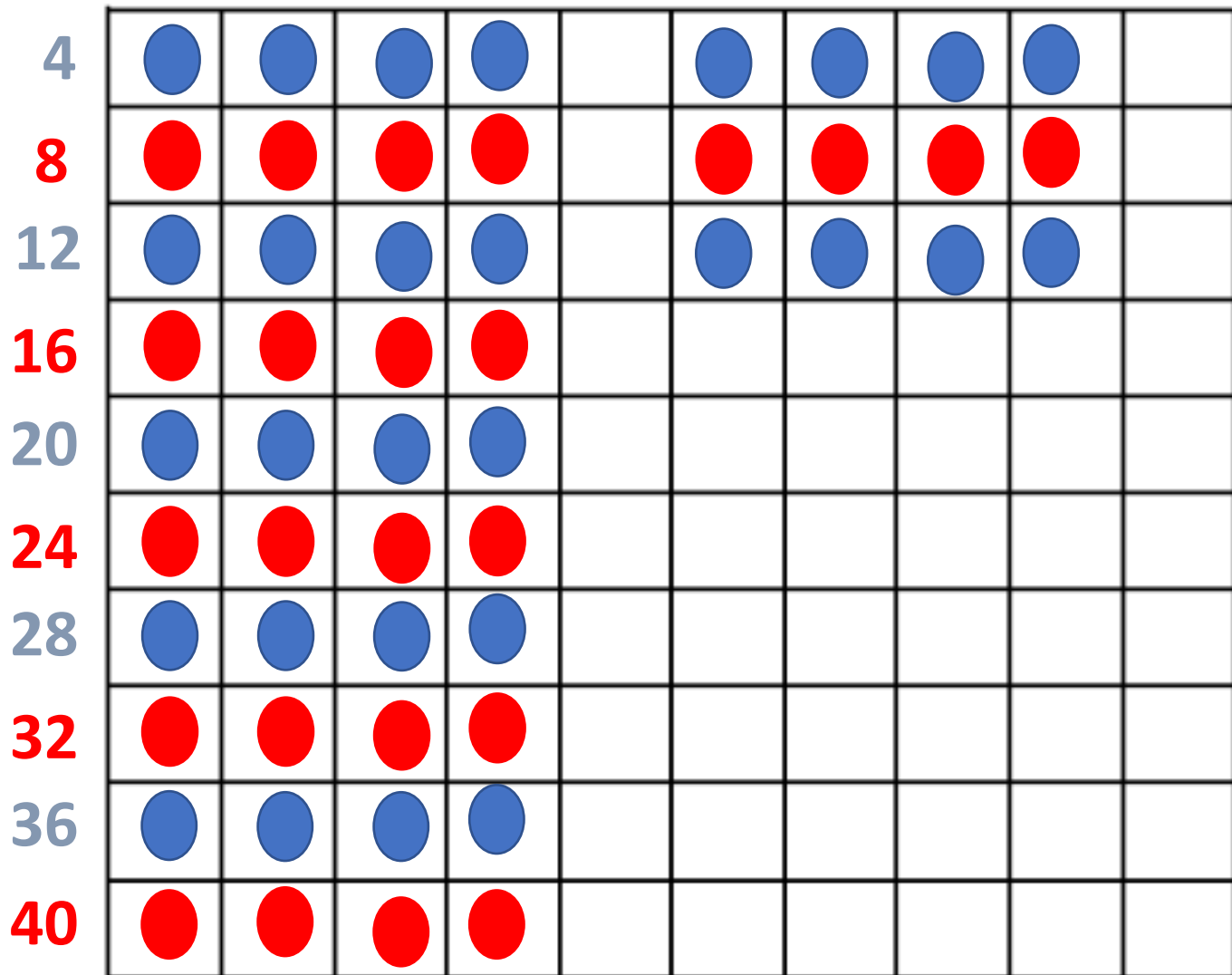
$= 30 + 30 + 18$

$= 78$

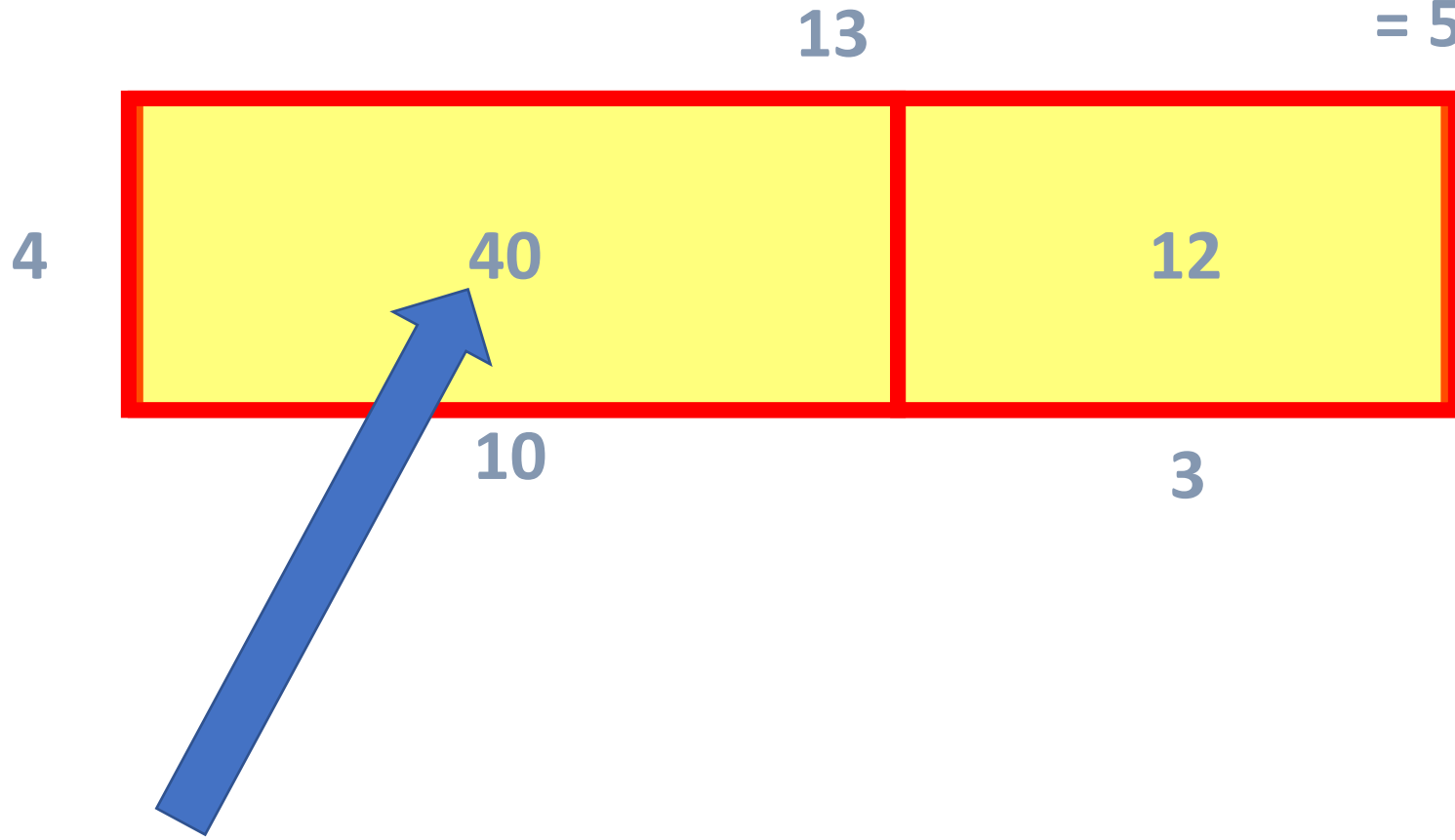


# The Big Grid

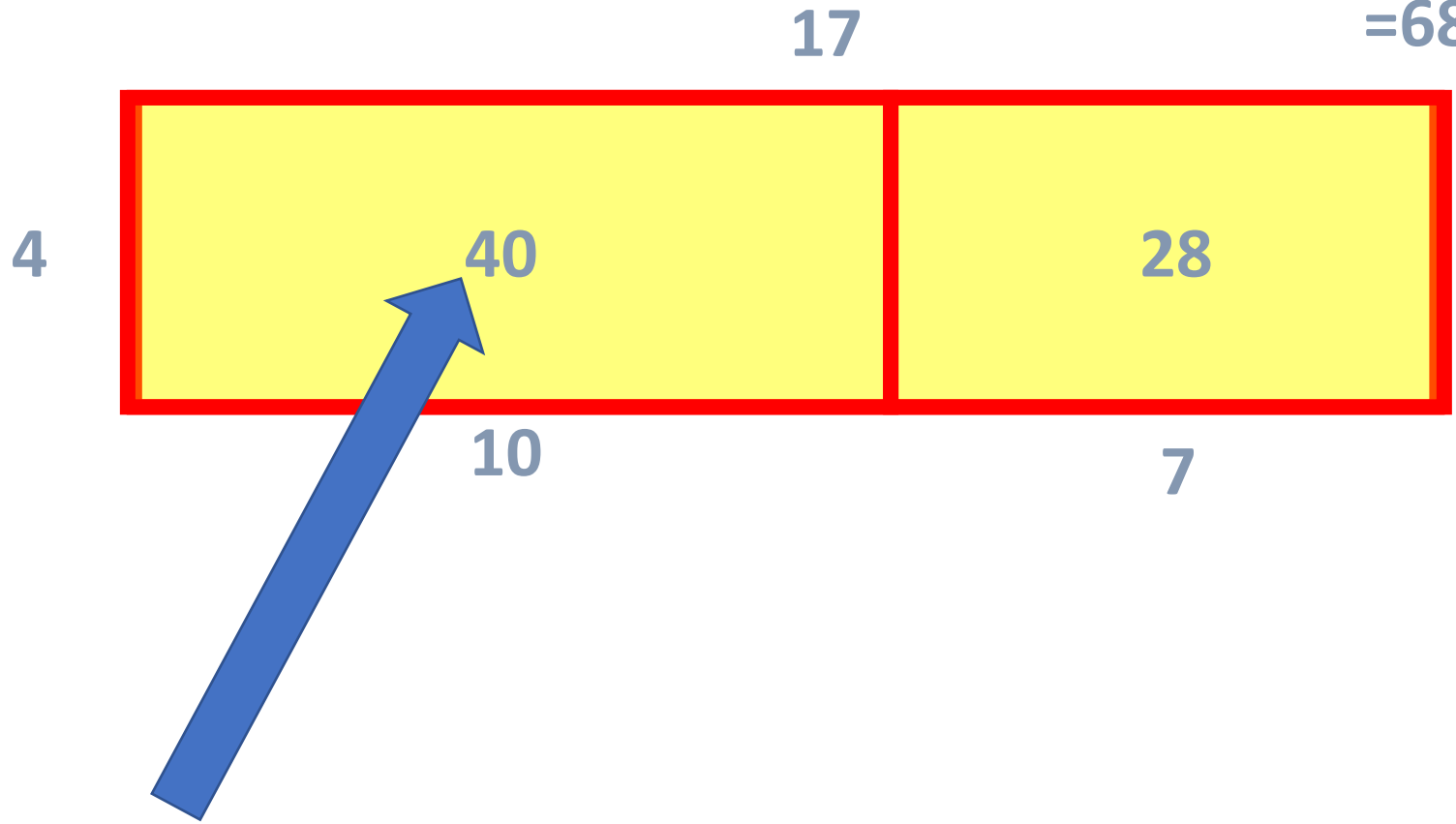
1) What is  $13 \times 4$



$13 \times 4$   
 $= 40 + 12$   
 $= 52$



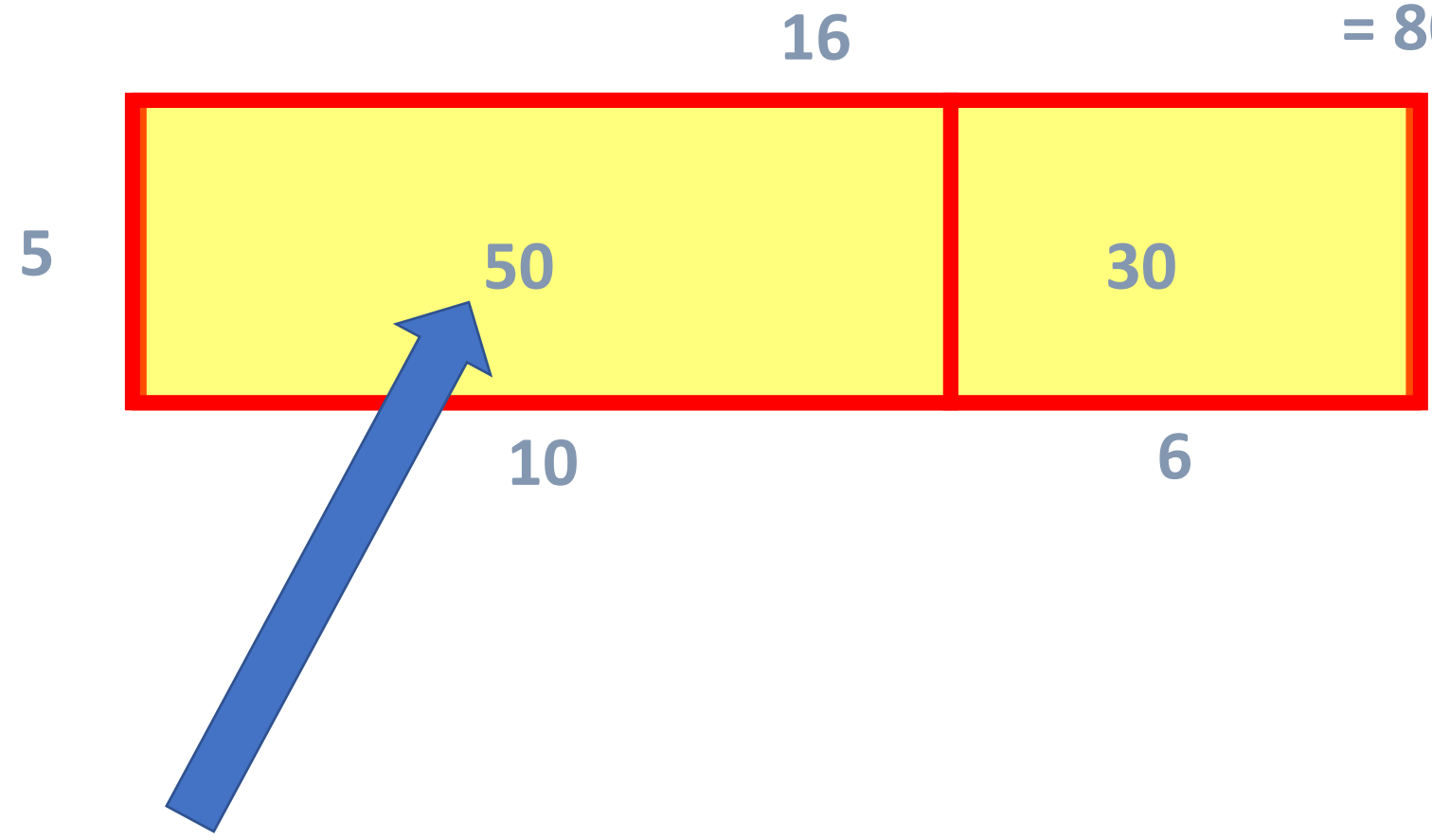
$17 \times 4$   
 $= 40 + 28$   
 $= 68$



$$16 \times 5$$

$$= 50 + 30$$

$$= 80$$



Try these questions draw a bar model for each one

### Basic Set

- 1)  $15 \times 3$
- 2)  $18 \times 4$
- 3)  $17 \times 3$
- 4)  $13 \times 5$
- 5)  $14 \times 4$
- 6)  $17 \times 5$
- 7)  $14 \times 3$
- 8)  $16 \times 3$
- 9)  $15 \times 4$
- 10)  $16 \times 5$

### Intermediate Set

- 1)  $16 \times 4$
- 2)  $18 \times 4$
- 3)  $17 \times 6$
- 4)  $13 \times 7$
- 5)  $14 \times 9$
- 6)  $17 \times 8$
- 7)  $14 \times 6$
- 8)  $16 \times 8$
- 9)  $13 \times 9$
- 10)  $16 \times 6$

### Extension Set

- 1)  $26 \times 3$
- 2)  $28 \times 4$
- 3)  $27 \times 6$
- 4)  $23 \times 7$
- 5)  $24 \times 9$
- 6)  $27 \times 8$
- 7)  $24 \times 6$
- 8)  $26 \times 8$
- 9)  $23 \times 9$
- 10)  $26 \times 6$



## If you like that strategy for multiplying you can use it for division

When dividing we just need to understand that each number has a key number

When dividing by 3 the key number is .... **30**

When dividing by 4 the key number is .... **40**

When dividing by 8 the key number is .... **80**

When dividing by 6 the key number is .... **60**

When dividing by 13 the key number is .... **130**

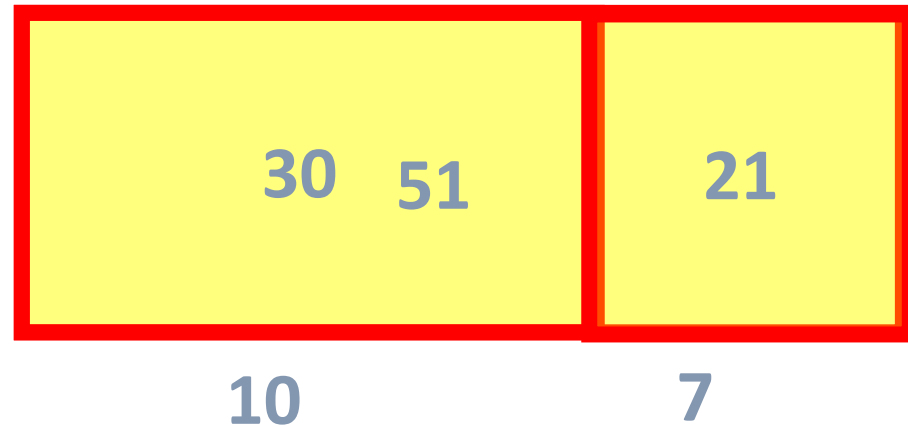
## Using the bar modelling strategy for division

$$51 \div 3$$

$$?? \times 3 = 51$$

Partitioning the 51 into key number of 30 and 21 makes the division easier

3



When dividing by 3 the key number is ... 30

If the first bit is the key number of 30 the other bit must be 21  
As  $30 + 21 = 51$

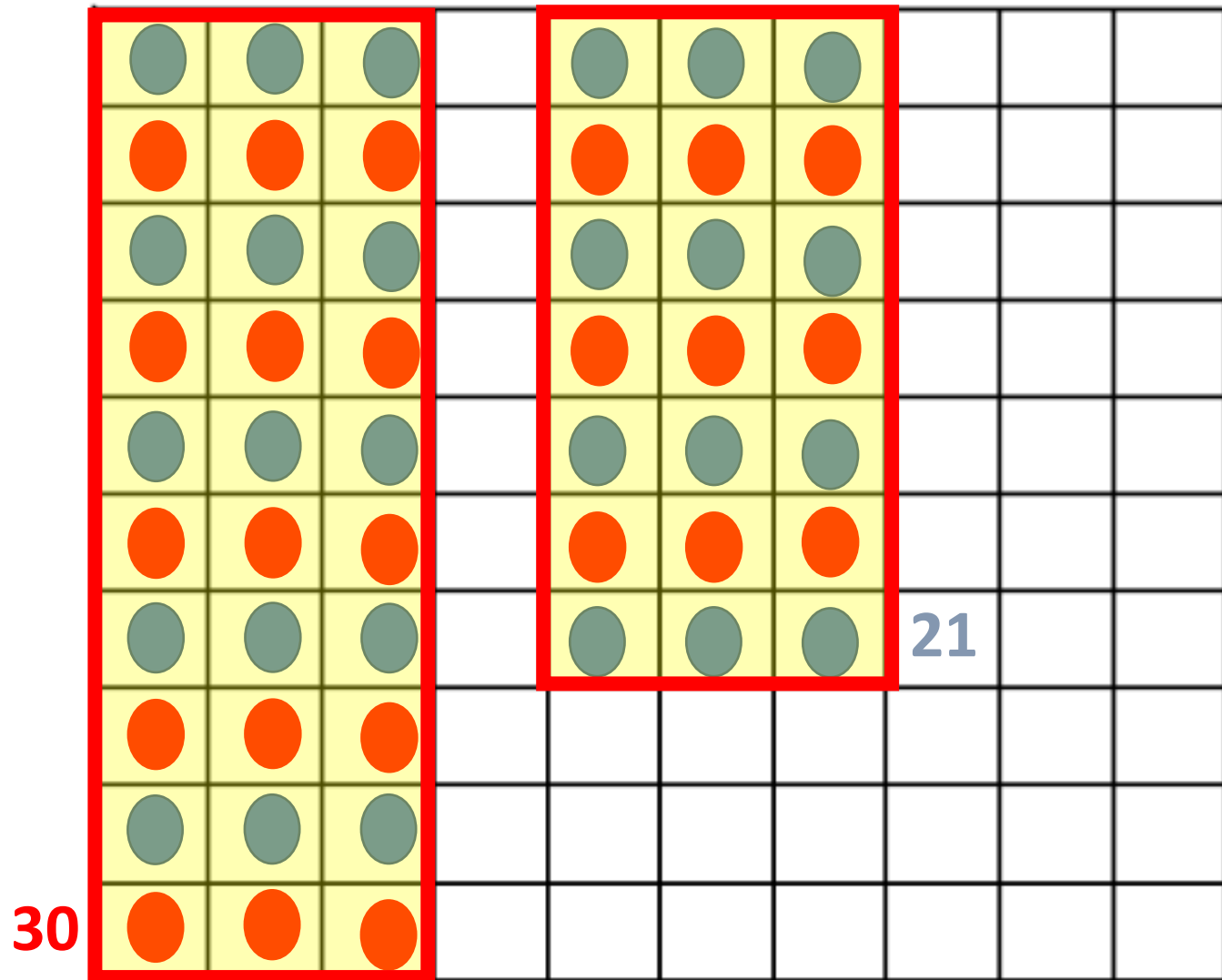
Divide 30 and 21 by 3 separately

$$30 \div 3 = 10$$

$$21 \div 3 = 7$$

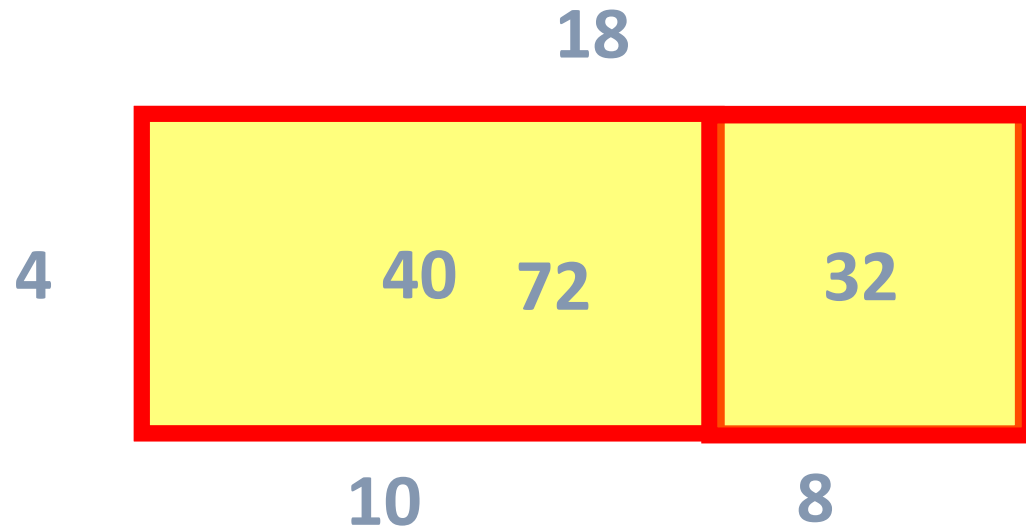
$$\text{So } 51 \div 3 = 17$$

# The Big Grid



$$51 \div 3$$

## Using the bar modelling strategy for division



Partitioning the 72 into key number of 40 and 32 makes the division easier

$$72 \div 4$$

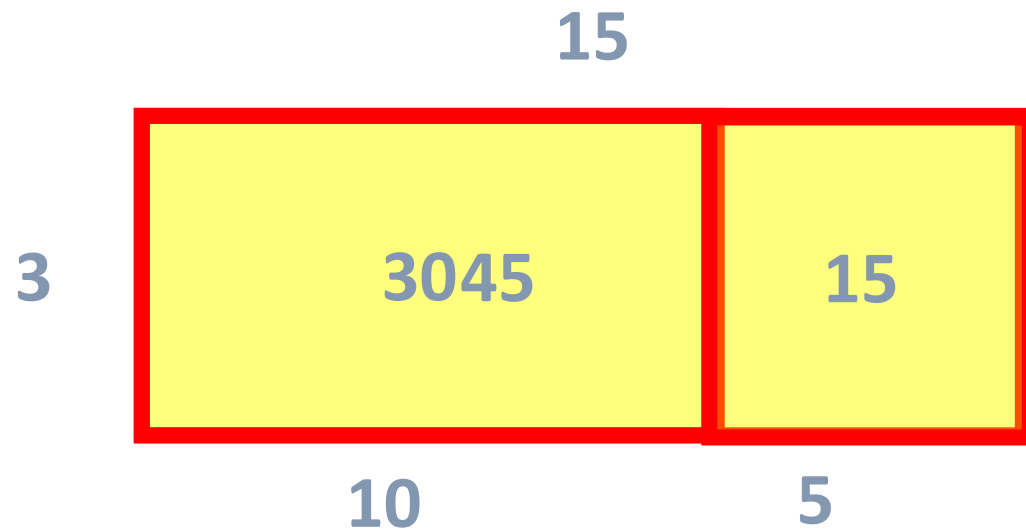
When dividing by 4 the key number is ... 40

If the first bit is the key number of 40 the other bit must be 32

$$\text{As } 40 + 32 = 72$$

$$\text{So } 72 \div 4 = 18$$

## Using the bar modelling strategy for division



$$45 \div 3$$

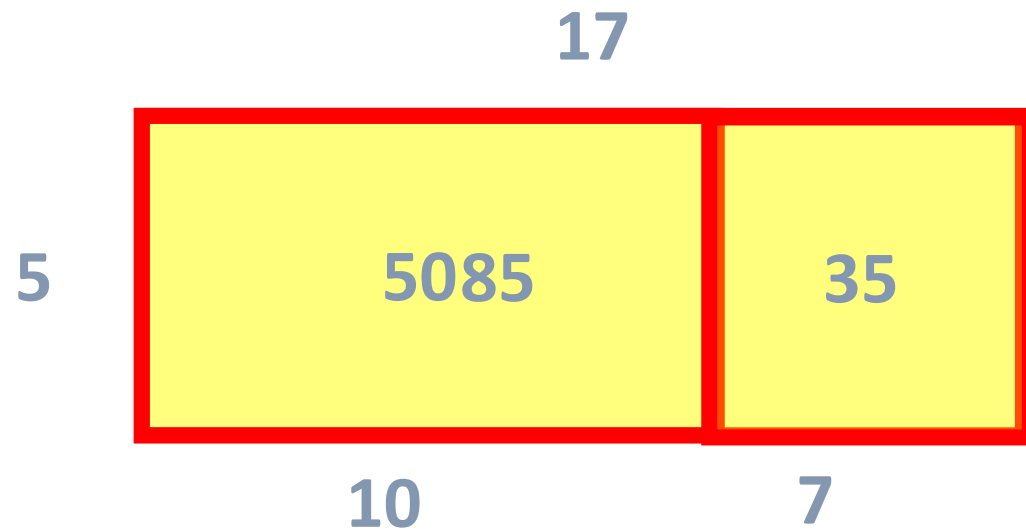
When dividing by 3 the key number is .... 30

If the first bit is the key number of 30 the other bit must be 15

As  $30 + 15 = 45$

$$\text{So } 45 \div 3 = 15$$

## Using the bar modelling strategy for division



$$85 \div 5$$

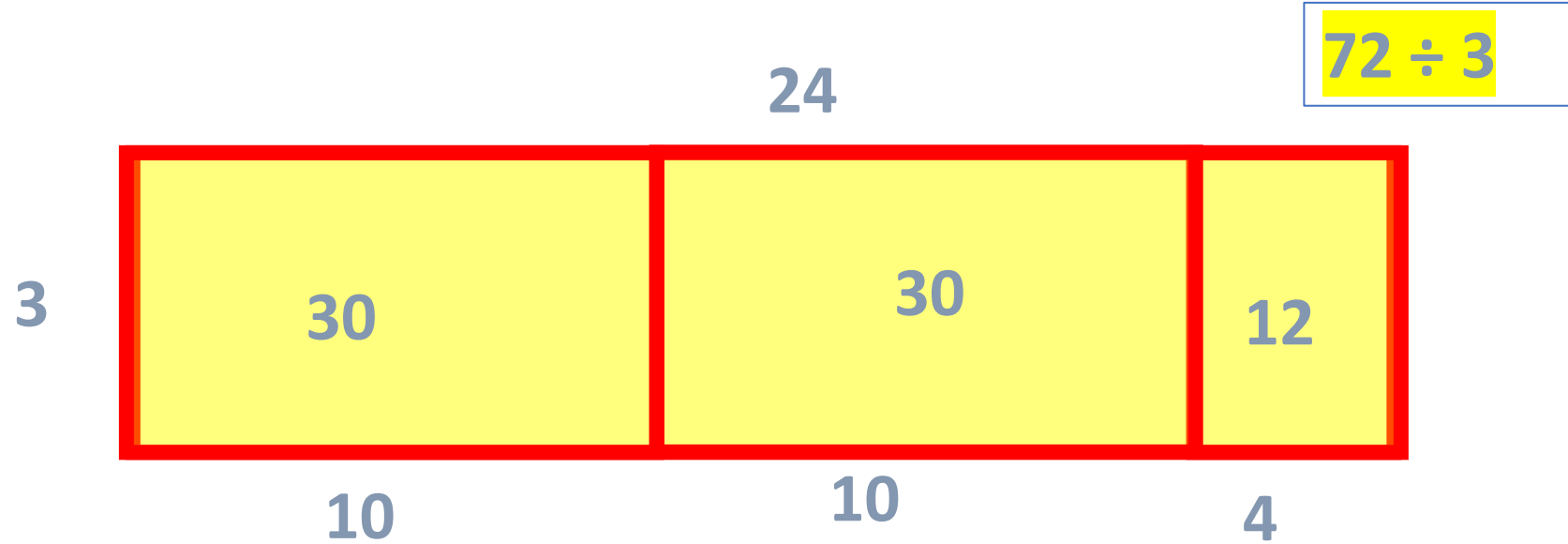
When dividing by 5 the key number is .... 50

If the first bit is the key number of 50 the other bit must be 35

As  $50 + 35 = 85$

$$\text{So } 85 \div 5 = 17$$

## Using the bar modelling strategy for division



When dividing by 3 the key number is .... 30  
We can fit 30 into 72 twice

So  $72 \div 3 = 24$

Try these questions. You must draw a bar model for each one.

This will help strengthen the understanding and help you remember long term.

### Basic Set

1)  $42 \div 3$

2)  $56 \div 4$

3)  $84 \div 6$

4)  $48 \div 3$

5)  $64 \div 4$

6)  $85 \div 5$

7)  $39 \div 3$

8)  $54 \div 3$

9)  $96 \div 6$

10)  $72 \div 4$

### Intermediate Set

1)  $104 \div 8$

2)  $126 \div 9$

3)  $112 \div 7$

4)  $108 \div 6$

5)  $107 \div 9$

6)  $136 \div 8$

7)  $168 \div 14$

8)  $204 \div 17$

9)  $128 \div 8$

10)  $154 \div 11$

### Extension Set

1)  $72 \div 3$

2)  $92 \div 4$

3)  $114 \div 6$

4)  $78 \div 3$

5)  $135 \div 5$

6)  $161 \div 7$

7)  $84 \div 3$

8)  $156 \div 6$

9)  $112 \div 4$

10)  $135 \div 3$

Post your answers on twitter page or FB



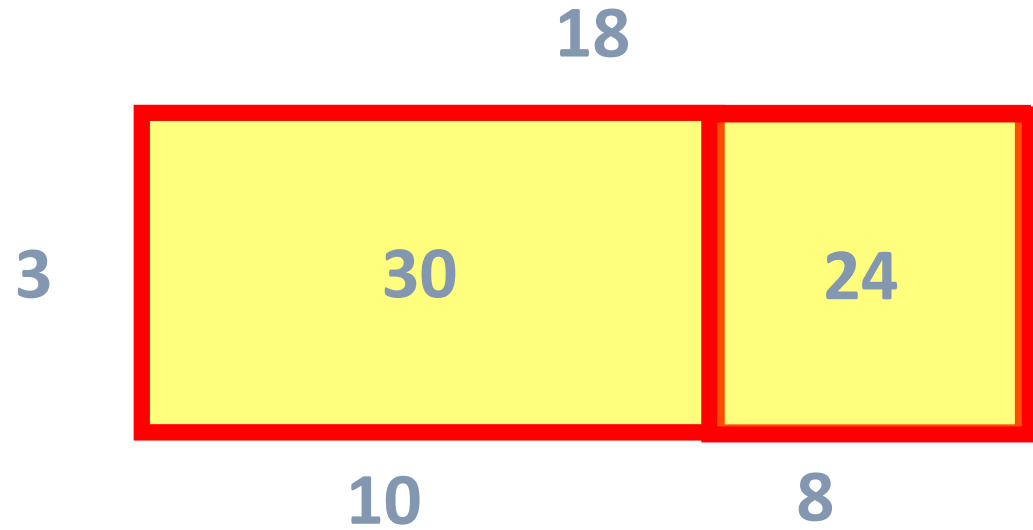
**There are 18 people in the Karate club.**

**Each week they pay the karate Instructor £3.**

**How much money does the karate instructor collect each week?**

**18 x £3**

Let's represent that strategy for  $18 \times 3$  in what is called a 'bar model'



$$18 \times 3 = 30 + 24 = 54$$

The karate instructor collects £54

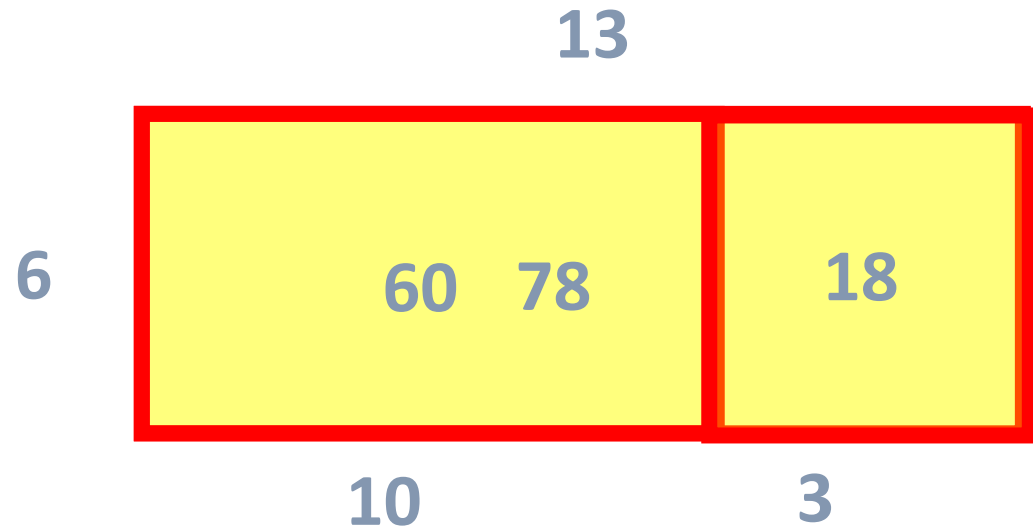
**A farmer collects 78 eggs from his chickens on Sunday morning.**

**He packs them into packs of 6 for selling to customers.**

**How many packs of 6 does he have to sell?**

$$78 \div 6$$

## Using the bar modelling strategy for division



$$78 \div 6$$

When dividing by 6 the key number is .... 60

$$\text{So } 78 \div 6 = 13$$

The farmer has 13 packs of 6 to sell

**If the farmer sells each pack for £2 how much money would he make?**

$$\begin{aligned} &13 \times \text{£}2 \\ &= \text{£}26 \end{aligned}$$

**If the farmer sells each pack for £1.99  
how much money would he make?**

$$\begin{aligned} &13 \times \text{£}2 \\ &= \text{£}26 \end{aligned}$$

$$\begin{aligned} &13 \times \text{£}1.99 \\ &= \text{£}26.00 - \text{£}0.06 \\ &= \text{£}25.94 \end{aligned}$$

**Basic****Question 1**

There are 8 people in the rugby club. Each week they pay the rugby coach £3.

How much money does the rugby coach collect each week?

**Question 2**

A golf shop has collects 21 golf balls. They sell them in packs of 3.

How many packs of 3 do they have to sell?

**Intermediate****Question 1**

There are 17 people in the rugby club. Each week they pay the rugby coach £4.

How much money does the rugby coach collect each week?

**Question 2**

A golf shop has collects 68 golf balls. They sell them in packs of 4.

How many packs of 4 do they have to sell?

**Extension****Question 1**

There are 23 people in the rugby club. Each week they pay the rugby coach £7.

How much money does the rugby coach collect each week?

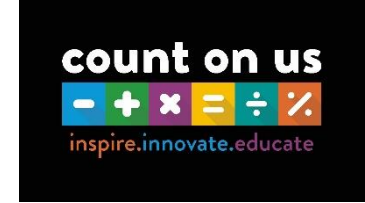
**Question 2**

A golf shop has collects 138 golf balls. They sell them in packs of 6.

How many packs of 6 do they have to sell?

Next week we have sessions on:

All 10:00am



Tuesday - Fractions

Thursday - Decimals

Friday – Percentages

FDP become more of a challenge if the skills of multiplication and division are not embedded.



# Slides and resources at

[www.countonus.org.uk/learning-together/](http://www.countonus.org.uk/learning-together/)

#npfsmaths

Thanks to NPFS, MMC and ES

# Slides and resources at

[www.countonus.org.uk/learning-together/](http://www.countonus.org.uk/learning-together/)

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YouTube

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**@CountOnUsEd**

# Thank You!

To help us continue to represent parents views, understand yours and your child's experiences of maths and numeracy, and to continue to improve the delivery of these sessions, we would appreciate your feedback.

<https://www.surveymonkey.co.uk/r/learningtogetherfeedback>



*With support from Education Scotland and Scottish Government, building on themes emerging from the 'Making Maths Count' Group report*



Slides and resources at  
[www.countonus.org.uk/learning-together](http://www.countonus.org.uk/learning-together)

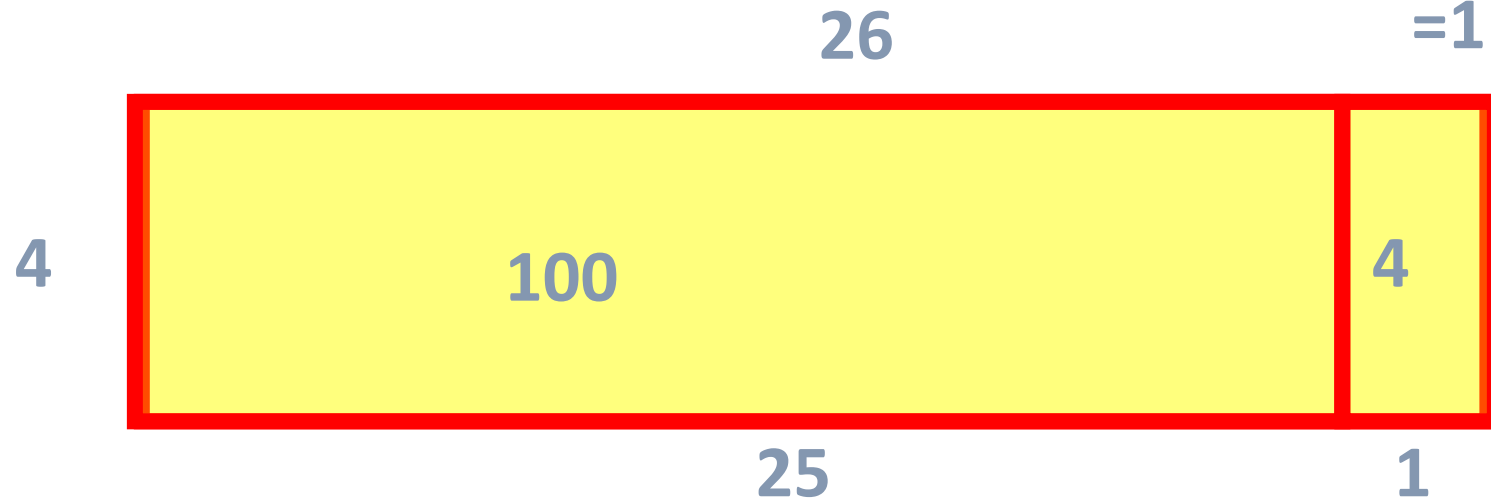
#npfsmaths

## Extra Examples

$$26 \times 4$$

$$= 70 + 42$$

$$= 112$$



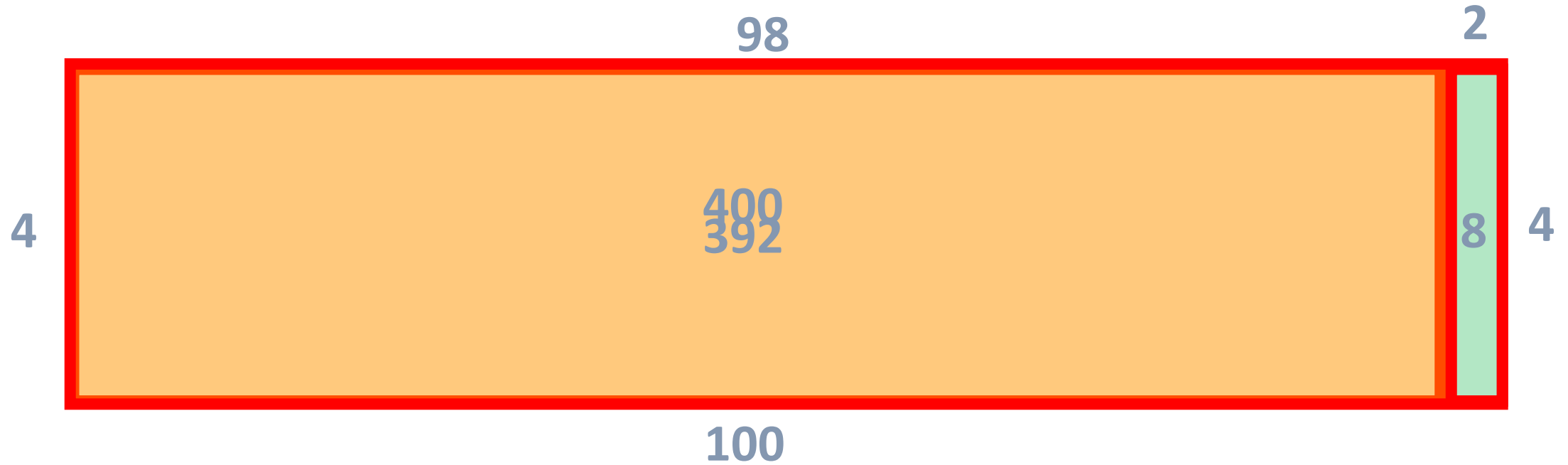
In this case I would personally partition  
the 26 into  $25 + 1$

As I like the fact that  $25 \times 4 = 100$

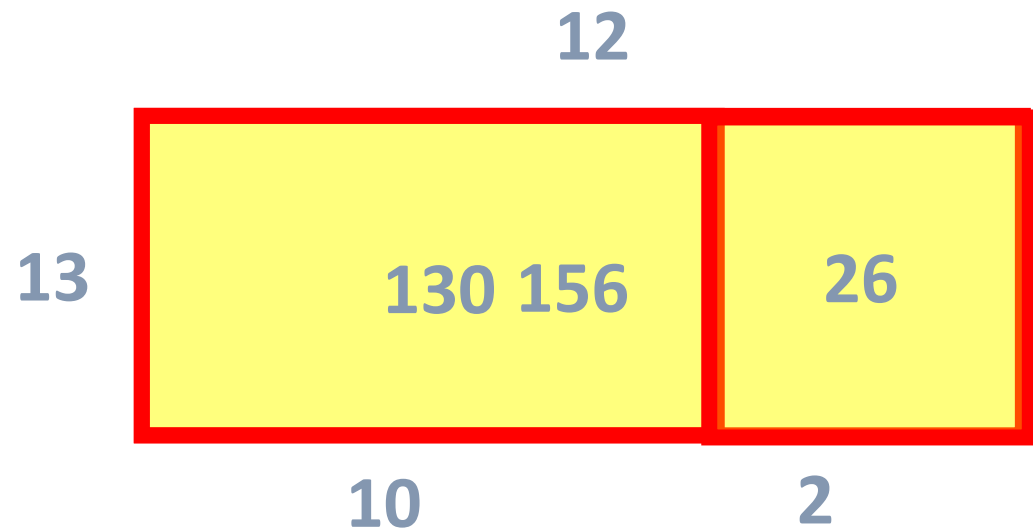
In this case I would personally work out  $100 \times 4$

$$98 \times 4$$

$$= 400 - 8$$
$$= 392$$



## Using the bar modelling strategy for division

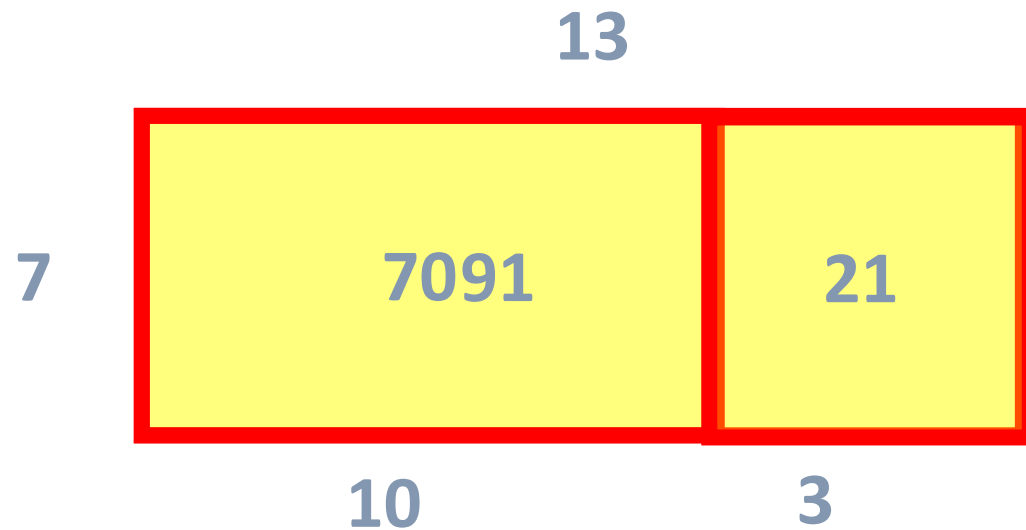


$$156 \div 13$$

When dividing by 13 the key number is .... 130

$$\text{So } 156 \div 13 = 12$$

## Using the bar modelling strategy for division



$$91 \div 7$$

When dividing by 7 the key number is .... 70

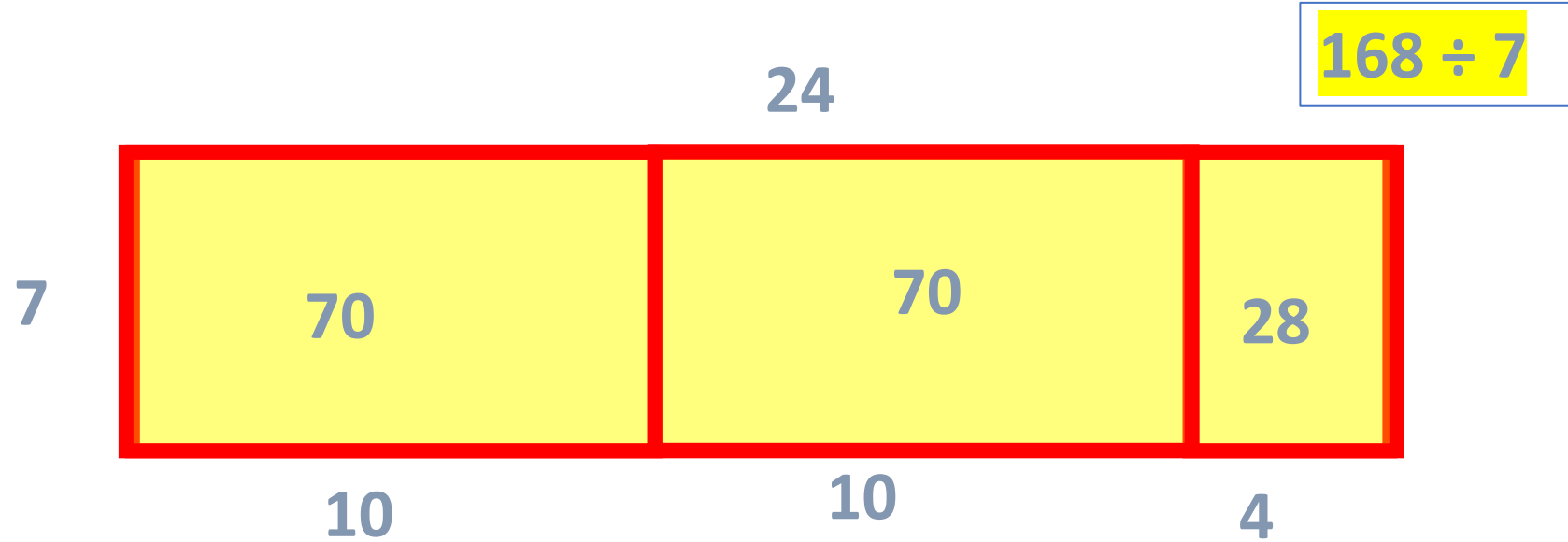
If the first bit is the key number of 70 the other bit must be 21

$$\text{As } 70 + 21 = 91$$

$$\text{So } 91 \div 7 = 13$$



## Using the bar modelling strategy for division

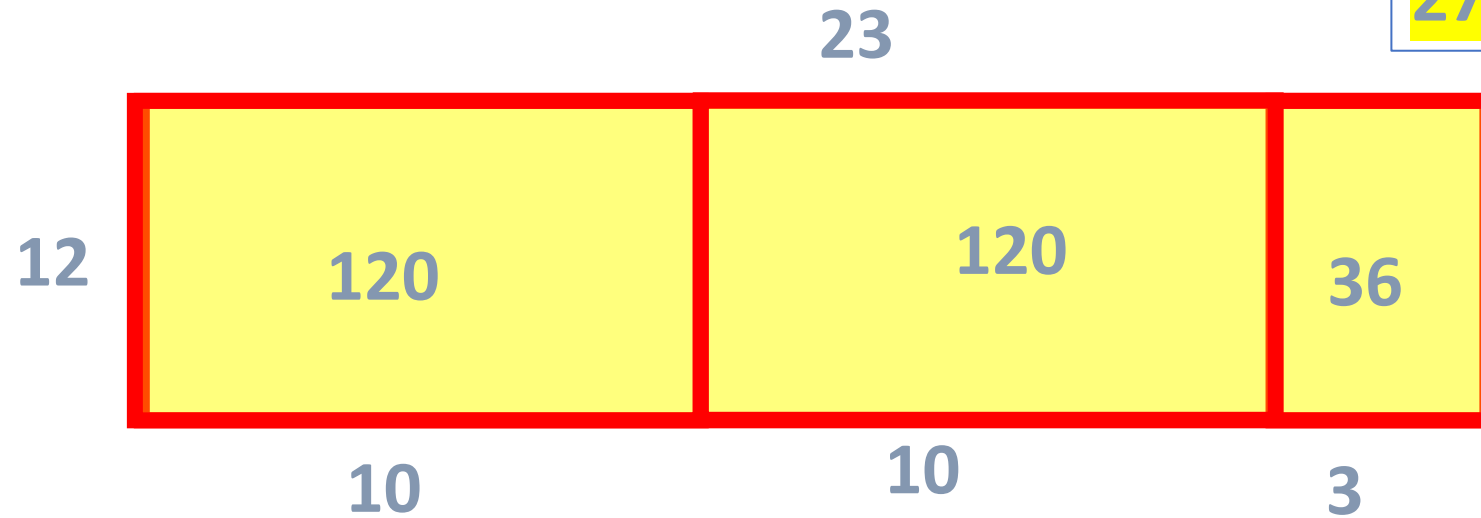


When dividing by 7 the key number is ... 70  
We can fit 70 into 168 twice

$$\text{So } 168 \div 7 = 24$$

## Using the bar modelling strategy for division

$$276 \div 12$$



When dividing by 12 the key number is .... 120

We can fit 120 into 276 twice

$$\text{So } 276 \div 12 = 23$$