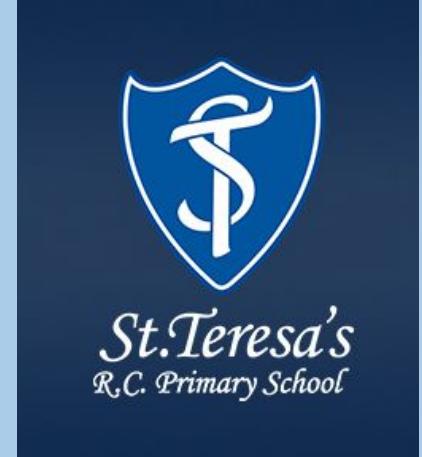


Year 4 Maths Workshop



Multiplication Problem Solving and Reasoning

17th November 2022



1	2	3	4	5
$1 \times 1 = 1$	$2 \times 1 = 2$	$3 \times 1 = 3$	$4 \times 1 = 4$	$5 \times 1 = 5$
$1 \times 2 = 2$	$2 \times 2 = 4$	$3 \times 2 = 6$	$4 \times 2 = 8$	$5 \times 2 = 10$
$1 \times 3 = 3$	$2 \times 3 = 6$	$3 \times 3 = 9$	$4 \times 3 = 12$	$5 \times 3 = 15$
$1 \times 4 = 4$	$2 \times 4 = 8$	$3 \times 4 = 12$	$4 \times 4 = 16$	$5 \times 4 = 20$
$1 \times 5 = 5$	$2 \times 5 = 10$	$3 \times 5 = 15$	$4 \times 5 = 20$	$5 \times 5 = 25$
$1 \times 6 = 6$	$2 \times 6 = 12$	$3 \times 6 = 18$	$4 \times 6 = 24$	$5 \times 6 = 30$
$1 \times 7 = 7$	$2 \times 7 = 14$	$3 \times 7 = 21$	$4 \times 7 = 28$	$5 \times 7 = 35$
$1 \times 8 = 8$	$2 \times 8 = 16$	$3 \times 8 = 24$	$4 \times 8 = 32$	$5 \times 8 = 40$
$1 \times 9 = 9$	$2 \times 9 = 18$	$3 \times 9 = 27$	$4 \times 9 = 36$	$5 \times 9 = 45$
$1 \times 10 = 10$	$2 \times 10 = 20$	$3 \times 10 = 30$	$4 \times 10 = 40$	$5 \times 10 = 50$
6	7	8	9	10
$6 \times 1 = 6$	$7 \times 1 = 7$	$8 \times 1 = 8$	$9 \times 1 = 9$	$10 \times 1 = 10$
$6 \times 2 = 12$	$7 \times 2 = 14$	$8 \times 2 = 16$	$9 \times 2 = 18$	$10 \times 2 = 20$
$6 \times 3 = 18$	$7 \times 3 = 21$	$8 \times 3 = 24$	$9 \times 3 = 27$	$10 \times 3 = 30$
$6 \times 4 = 24$	$7 \times 4 = 28$	$8 \times 4 = 32$	$9 \times 4 = 36$	$10 \times 4 = 40$
$6 \times 5 = 30$	$7 \times 5 = 35$	$8 \times 5 = 40$	$9 \times 5 = 45$	$10 \times 5 = 50$
$6 \times 6 = 36$	$7 \times 6 = 42$	$8 \times 6 = 48$	$9 \times 6 = 54$	$10 \times 6 = 60$
$6 \times 7 = 42$	$7 \times 7 = 49$	$8 \times 7 = 56$	$9 \times 7 = 63$	$10 \times 7 = 70$
$6 \times 8 = 48$	$7 \times 8 = 56$	$8 \times 8 = 64$	$9 \times 8 = 72$	$10 \times 8 = 80$
$6 \times 9 = 54$	$7 \times 9 = 63$	$8 \times 9 = 72$	$9 \times 9 = 81$	$10 \times 9 = 90$
$6 \times 10 = 60$	$7 \times 10 = 70$	$8 \times 10 = 80$	$9 \times 10 = 90$	$10 \times 10 = 100$



Current picture...



Nationally

- **71%** of Year 6 pupils achieved the **Expected Standard** in May 2022 in Mathematics
- **22%** of pupils achieving **Greater Depth**

St Teresa's

- **91%** of our 2022 Year 6 cohort achieved the **Expected Standard**
- **50%** of pupils achieved **Greater Depth**

Multiplication tables check

What?

- It was announced in **2016** that government is to introduce a **statutory check** of pupils ability to **recall** their **multiplication facts**

Why?

- Strong **evidence** to suggest that being able to **recall multiplication facts** with **fluency** plays a **crucial role** in being able to solve more complex mathematical problems:**long multiplication, division, algebra, fractions and proportional reasoning**

Estimating	Division
Fractions	Ration
Decimals	Proportion
Percentages	Algebra
Multiples	Problem solving
Equivalence	Area/Perimeter
Money	Volume
Multiplication	Conversion
Finding the mean	

Multiplication tables check

When?

- Large scale **pilot** to be undertaken in **2018 to 2019**
- In **2019** the **statutory check** is to be **introduced**

Who?

- After seeking advice from regarding which year group should implement the test and when, two fifths responded that at the **end year 4** was the favoured option.

How?

- Large scale **pilot** to be undertaken in **2018 to 2019**
- In **2019** the **statutory check** is to be introduced and the check is to be **administered online** (with an off-line option)

Multiplication tables check

Year One

- Solving one-step problems
- Making connections between arrays and number patterns
- Counting in 2's, 5's and 10's
- Recognising $\frac{1}{2}$ and one of two equal parts and $\frac{1}{4}$ as one of four equal parts

Year Two

- Recalling the multiplication and division facts for 2, 5 and 10
- Calculate mathematical statements and recognise commutative law for multiplication and that it does not apply to division
- Solve problems (including in context) using arrays, repeated addition, mental methods

Year Three

- Recall and use multiplication and division facts for the 3, 4 and 8
- Write and calculate mathematical statements for multiplication and division
- Multiply two-digit numbers by one-digit numbers, using mental methods progressing to formal written methods
- Solve problems, including missing number problems, involving multiplication and division

Year Four

- Recall multiplication and division facts for tables up to 12×12
- Use place value and to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1
- Multiplying together 3 numbers
- Recognise and use factor pairs and commutativity in mental calculations
- Multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- Solve problems involving multiplying and adding

Multiplication tables check

Year Five

- > Identify multiples and factors, including common factors of 2 numbers
- > Know prime numbers, prime factors and composite (non-prime) numbers
- > Establish whether a number up to 100 is prime and recall prime numbers up to 19
- > Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- > Multiply and divide numbers mentally, drawing upon known facts
- > 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
- > Multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000
- > Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- > Solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes
- > Solve problems involving addition, subtraction, multiplication and division and a combination of these including understanding the meaning of the equals sign
- > Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates

Multiplication tables check

Year Six

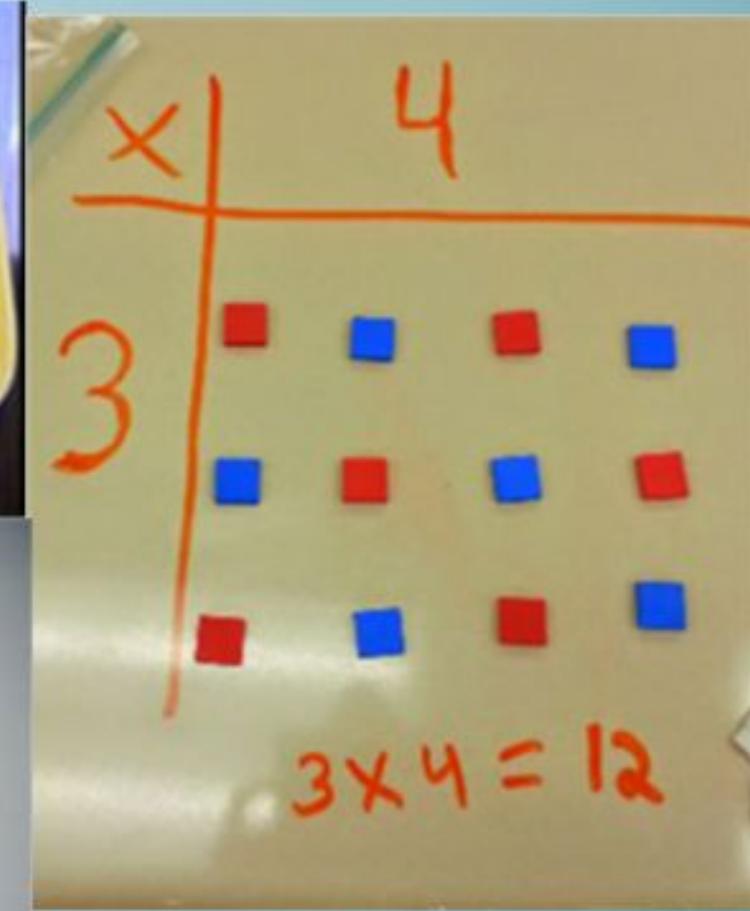
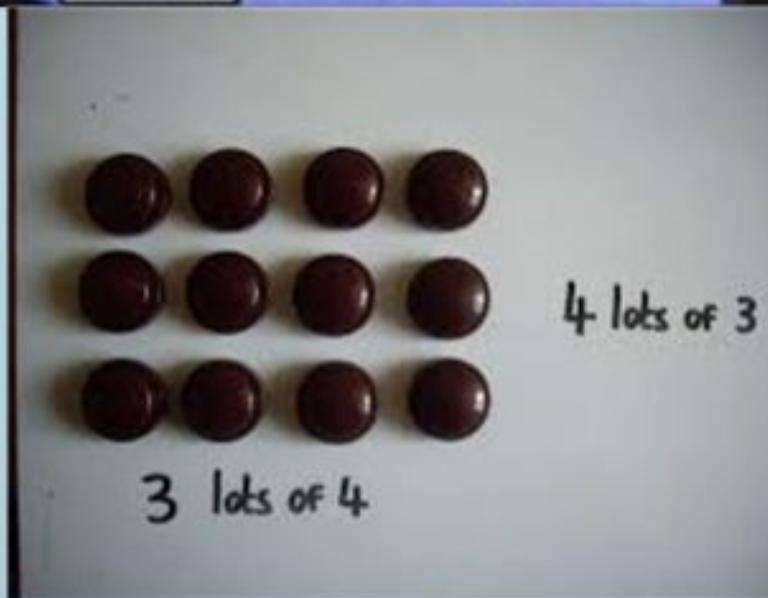
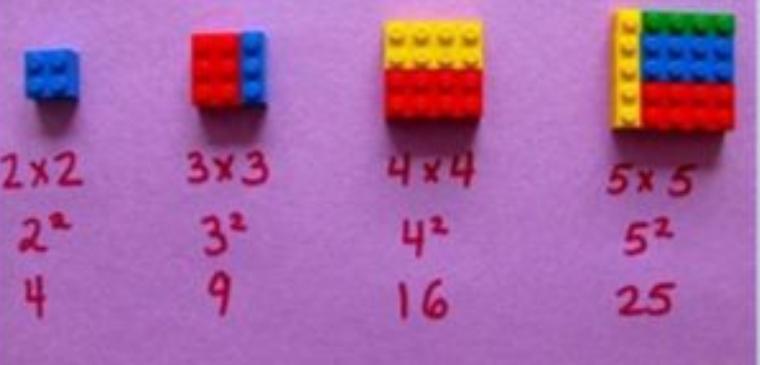
- > multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- > divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- > 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
- > perform mental calculations, including with mixed operations and large numbers
- > identify common factors, common multiples and prime numbers
- > use their knowledge of the order of operations to carry out calculations involving the 4 operations
- > solve addition and subtraction multi-step problems in contexts, deciding which operation and methods to use and why
- > solve problems involving addition, subtraction, multiplication and division
- > use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

Multiplication tables check

Concrete Manipulatives



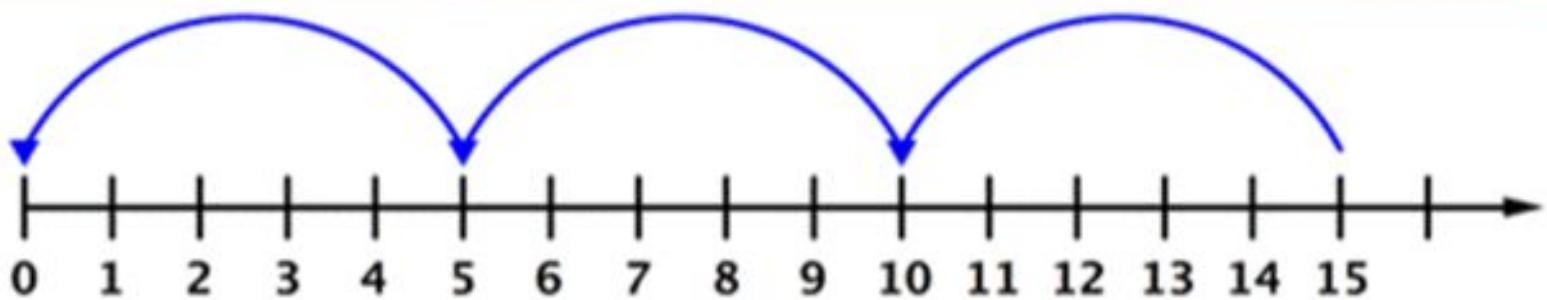
Building Square Numbers



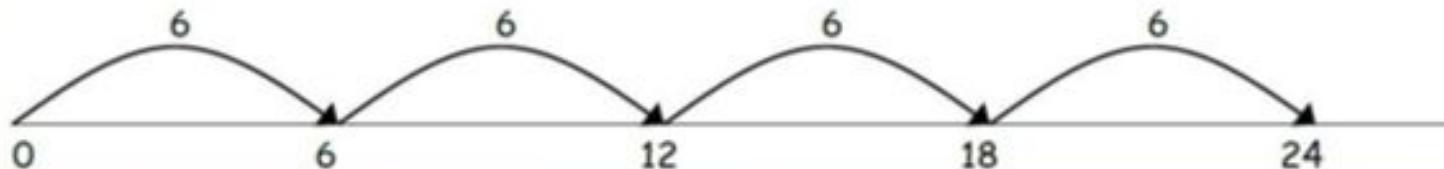
Multiplication tables check



What do you notice
when we add 5?



4 times 6 is $6 + 6 + 6 + 6 = 24$ or 4 lots of 6 or 6×4



Can you predict what the
next number will end in?

Multiplication tables check

Get them to consider, what they *already* know...



Empower them

Multiplication facts for 8

8
1x8

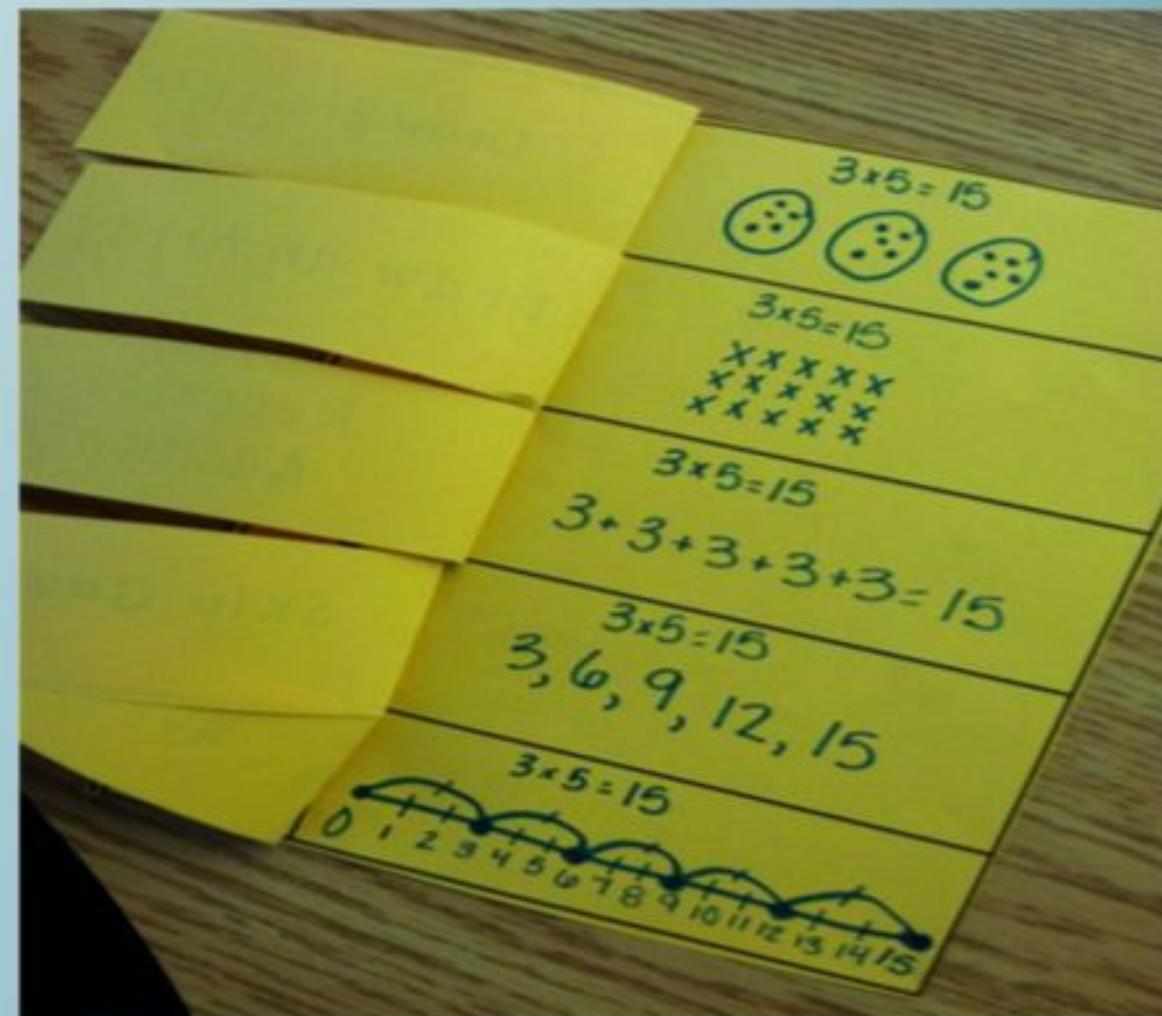
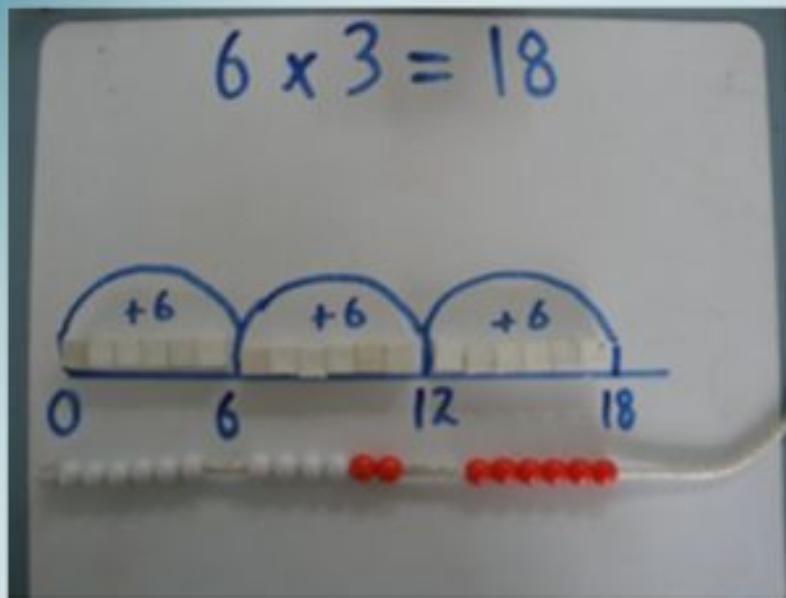
16
2x8

24
3x8

32
4x8

80
10x8

Multiplication tables check



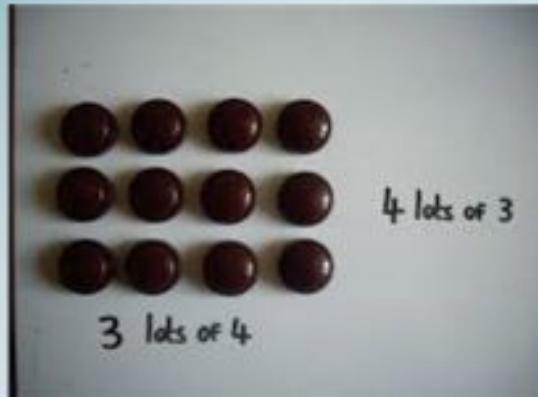
Multiplication tables check

Challenge

MA

HA

LA



Investigating

4	8	12	16
20	24	28	32
36	40	44	48

Can you represent
your understanding
using an image?

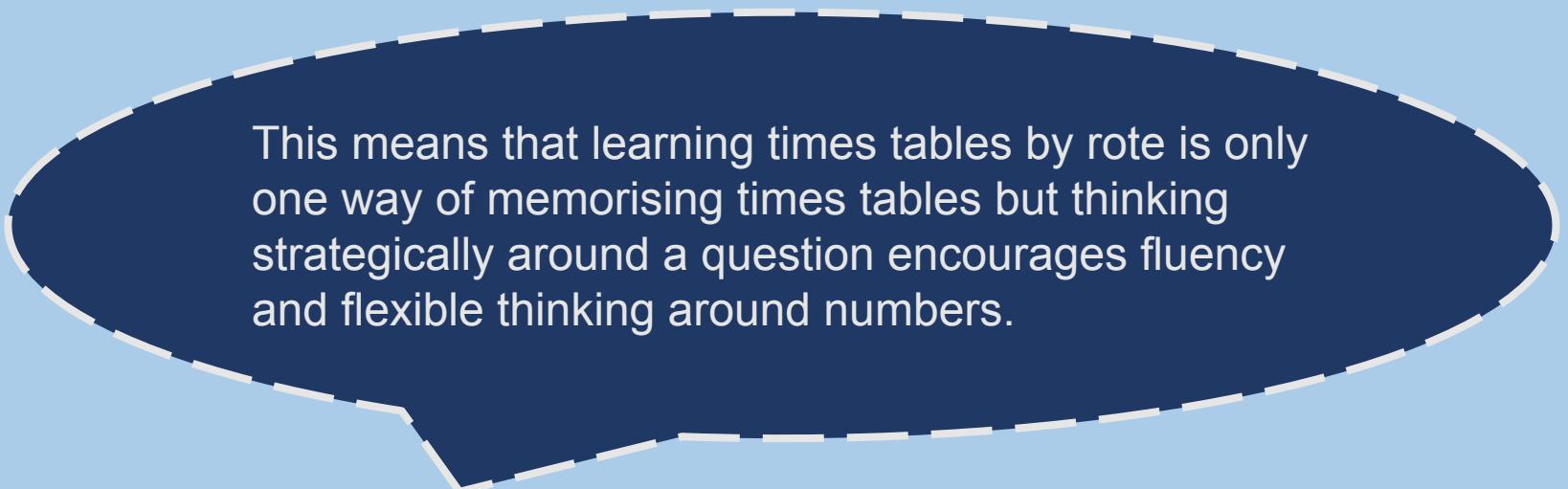
There are 6 pencils in a pack and Gemma has 4 packs of pencils, how many pencils does Gemma have altogether?

Can you show me how you know?

Memorisation and number sense

“People with number sense are those who can use numbers flexibly. When asked to solve 7×8 someone with number sense may have memorized 56 but they would also be able to work out that 7×7 is 49 and then add 7 to make 56, or they may work out ten 7's and subtract two 7's (70-14). They would not have to rely on a distant memory.”

(Boaler, 2009)



This means that learning times tables by rote is only one way of memorising times tables but thinking strategically around a question encourages fluency and flexible thinking around numbers.

What do we mean by ‘fluent’?

G. Kling and J. M. Bay-Williams, 2015



Knowing ‘from memory’ rather than from memorisation.

“With repeated experiences working with number, students can come to “just know” that $2 \times 6 = 12$, without ever having had to memorize it. At this point, we say students have mastered their multiplication facts, as they have become so fluent at applying their strategies that they do so automatically, without hesitation.”

MTC (Multiplication times tables check) takes place in June 2023

This is the format of the test your child will complete

The screenshot shows a digital interface for the Multiplication Tables Check. At the top left is the GOV.UK logo. In the center, it says "Multiplication Tables Check". On the right, it shows "Remaining time: 5". Below this, a multiplication question "11 × 2 =" is displayed, followed by a large empty input box with a yellow border. Underneath the input box is a numeric keypad with digits 1 through 9, a decimal point, and a backspace key. At the bottom right of the keypad are "Enter" and "0" buttons.

25 questions
6 seconds per question

Delivered on screen – computer or tablet

Online using an internet connection

A restart is available if something happens!

Wall displays should be removed if they assist the pupil with working out the answers.

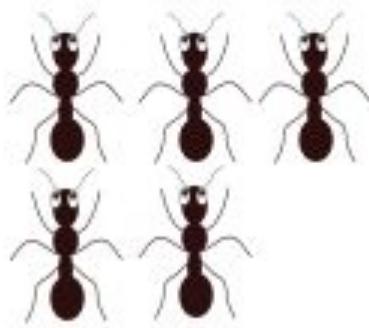
No calculators!

9×4

Can you represent this multiplication using the concrete manipulatives on your tables?

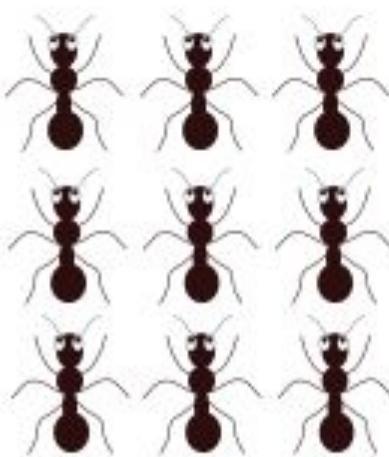
Have a go at this question using the items on your table.

Representations



$$5 \times 6 = \boxed{\quad}$$

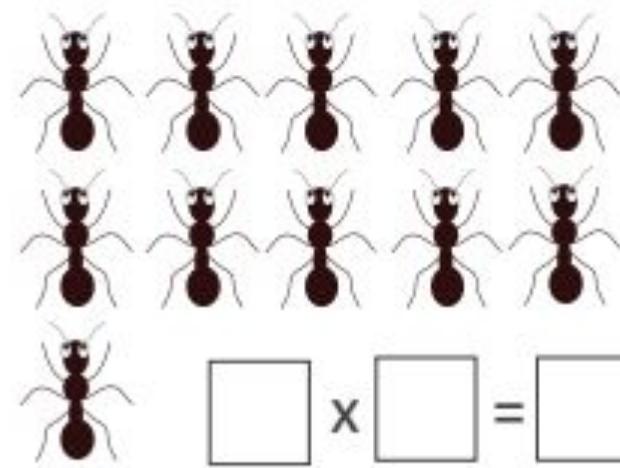
$$6 \times 5 = \boxed{\quad}$$



$$\boxed{\quad} \times 6 = \boxed{\quad}$$

$$6 \times \boxed{\quad} = \boxed{\quad}$$

Completing multiplication equations



$$\boxed{\quad} \times \boxed{\quad} = \boxed{\quad}$$

$$\boxed{\quad} \times \boxed{\quad} = \boxed{\quad}$$

Missing-number/symbol problems:

- 'Fill in the missing numbers.'

$$7 \times 6 = 6 \times \boxed{\quad} + 6$$

$$9 \times \boxed{\quad} = 10 \times 6 - 6$$

$$6 \times 9 - 6 = \boxed{\quad} \times 6$$

$$\boxed{\quad} \times 6 + 6 = 10 \times 6$$

$$\boxed{\quad} \times 6 + 3 \times 6 = 60$$



Cover it 6s



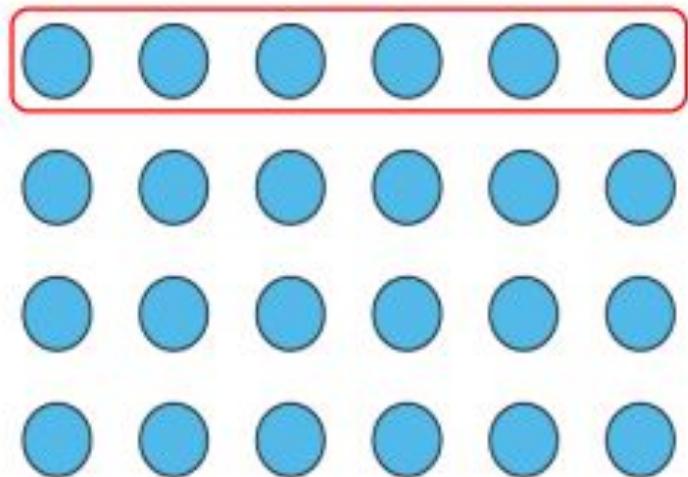
There are _____ groups of _____ legs.

There are _____ legs.

There are _____ groups of _____.

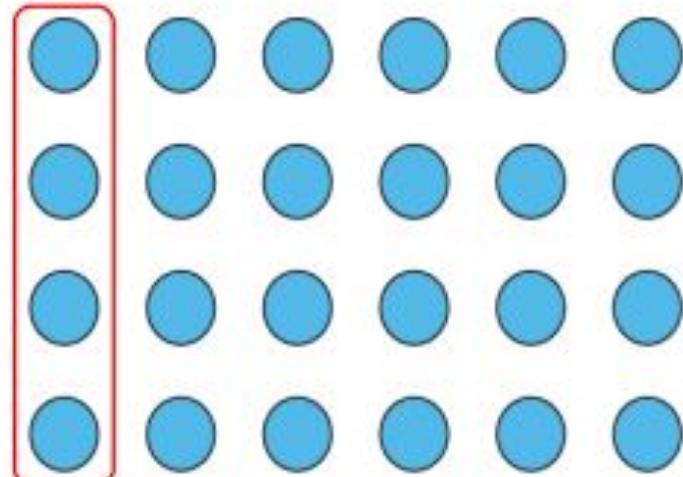
Representations

Using arrays



There are _____ groups of 6.

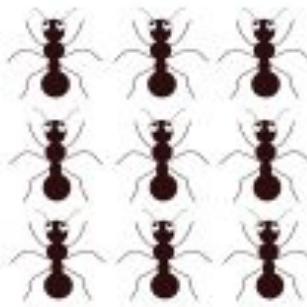
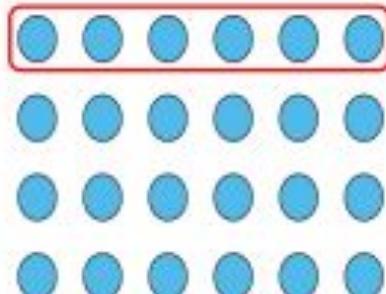
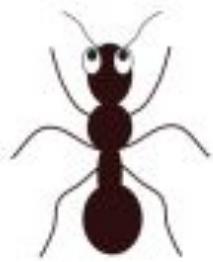
$$\boxed{\quad} \times 6 = \boxed{\quad}$$



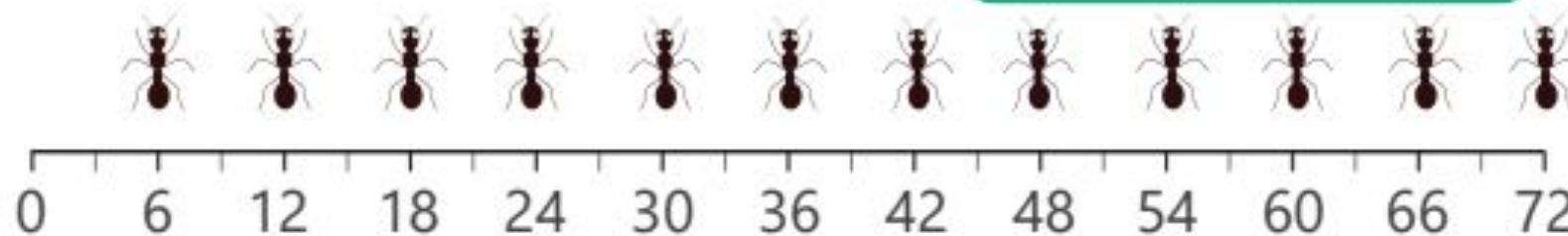
There are 6 groups of _____.

$$6 \times \boxed{\quad} = \boxed{\quad}$$

Representations

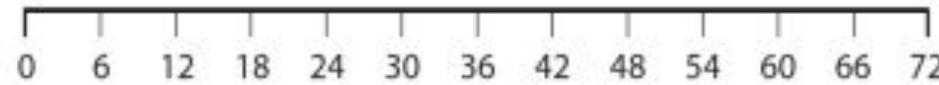
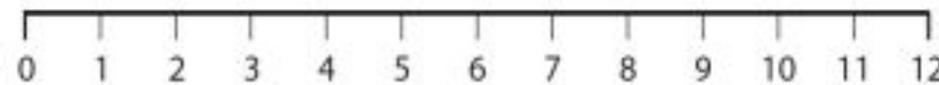


6



Models of 6s

What does the factor 6 represent?
What does the factor 4 represent?
The product of 6 and 4 is 24.



"Three groups of six is equal to 18"

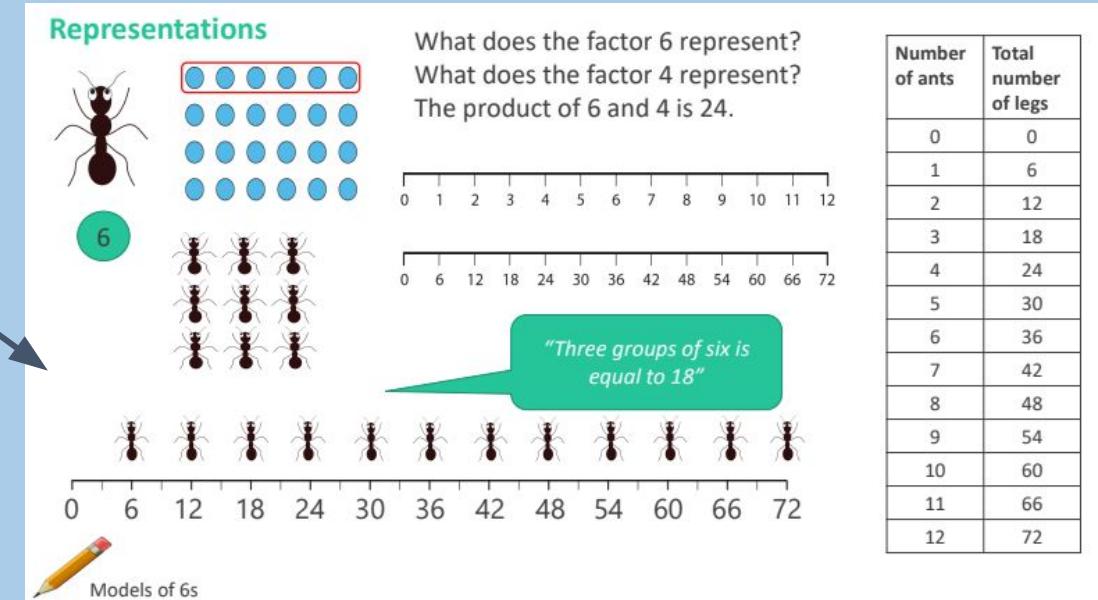
Number of ants	Total number of legs
0	0
1	6
2	12
3	18
4	24
5	30
6	36
7	42
8	48
9	54
10	60
11	66
12	72

Different ways to represent a multiplication concept

9×4

Think about how you could use arrays, number lines or other visual representations, clearly presenting all of the information.

Have a go at this question using the flipchart paper on your table.

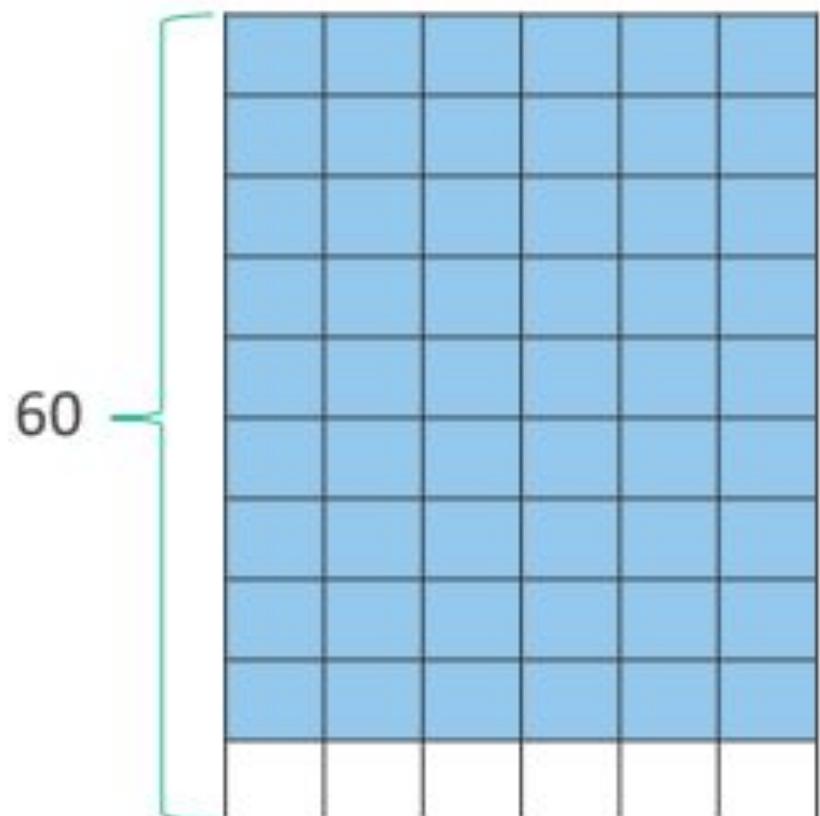


1. Subtracting a group – using adjacent multiples

Example: 9×6

$$9 \times 6 = 10 \times 6 - 6$$

$$60 - 6 = 54$$



Use nearby 2, 5 and 10 facts

I could use this for:

$$9 \times 4$$

$$9 \times n$$

$$4 \times 6$$

$$4 \times n$$

I don't know 9×6 , but I can use 10×6



- Great times table games to strengthen understanding
- ‘Practice’ MTC so children get used to the format
- 5/10 minutes of Sumdog and/or Times Table Rockstars every day



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1. Have a go at 'Sumdog' and show your parents and carers how fast you are at solving multiplication problems....
2. Can your parents have a go at a practice MTC?

If time...

This is how to find the cost of hiring a car.



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$$\text{cost of hiring a car} = 20 \times \text{number of days}$$

- (a) Leena hires the car for **10 days**.

How much must she pay?

Children will be expected to use their fluency and understanding of multiplication facts within reasoning questions.

£

- (b) Later, Tom pays £280 to hire the car.

For how many days does he hire the car?

Have a go at this question...



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(a) £ 200

1

(b) 14

1

[2]



Recap

- Children need to be fluent in all their times tables by the end of Year 4
- Multiplication Times Table Check in June 2023
- 5/10 minutes of Sumdog and/or Times Table Rockstars every day
- Utilise concrete and pictorial representations to aid understanding



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Any questions?