

White

**Rose
Maths**

Autumn - Block 3

Multiplication & Division

Overview

Small Steps

- ▶ Multiplication – equal groups
- ▶ Multiply by 3
- ▶ Divide by 3
- ▶ The 3 times table
- ▶ Multiply by 4
- ▶ Divide by 4
- ▶ The 4 times table
- ▶ Multiply by 8
- ▶ Divide by 8
- ▶ The 8 times table

NC Objectives

Count from 0 in multiples of 4, 8, 50 and 100

Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.

Write and calculate mathematical statements for multiplication and division using the multiplication tables they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.

Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Multiplication – Equal Groups

Notes and Guidance

Children recap their understanding of recognising, making and adding equal groups. This will allow them to build on prior learning and prepare them for the next small steps.

Mathematical Talk

What is the same and what is different between each of the groups?

What does the 3 represent?

What does the 8 represent?

How can we represent the groups?

Varied Fluency

Describe the equal groups.



___ equal groups of ___



___ equal groups of ___

How many different ways can you represent:
Six equal groups with 4 in each group?
Six 4s?

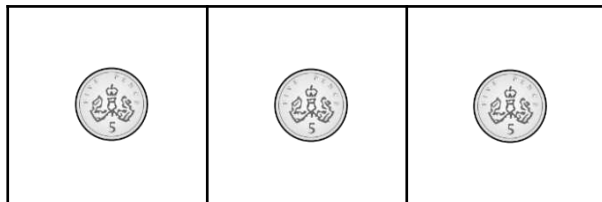
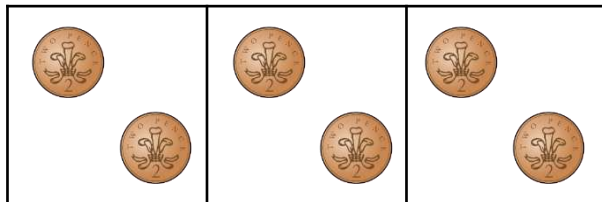
Complete:

	<p>Add It</p>
<p>Say it</p> <p>There are ___ equal groups with ___ in each group. There are ___ altogether.</p>	<p>Multiply it</p>

Multiplication – Equal Groups

Reasoning and Problem Solving

Which row of money is the odd one out?



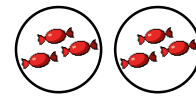
Explain why.

The first two rows have 4p in each group, and 12p in total.

The third row has 5p in each group, so 15p in total.

The third group is therefore the odd one out.

Match the equal groups together.



Three 5s



Two 10s



Two 3s

Sweets, squares, two 3s

Dice, cubes, three 5s

Coins, number pieces, two 10s.

Multiply by 3

Notes and Guidance

Children draw on their knowledge of counting in threes in order to start to multiply by 3

They use their knowledge of equal groups to use concrete and pictorial methods to solve questions and problems involving multiplying by 3

Mathematical Talk

How many equal groups do we have?

How many are in each group?

How many do we have altogether?

Can you write a number sentence to show this?

Can you represent the problem in a picture?

Can you use concrete apparatus to solve the problem?

How many lots of 3 do we have?

How many groups of 3 do we have?

Varied Fluency

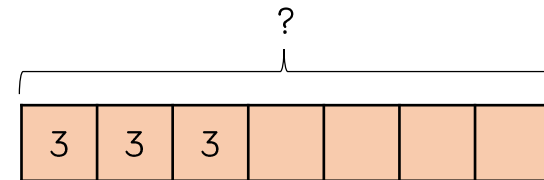
- There are five towers with 3 cubes in each tower.
How many cubes are there altogether?

$$\underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} \times \underline{\quad} = \underline{\quad}$$



- There are 7 tricycles in a playground.
How many wheels are there altogether?
Complete the bar model to find the answer.



- There are 3 tables with 6 children on each table.
How many children are there altogether?

$$\underline{\quad} \text{ lots of } \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} \times \underline{\quad} = \underline{\quad}$$

Multiply by 3

Reasoning and Problem Solving

There are 8 children.
Each child has 3 sweets.
How many sweets altogether?

Use concrete or pictorial representations to show this problem.

Write another repeated addition and multiplication problem and ask a friend to represent it.

There are 24 sweets altogether.

Children may use items such as counters or cubes.

They could draw a bar model for a pictorial representation.

If $5 \times 3 = 15$, which number sentences would find the answer to 6×3 ?

- $5 \times 3 + 6$
- $5 \times 3 + 3$
- $15 + 3$
- $15 + 6$
- 3×6

Explain how you know.

$5 \times 3 + 3$
because one more lot of 3 will find the answer.

$15 + 3$ because adding one more lot of 3 to the answer to 5 lots will give me 6 lots.

3×6 because $3 \times 6 = 6 \times 3$ (because multiplication is commutative).

Divide by 3

Notes and Guidance

Children explore dividing by 3 through sharing into three equal groups and grouping in threes.

They use concrete and pictorial representations and use their knowledge of the inverse to check their answers.

Mathematical Talk

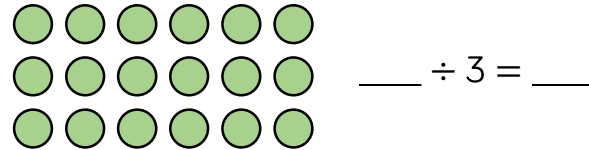
Can you put the counters into groups of three?

Can you share the number into three groups?

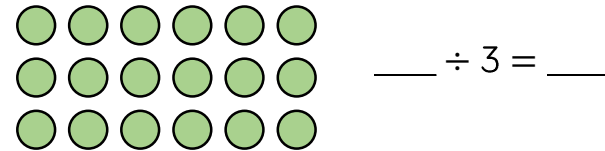
What is the difference between sharing and grouping?

Varied Fluency

- Circle the counters in groups of 3 and complete the division.

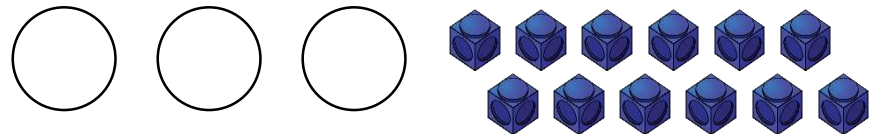


- Circle the counters in 3 equal groups and complete the division.



What's different about the ways you have circled the counters?

- There are 12 pieces of fruit. They are shared equally between 3 bowls. How many pieces of fruit are in each bowl?
Use cubes/counters to represent fruit and share between 3 circles.



- Bobbles come in packs of 3
If there are 21 bobbles altogether, how many packs are there?

Divide by 3

Reasoning and Problem Solving

Share 33 cubes between 3 groups.

Complete:

There are 3 groups with ____ cubes in each group.

$$33 \div 3 = \underline{\quad}$$

Put 33 cubes into groups of 3

Complete:

There are ____ groups with 3 cubes in each group.

$$33 \div 3 = \underline{\quad}$$

What is the same about these two divisions?

What is different?

The number sentences are both the same.

The numbers in each number sentence mean different things.

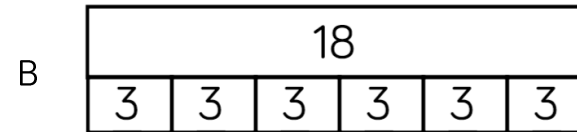
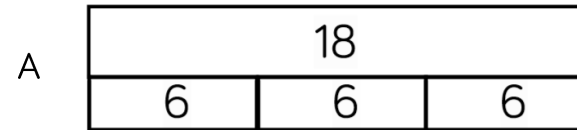
In the first question, the '3' means the number of groups the cubes are shared into because the cubes are being shared.

In the second question, the '3' means the size of each group.

Jack has 18 seeds.

He plants 3 seeds in each pot.

Which bar model matches the problem?



Explain your choice.

Bar model B matches the problem because Jack plants 3 seeds in each pot, therefore he will have 6 groups (pots), each with 3 seeds.

The 3 Times Table

Notes and Guidance

Children draw together their knowledge of multiplying and dividing by three in order to become more fluent in the three times table.

Children apply their knowledge to different contexts.

Mathematical Talk

Can you use concrete or pictorial representations to help you?

What other facts can you link to this one?

What other times table will help us with this question?

Varied Fluency

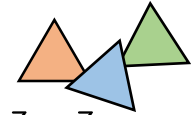
Complete the number sentences.

1 triangle has 3 sides.

3 triangles have ___ sides in total.

___ triangles have 6 sides in total.

5 triangles have ___ sides in total.



$$1 \times 3 = 3$$

$$3 \times \underline{\quad} = \underline{\quad}$$

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

$$\underline{\quad} \times \underline{\quad} = \underline{\quad}$$

Tick the number sentences that the image shows.



$$12 \div 3 = 4$$

$$12 = 4 \times 3$$

$$3 \div 4 = 12$$

$$3 = 12 \div 4$$

$$3 \times 12 = 4$$

$$3 \times 4 = 12$$

Fill in the missing number facts.

$$1 \times 3 = \underline{\quad}$$

$$2 \times \underline{\quad} = 6$$

$$\underline{\quad} = 3 \times 3$$

$$9 \times 3 = \underline{\quad}$$

$$\underline{\quad} \times 3 = 30$$

$$8 \times \underline{\quad} = 24$$

$$6 \times 3 = \underline{\quad}$$

$$21 = \underline{\quad} \times 3$$

The 3 Times Table

Reasoning and Problem Solving

Sort the cards below so they follow round in a loop.

Start at $18 - 3$

Calculate the answer to this calculation.

The next card needs to begin with this answer.

18 - 3	21 ÷ 3	15 ÷ 3	8 - 5
5 × 2	10 × 2	20 + 1	4 × 2
14 - 2	12 ÷ 3	3 × 6	7 × 2

Order:

$18 - 3$
 $15 \div 3$
 5×2
 10×2
 $20 + 1$
 $21 \div 3$
 7×2
 $14 - 2$
 $12 \div 3$
 4×2
 $8 - 5$
 3×6

Start this rhythm:

Clap, clap, click, clap, clap, click.

Carry on the rhythm, what will you do on the 15th beat?

How do you know?

What will you be doing on the 20th beat?

Explain your answer.

Clicks are multiples of three.

On the 15th beat, I will be clicking because 15 is a multiple of 3

On the 20th beat, I will be clapping because 20 is not a multiple of 3

Multiply by 4

Notes and Guidance

Building on their knowledge of the two times table, children multiply by 4

They link multiplying by 4 to doubling then doubling again. Children connect multiplying by 4 to repeated addition and counting in 4s.

To show the multiplication of 4, children may use number pieces, cubes, counters, bar models etc.

Mathematical Talk

How many equal groups do we have?

How many are in each group?

How many do we have altogether?

Can you write a number sentence to show this?

Can you represent the problem in a picture?

Can you use concrete apparatus to solve the problem?

How many lots of 4 do we have?

How many groups of 4 do we have?

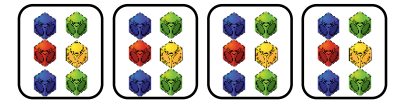
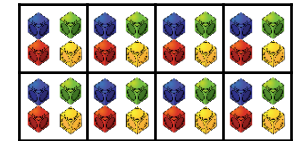
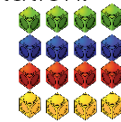
Varied Fluency

Match the multiplication to the representation.

4×4

4×6

8×4



How many dots are there altogether?



There are ___ dice with ___ dots on each.

There ___ fours.

___ \times ___ = ___ dots.

There are 4 pens in a pack.
How many pens are there in 7 packs?

Multiply by 4

Reasoning and Problem Solving

Tommy has four bags with five sweets in each bag.

Annie has six bags with four sweets in each bag.

Who has more sweets?

How many more sweets do they have?

Draw a picture to show this problem.

Annie has more sweets.

She has four more sweets than Tommy.

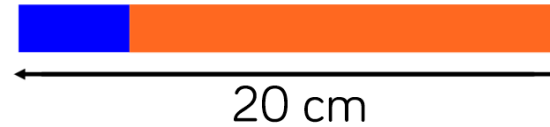
Here is a blue strip of paper.



An orange strip is four times as long.



The strips are joined end to end.



How long is the blue strip?

How long is the orange strip?

Explain how you know.

The blue strip is 4 cm long.

The orange strip is 16 cm long.

The orange strip is 4 times as long as the blue strip, so there are 5 equal parts in total, and the length of each part is:

$20 \div 5 = 4$ cm long.

To find the length of the orange part:

$4 \times 4 = 16$ cm.

Divide by 4

Notes and Guidance

Children explore dividing by 4 through sharing into four equal groups and grouping in fours.

They use concrete and pictorial representations and their knowledge of the inverse to check their answers.

Mathematical Talk

Can you put the buttons into groups of fours?

Can you share the number into four groups?

What is the difference between sharing and grouping?

Varied Fluency

- Circle the buttons in groups of 4.

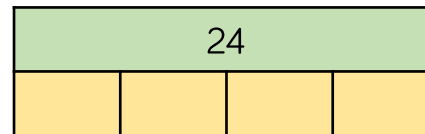


Can you also split the buttons into 4 equal groups?
How is this the same? How is it different?

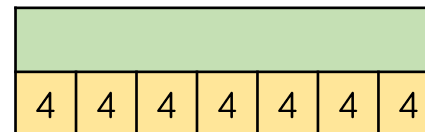
- There are some cars in a car park.
Each car has 4 wheels.
In the car park there are 32 wheels altogether.
How many cars are there?

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

- Complete the bar models and the calculations.



$$24 \div 4 = \underline{\quad}$$



$$\underline{\quad} \div 4 = \underline{\quad}$$

Divide by 4

Reasoning and Problem Solving

Which of the word problems can be solved using $12 \div 4$?

There are 12 bags of sweets with 4 sweets in each bag.
How many sweets are there altogether?

A rollercoaster carriage holds 4 people.
How many carriages are needed for 12 people?

I have 12 crayons and share them equally between 4 people.
How many crayons does each person receive?

I have 12 buns and I give 4 to my brother.
How many do I have left?

Explain your reasoning for each.

No, the calculation is $12 \times 4 = 48$ sweets

Yes, 12 is being grouped into 4s.

Yes, 12 is being shared equally into 4 groups.

No, the calculation is $12 - 4 = 8$ buns

Five children are playing a game.

They score 4 points for every bucket they knock down.



Mo	16
Eva	28
Tommy	12
Amir	32
Dora	8

How many buckets did they knock down each?

How many buckets did they knock down altogether?

How many more buckets did Eva knock down than Mo?

Mo = 4 buckets.

Eva = 7 buckets.

Tommy = 3 buckets.

Amir = 8 buckets.

Dora = 2 buckets.

They knocked down 24 buckets altogether.

Eva knocked 3 more buckets down than Mo.

The 4 Times Table

Notes and Guidance

Children use knowledge of known multiplication tables (2, 3, 5 and 10 times tables) and understanding of key concepts of multiplication to develop knowledge of the 4 times table.

Children who have learnt $3 \times 4 = 12$ can use understanding of commutativity to know that $4 \times 3 = 12$

Mathematical Talk

What do you notice about the pattern?

Can you use concrete or pictorial representations to help you?

What other facts can you link to this one?

What other times tables will help you with this times table?

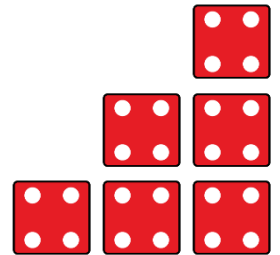
Varied Fluency

Use the pictorial representations to complete the calculations.

$1 \times 4 = \underline{\quad}$

$2 \times 4 = \underline{\quad}$

$3 \times 4 = \underline{\quad}$



Continue the pattern.

2 cars have eight wheels. How many wheels do four cars have?

$2 \times 4 = 8 \qquad 4 \times 4 = \underline{\quad}$

Three cows have 12 legs. How many legs do six cows have?

$3 \times \underline{\quad} = 12 \qquad 6 \times \underline{\quad} = \underline{\quad}$

Colour in the multiples of 4
What pattern do you notice?

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

The 4 Times Table

Reasoning and Problem Solving

I have forgotten what 4×4 is.



Jack says,
“The answer is more than 3×4 ”

Complete the calculation to prove this.
 $4 \times 4 = 3 \times 4 + \underline{\quad}$

Mo says,
“The answer is 4 less than 5×4 ”

Complete the calculation to prove this.
 $4 \times 4 = \underline{\quad} \times 4 - \underline{\quad}$

Teddy says,
“The answer is double 2×4 ”

Complete the calculation to prove this.
 $4 \times 4 = \underline{\quad} \times 4 \times \underline{\quad}$

Whose idea do you prefer? Why?

$$\begin{aligned} 4 \times 4 &= 3 \times 4 + 4 \\ &= 12 + 4 \\ &= 16 \end{aligned}$$

$$\begin{aligned} 4 \times 4 &= 5 \times 4 - 4 \\ &= 20 - 4 \\ &= 16 \end{aligned}$$

$$\begin{aligned} 4 \times 4 &= 2 \times 4 \times 2 \\ &= 16 \end{aligned}$$

Which part below does not show counting in fours?

$4 + 4 + 4 + 4$	

Explain why.

The place value counters do not show counting in fours because each part has 3 in so it is counting in threes.

Multiply by 8

Notes and Guidance

Building on their knowledge of the 4 times table, children start to multiply by 8, understanding that each multiple of 8 is double its equivalent multiple of 4. They link multiplying by eight to previous knowledge of equal groups and repeated addition. Children explore the concept of multiplying by 8 in different ways, when 8 is the multiplier (first number in the multiplication calculation) and where 8 is the multiplicand (second number).

Mathematical Talk

- How many equal groups do we have?
- How many are in each group?
- How many do we have altogether?
- Can you write a number sentence to show this?
- Can you represent the problem in a picture?
- Can you use concrete apparatus to solve the problem?
- How many lots of 8 do we have?
- How many groups of 8 do we have?
- We have 8 groups, how many are in each group?

Varied Fluency

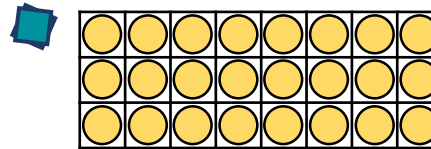


How many legs altogether do four spiders have?
There are ___ legs on each spider.

$$\underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} \times 8 = \underline{\quad}$$

If there are ___ spiders, there will be ___ legs altogether.



Arrange 24 counters in an array as shown and complete the calculations.

$$\underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad} \times \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad} \times \underline{\quad}$$

Fill in the table to show that multiplying by 8 is the same as double, double and double again.

6	6	6	6	6	6	6	6
$6 \times 2 = \underline{\quad}$		$6 \times 2 = \underline{\quad}$		$6 \times 2 = \underline{\quad}$		$6 \times 2 = \underline{\quad}$	
$\underline{\quad} \times 2 = \underline{\quad}$				$\underline{\quad} \times 2 = \underline{\quad}$			
$\underline{\quad} \times 2 = \underline{\quad}$							

Multiply by 8

Reasoning and Problem Solving

$$8 \times 3 = \underline{\quad}$$

$$2 \times 4 \times 3 = \underline{\quad}$$

$$2 \times 2 \times 2 \times 3 = \underline{\quad}$$

What do you notice?
Why do you think this has happened?

All of the answers are equal.
8 has been split (factorised) into 2 and 4 in the second question and 2, 2 and 2 in the third.

Jack calculates 8×6 by doing 5×6 and 3×6 and adding them.

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

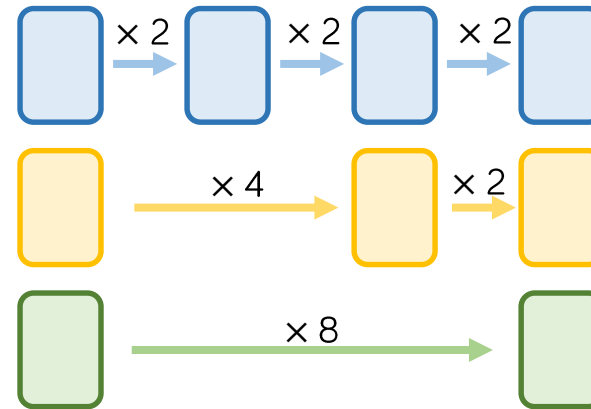
Ron calculates 8×6 by doing $4 \times 6 \times 2$

$$\underline{\quad} \times 2 = \underline{\quad}$$

Whose method do you prefer?
Explain why.

Possible answers:
I prefer Jack's method because I know my 5 and 3 times tables.
I prefer Ron's method because I know my 4 times table and can double numbers.

Start each function machine with the same number.



What do you notice about each final answer?

Tommy knows the 4 times table table, but is still learning the 8 times table table.

Which colour row should he use? Why?

Each time the final number is 8 times greater than the starting number.

Tommy should use the yellow row because he can double each multiple of 4 to calculate a number multiplied by 8 e.g. $4 \times 6 = 24$ so 8×6 is double that (48).

Divide by 8

Notes and Guidance

Children explore dividing by 8 through sharing into eight equal groups and grouping in eights.

They use concrete and pictorial representations and their knowledge of inverse operations to check their answers.

Mathematical Talk

What concrete/pictorial representations might help you?

Can you group the numbers in eights?

Can you share the number into eights groups?

Can you use any prior knowledge to check your answer?

Varied Fluency

- There are 32 children in a PE lesson. They are split into 8 equal teams for a relay race. How many children are in each team? Use counters or multi-link to represent each child.

There are ___ teams with ___ children in each team.

- Crayons are sold in packs of 8. Year 3 need 48 crayons. How many packs should be ordered?



They should order ___ packs of crayons.

- Complete:

$$80 \div 8 = \underline{\quad}$$

$$8 = 72 \div \underline{\quad}$$

$$64 \div 8 = \underline{\quad}$$

$$8 \times \underline{\quad} = 40$$

$$\underline{\quad} \times 8 = 24$$

$$\underline{\quad} \div 8 = 7$$

Divide by 8

Reasoning and Problem Solving

$$48 \div 2 = \underline{\quad}$$

$$48 \div 4 = \underline{\quad}$$

$$48 \div 8 = \underline{\quad}$$

What do you notice about the answers to these questions?

Can you predict what $48 \div 16$ would be?

Which numbers can be divided by 8 without a remainder?

64

32

800

18

200

42

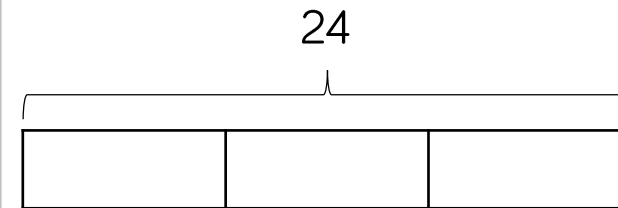
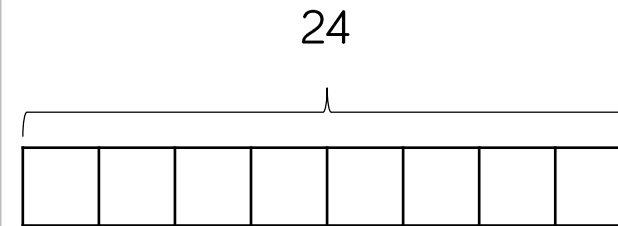
The answers (quotients) halve and the divisors double.

3

64, 32, 800, 200

Amir shares 24 sweets equally between 8 friends.

How many do they get each? Which bar model would you use to represent this problem? Why?



Although both can represent $24 \div 8 = 3$, the first bar model fits this word problem best, because 24 has been split into 8 parts, 1 part shows 1 friend.

The 8 Times Table

Notes and Guidance

Children use prior knowledge of multiplication facts for 2, 3, 4 and 5 times tables along with the distributive law in order to calculate unknown multiplication facts.

Mathematical Talk

Why is it helpful to partition the number you are multiplying by?

Can you use concrete or pictorial representations to help you?

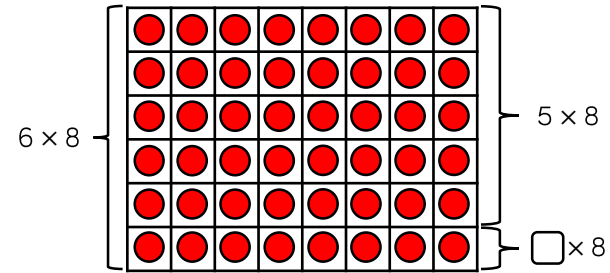
What other facts can you link to this one?

What other times tables will help you with this times table?

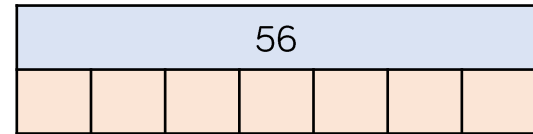
Varied Fluency

Complete the diagram using known facts.

$$6 \times 8 \begin{cases} 5 \times 8 = \square \\ \square \times 8 = \square \\ \hline \text{altogether } \square \end{cases}$$



Complete the bar model.



Complete the table.

×	2	4	8
3	6		
	10	20	
			72

Can you spot a pattern in the numbers?

The 8 Times Table

Reasoning and Problem Solving



All the numbers in the 8 times table are even.

Explain why

When you add an even number to an even number you always make an even number. The 8 times table is repeated addition so keeps adding an even number each time.

On a blank hundred square, colour multiples of 8 red and multiples of 4 blue.

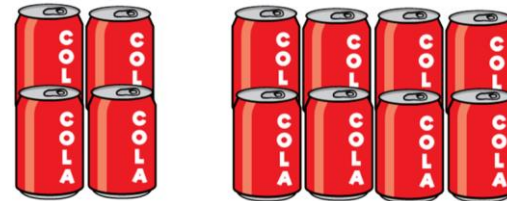
Always, Sometimes, Never

- Multiples of 4 are also multiples of 8
- Multiples of 8 are also multiples of 4

- 1) Sometimes, every other multiple of 4 is also a multiple of 8. The ones in between aren't because the jumps are smaller than 8
- 2) Always - 8 is a multiple of 4 therefore all multiples of 8 will be multiples of 4

Rosie has some packs of cola which are in a box.

Some packs have 4 cans in them, and some packs have 8 cans in them.



Rosie's box contains 64 cans of pop.

How many packs of 4 cans and how many packs of 8 cans could there be?

Find all the possibilities.

Possible answers:

- 2 packs of 4, 7 packs of 8
- 4 packs of 4, 6 packs of 8
- 6 packs of 4, 5 packs of 8
- 8 packs of 4, 4 packs of 8
- 10 packs of 4, 3 packs of 8
- 12 packs of 4, 2 packs of 8
- 14 packs of 4, 1 pack of 8