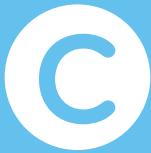
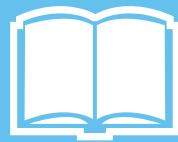


Mathletics

Series



Student



$$3 + 1 = 2 + 2 =$$

Patterns and Relationships

My name



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Series C – Patterns and Relationships

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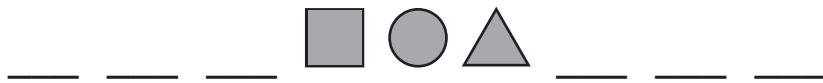
Series Author:

Rachel Flenley

Patterns and rules – repeating patterns

We are used to continuing repeated patterns.  

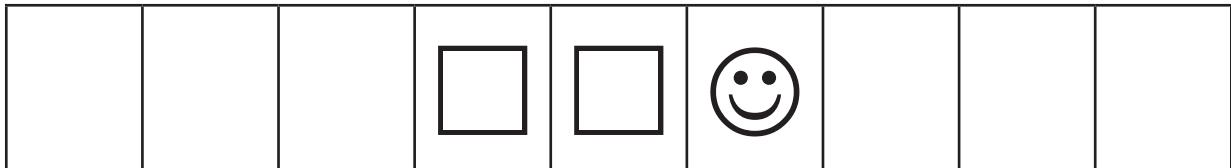
But what if the pattern rule is in the middle?



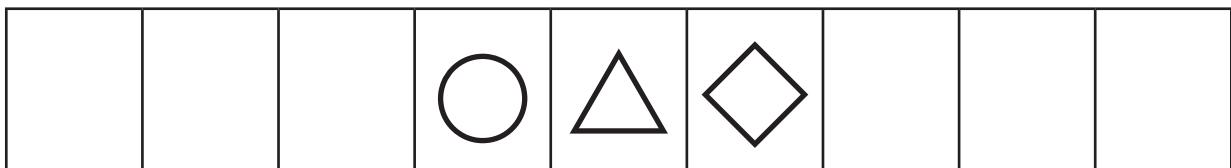
What strategies can you use to continue these patterns both ways?

- 1 Continue these patterns both ways.

a

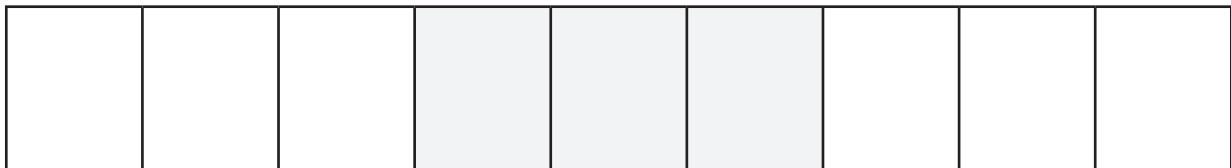


b

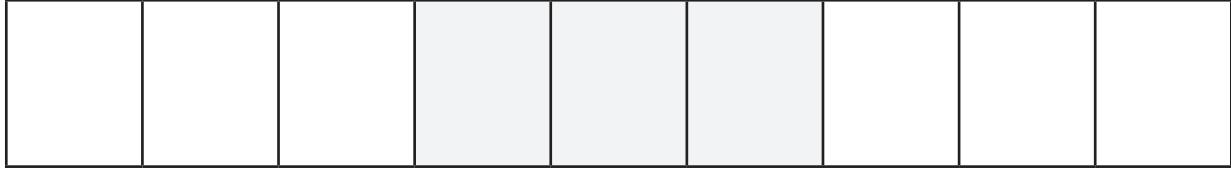


- 2 Create your own pattern rules in the grey boxes. Swap with a partner and continue each other's patterns both ways.

a



b

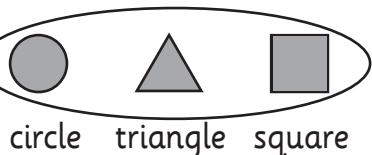


Patterns and rules – repeating patterns

Patterns follow very strict rules. Look at this pattern.



The rule is

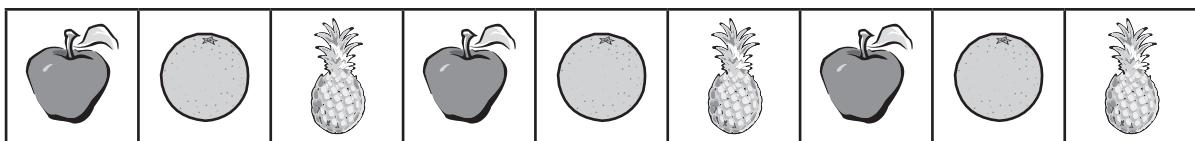


circle triangle square

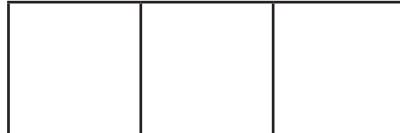
The pattern repeats
this rule over and over.

- 1 Circle the rule in each repeating pattern. Record it below.

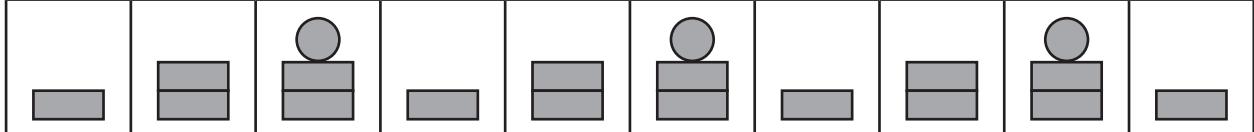
a



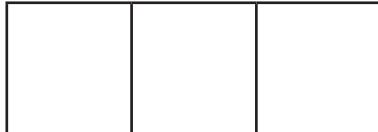
The rule is



b



The rule is



- 2 Make up a rule and record it somewhere secret. Draw your rule (or make it with blocks) and repeat it over and over. Ask a partner to identify your pattern rule and record it here. Tick it if they were right.

Patterns and rules – repeating patterns

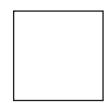
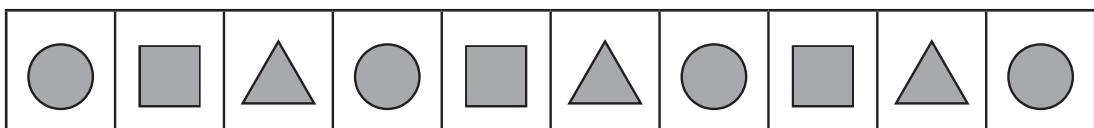
If there is no rule, it is NOT a pattern.



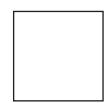
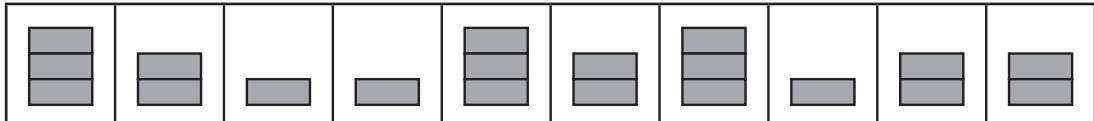
This is not a pattern, it is just a row of shapes.

1 Look at these rows. Tick the ones that follow a pattern rule.

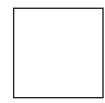
a



b



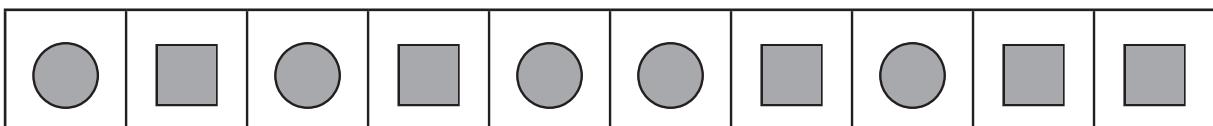
c



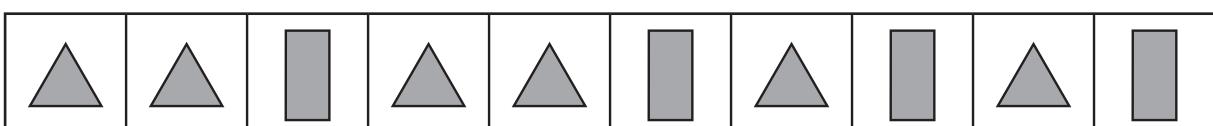
2 Look at these rows. They started off as patterns but went a bit astray.

Circle the parts that don't follow the patterns and give the rows a good telling off. Tell them there are many rows that would like to be patterns and if they can't do it properly, you'll give the job to other rows.

a



b



Patterns and rules – translating patterns

We can make patterns speak in different languages.

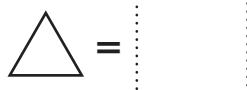
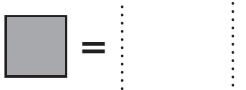
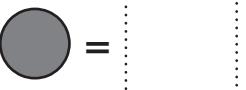
We call this **translating**.

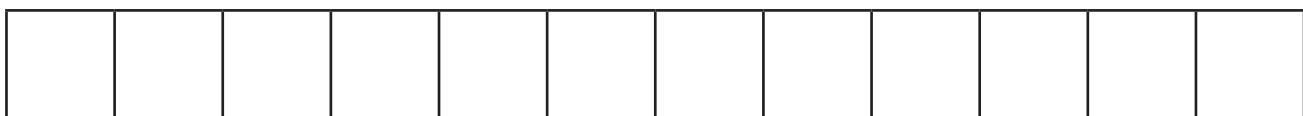
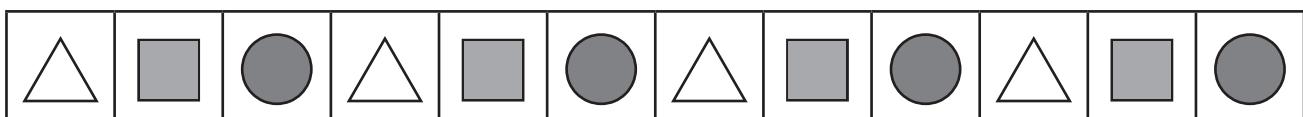
Say this pattern out loud. 

We can change it to 

Say it out loud now.

- 1 Look at this pattern. Translate it by changing each shape.

Plan it here:  =  =  =

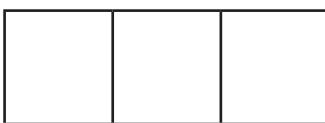


- 2 a Think of a simple pattern rule you could make using 3 different pattern blocks.

Record it here. 

- b Make your rule with pattern blocks and repeat it 5 times.

- c Ask a partner to translate your pattern using different pattern blocks.

- d Record their translated rule here. 

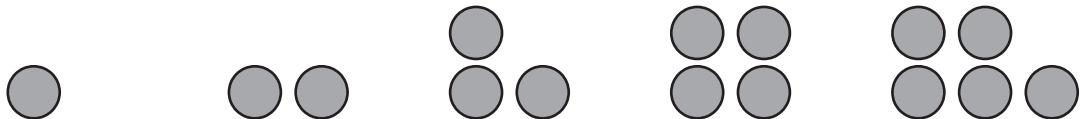
Patterns and rules – growing patterns

Some patterns repeat.



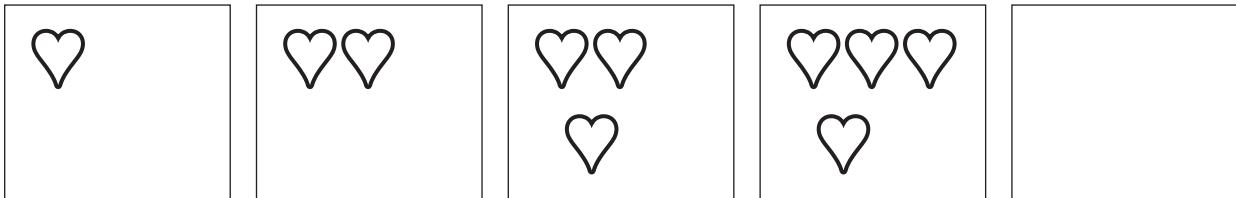
Some patterns grow. When they grow, they must still follow a rule.

The rule for this pattern is '+ 1'



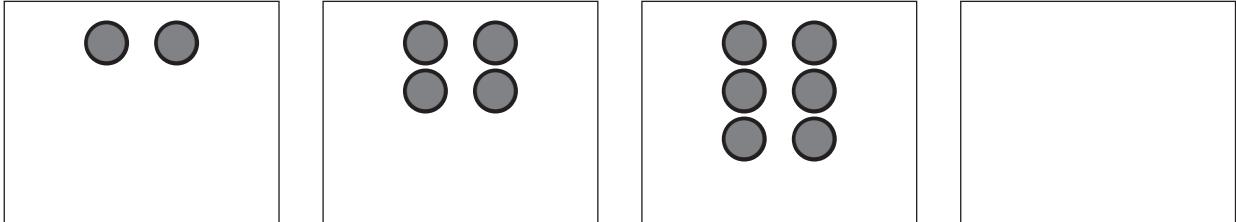
1 Work out the rule and draw the next part of each pattern.

a



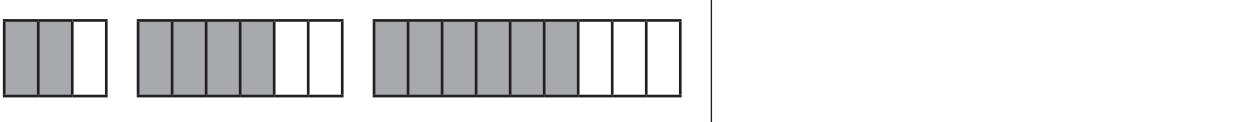
The rule is + _____

b



The rule is + _____

c

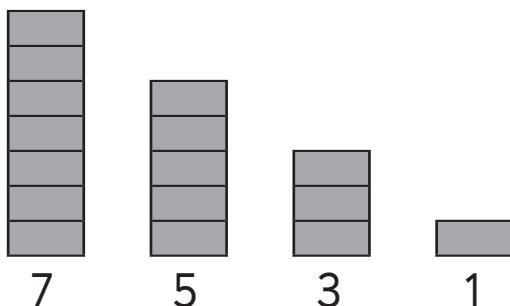


The rule is + _____ and + _____

2 Make your own growing pattern with blocks. Record the rule and the first few parts of the pattern here.

Patterns and rules – growing patterns

Patterns can also shrink. Look at this pattern.



It follows a -2 rule.
In each stage we have
2 fewer blocks.

You will need: a partner counters

What to do:

Start with 10 counters. 

Take some away so there are only **7 left**. 

Then take some more away so there are only **4 left**. 

Now take some away so there is only **1 left**. 

a How many counters are you taking away each time? _____

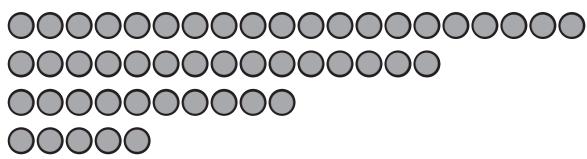
b What is the rule? _____

What to do next:

Think of a different take away rule.
Write it somewhere secret. Don't let
your partner see!

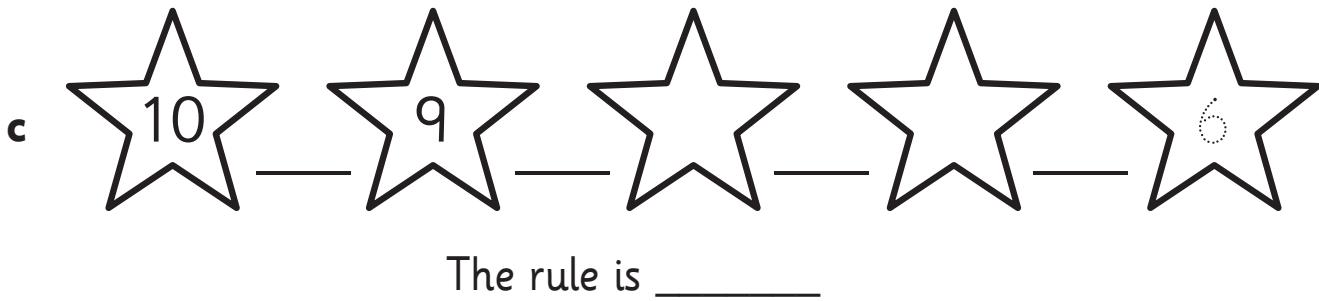
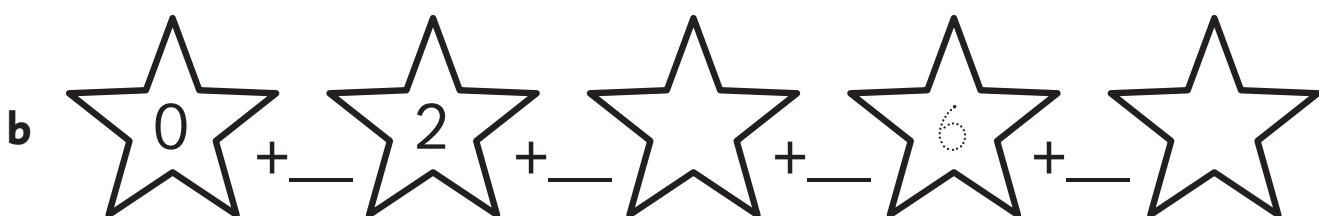
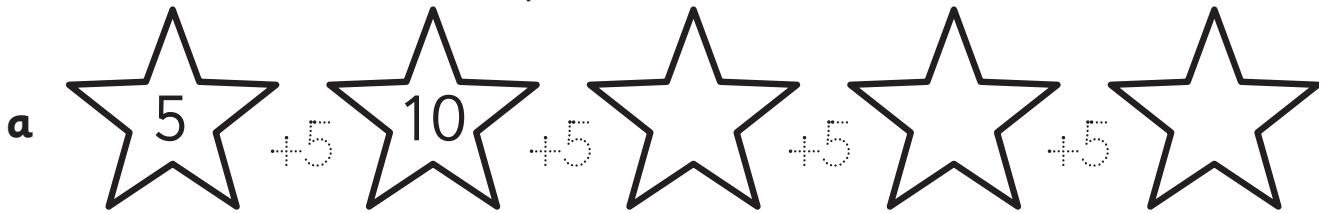
Put out 20 counters in a row. Then put out your
next row of counters following your take away rule.
Continue until your last row would have zero counters.

Guess each other's secret rule!

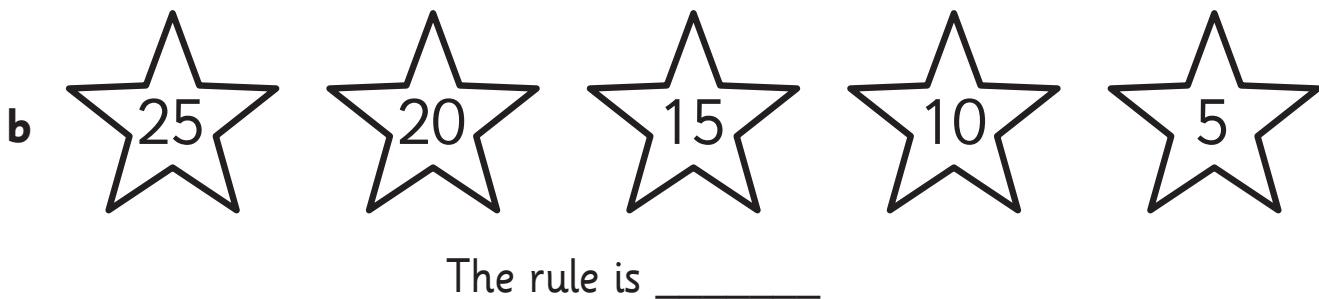
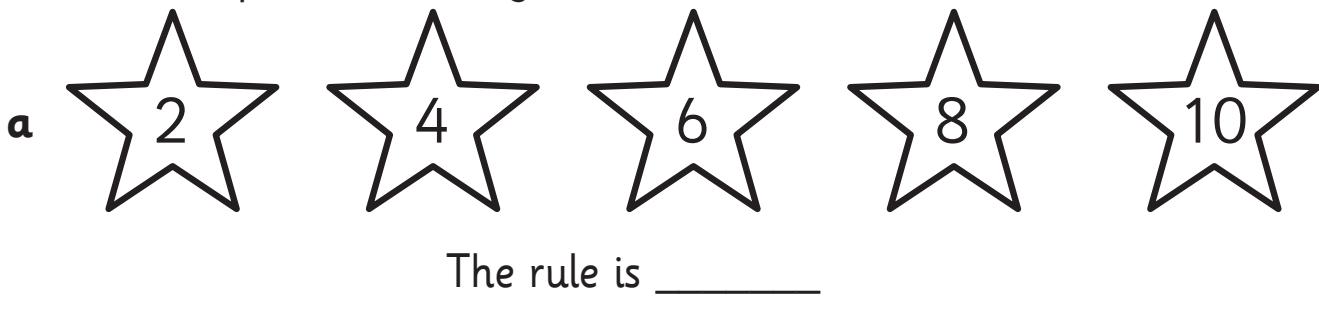


Patterns and rules – growing patterns

- 1 Follow each rule and keep the number patterns growing or shrinking.
You can use counters to help.



- 2 Look at the patterns. Can you work out each rule?



Patterns and rules – growing patterns

You will need:



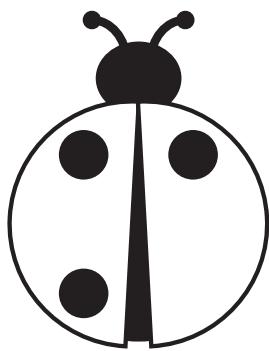
a partner



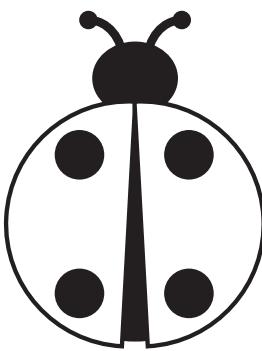
a black pencil

What to do:

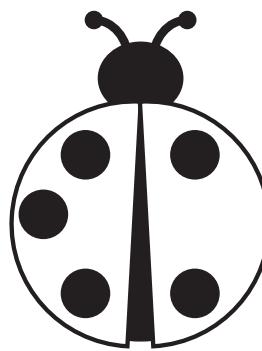
Each week this ladybug develops more spots according to a secret rule. Work out the secret rule and draw the spots we would see in Weeks 4, 5 and 6.



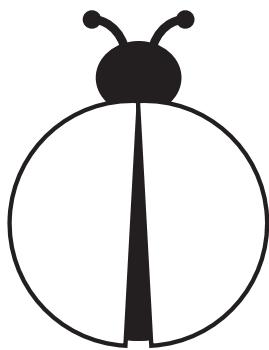
Week 1



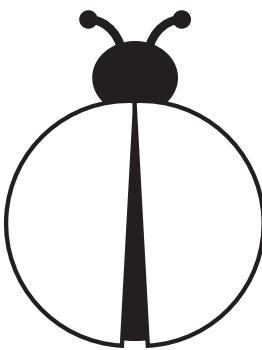
Week 2



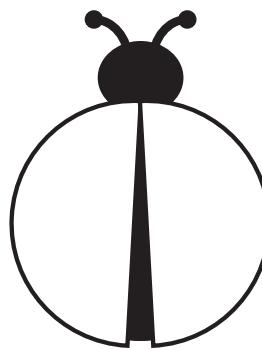
Week 3



Week 4



Week 5



Week 6

What is the
secret rule?

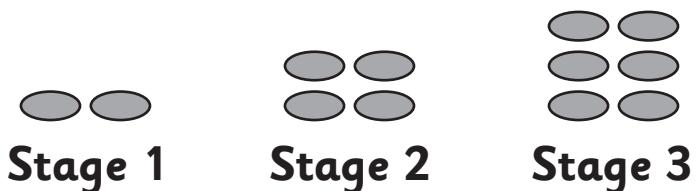
What to do next:

Can you work out how many spots the ladybug would have when it is 10 weeks old **without** drawing them on? If you can, explain how you did it. If not, draw them.

Patterns and rules – recording patterns in tables

We can record patterns by drawing them. Look at this growing pattern.

We can also record the same patterns in a table.



Stage	1	2	3
Number of	2	4	6
Stage	1	2	3

- 1 Record each growing pattern in its table.

a

Stage	1	2	3	4	5
Number of					

b

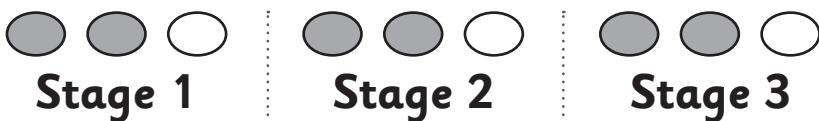
Stage	1	2	3	4
Number of	1	2	3	4

- c Can you work out how many matchsticks would be in stage 5? Add it to the table and tell someone how you did it.

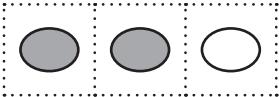
Patterns and rules – recording patterns in tables

We can record repeating patterns in tables as well.

Look at this pattern:



The rule is



Now we repeat it.

How many counters have we used at the end of Stage 3?

Stage	1	2	3
Number of	2	4	6
Number of	1	2	3

- 1 Record the repeating pattern in the table.

The rule is



Stage	1	2	3	4
Number of	2	4		
Number of	1	2		

- 2 Create your own repeating pattern using 2 different colours of cubes. Record the first 5 stages in the table. Show your pattern and table to your teacher.

The rule is



Stage	1	2	3	4
Number of				
Number of				

Patterns and rules – skip counting

When we skip count, we follow number patterns.

- 1 Count by 2s to find how many wheels.



2



4



- 2 Count by 5s to find how many toes.



- 3 Count by 2s to fill in the gaps. Watch out! Your starting point is not 2. You can use a hundred grid to help.

5

7

13

19

- 4 Count by 5s to fill in the gaps. Watch out! Your starting point is not 5.

3

8

13

23

28

What pattern do you notice?

Patterns and rules – skip counting

- 1 Finish the grid. Try going **down** the columns, not **across** the rows.
Can you find and follow the patterns?

1	2	3	4	5		7		9	
11	12	13	14	15	16	17	18	19	
21		23	24	25				29	
31	32	33		35		37		39	
41		43		45				49	
	52		54		56		58		60
	62	63			66	67			
71			74				78		80
			84		86				
	92			95		97		99	100

- 2 Now colour the chart above like this.
- a If you say the number when you count by 2s, give it a yellow stripe.
 - b If you say the number when you count by 5s, give it a green stripe.
 - c If you say the number when you count by 10s, give it a red stripe.
- 3 What do you notice:
- a about the numbers that have 3 stripes?
 - b about the numbers that only have a green stripe?
 - c about the numbers that have a yellow stripe?

Patterns and rules – skip counting

Calculators can help us learn more about number patterns.

You will need:  a calculator

What to do:

a Press 5 + = =

What number appears? _____

Keep pressing =

What is the calculator counting by? _____

b Press 10 + = =

What number appears? _____

Keep pressing =

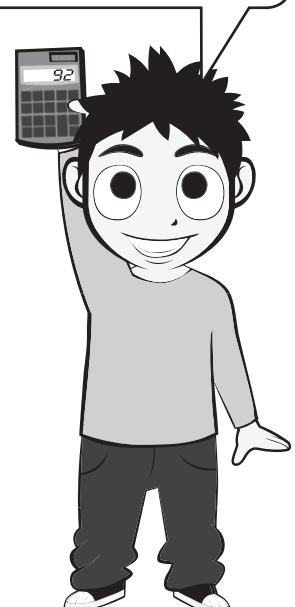
What is the calculator counting by? _____

What to do next:

Choose your own number to skip count by. Write it in the first box. Press your number and + = =

Write each new answer in the boxes below.

How smart am I!
I can count by 23s.
23 ... 46 ... 69 ... 92 ...



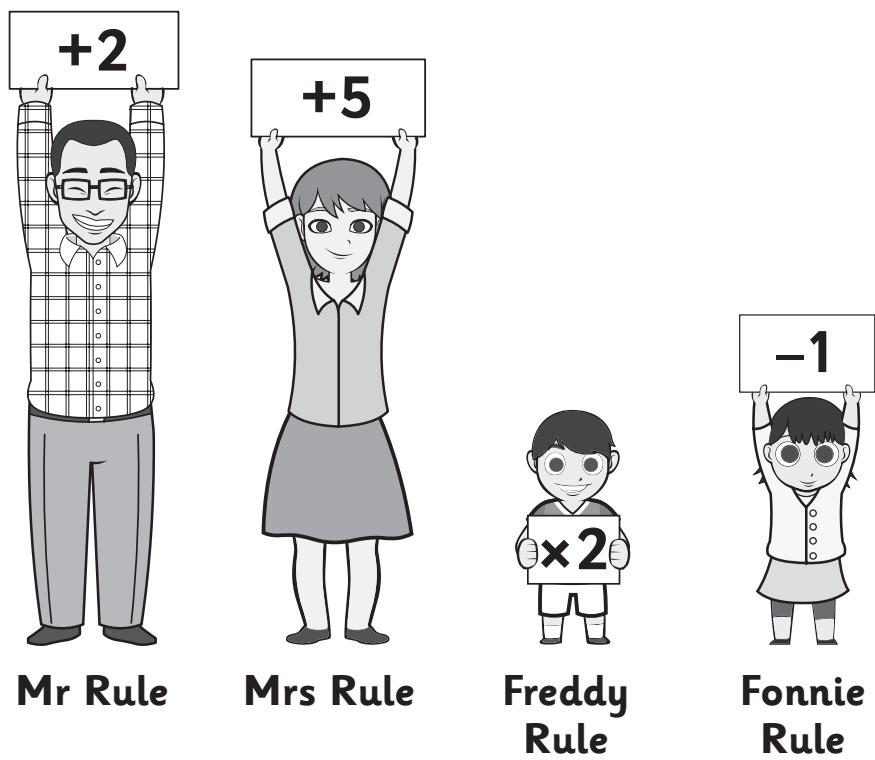
Patterns and rules – function rules

Meet the Rule family.

The Rules like to do everything the same way. They ALWAYS get up at the same time every day and they ALWAYS eat the same thing for breakfast. Mr Rule eats 2 boiled eggs, Mrs Rule eats muesli, Freddy likes Weetbix and Fannie loves

toast with jam. They ALWAYS go to work or school the same way at the same time. Get the picture?

You can rely on the Rules. And if you give them a number, each of them will ALWAYS do the same thing to it.

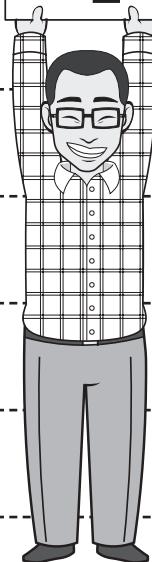


- 1 Let's give Mr Rule some numbers. He always adds 2 to them. Fill in the missing numbers below.

Give Mr Rule this

2
3
4
5
10

+2

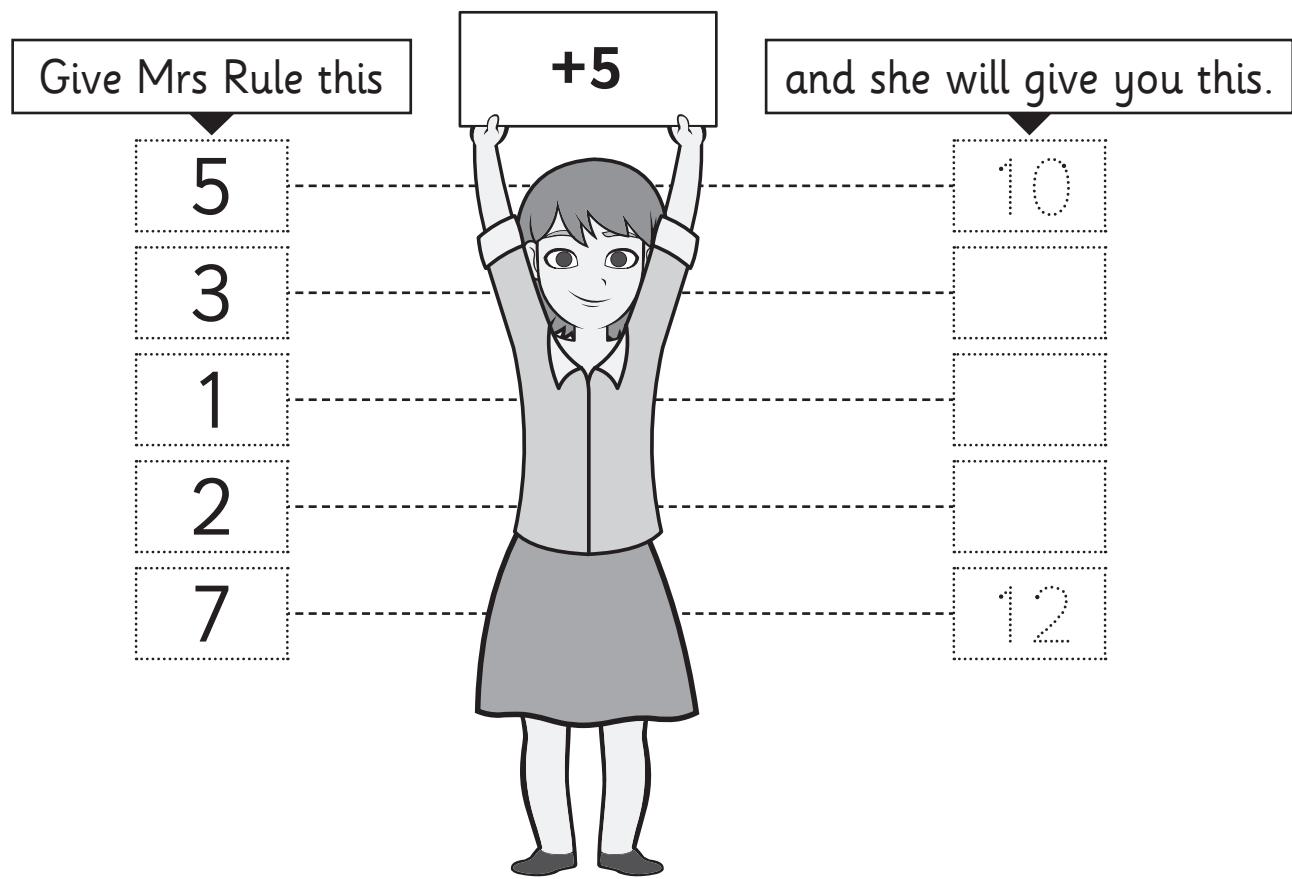


and he will give you this.

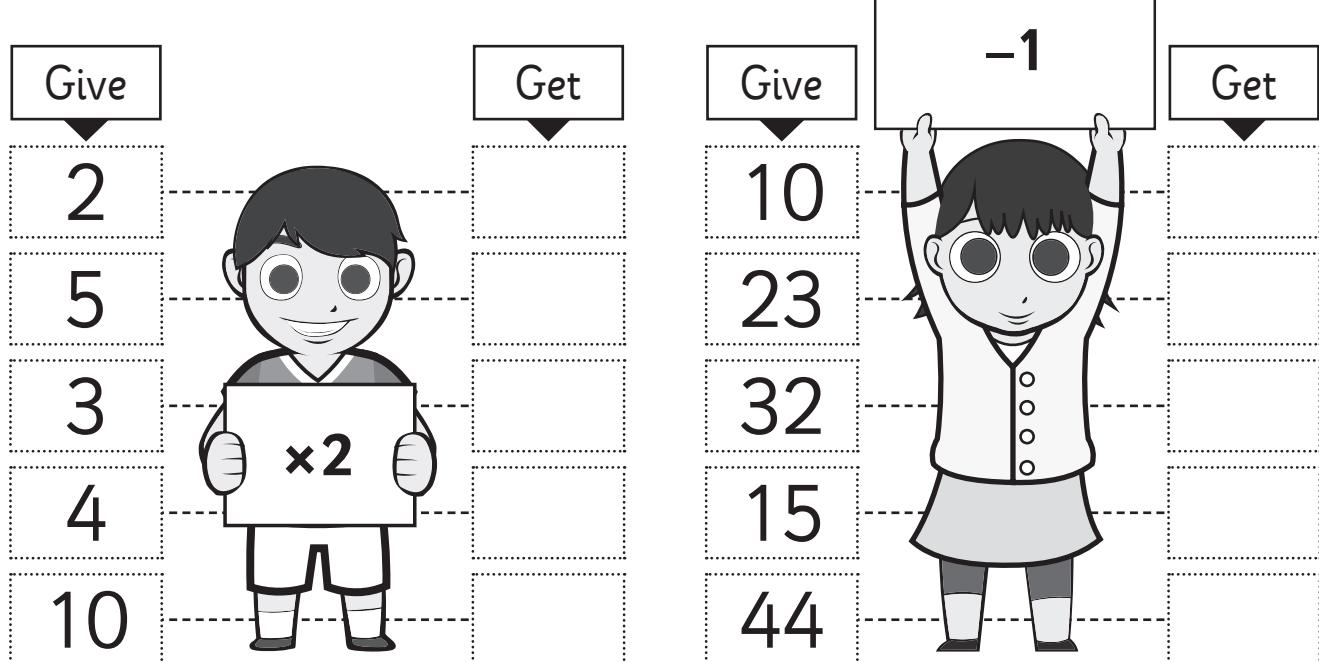
4
5
12

Patterns and rules – function rules (continued)

- 2 Now let's give Mrs Rule some numbers. She is a **+5** woman.

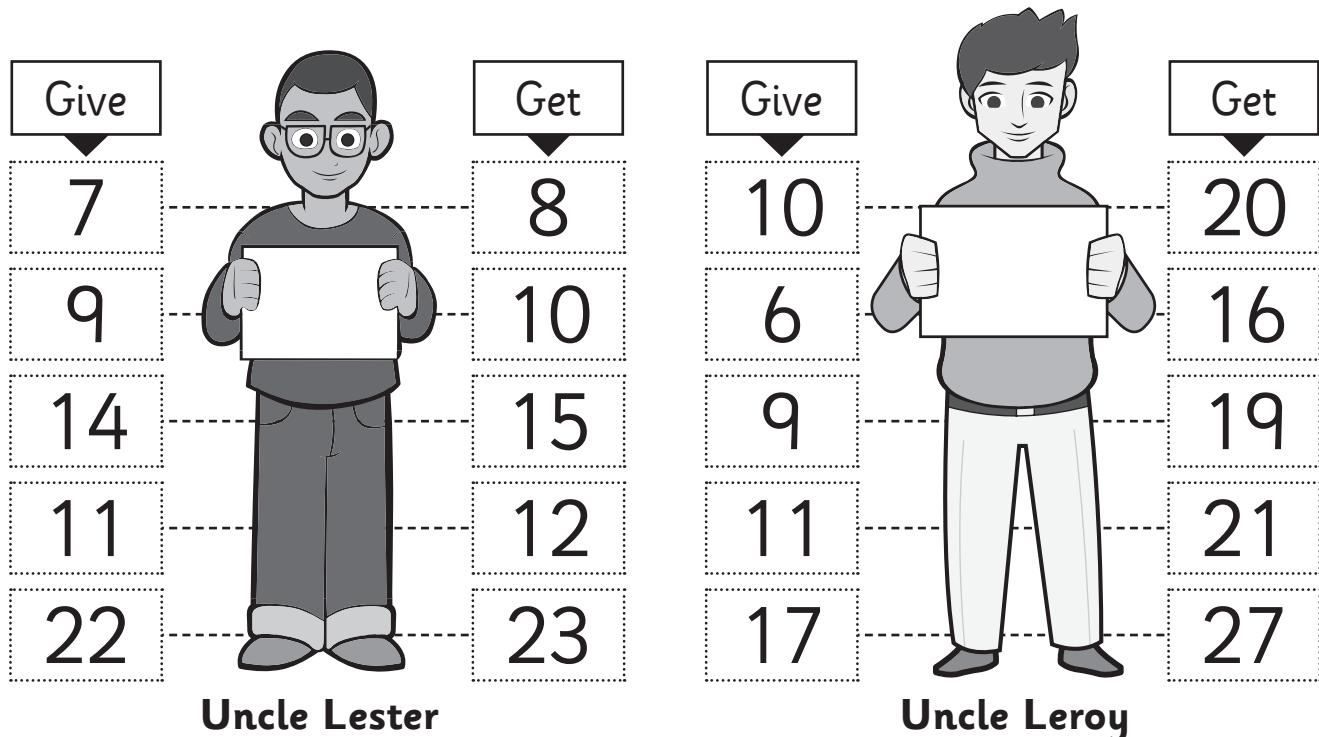


- 3 What about the kids? Freddy likes to **×2** and Fannie is a **-1** kind of girl.

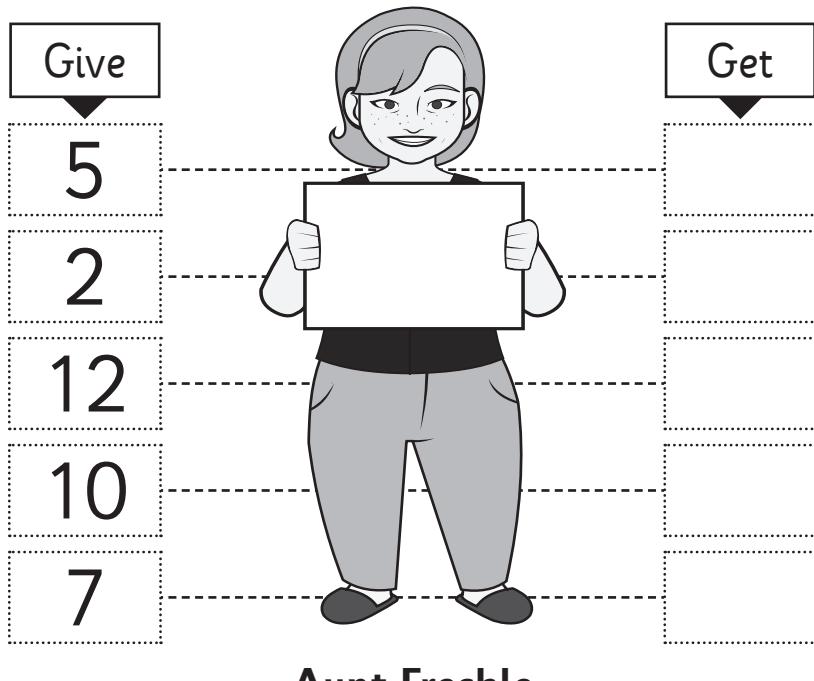


Patterns and rules – function rules (continued)

- 4 Uncles Lester and Leroy Rule have flown in from New York. Their numbers arrived with them, but unfortunately their rules seem to be lost in transit. Look closely at the numbers and see if you can work out each uncle's rule. Write it.



- 5 Aunt Freckle has also arrived. She says you can make up the rule. Make up your own rule and write it on the sign. Work out what you'll get.



Aunt Freckle

Patterns and rules – function rules (continued)

You will need:  a partner  coloured pencils

What to do:

Design your own member of the Rule family. Give them a name and their own style.

My rule	
Give	Get
<input type="text"/>	<input type="text"/>

What to do next:

Think of a simple rule and write it in the box. Write some numbers in the ‘Give’ column. Don’t make them too hard! Work out the answers that will appear in the ‘Get’ column and write them down somewhere secret. Show your teacher.

Switch papers with a partner and work out the answers for each other’s character. Check their thinking.

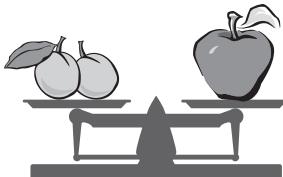
Number relationships – equality and inequality

This is the equals sign = It means the **same**.

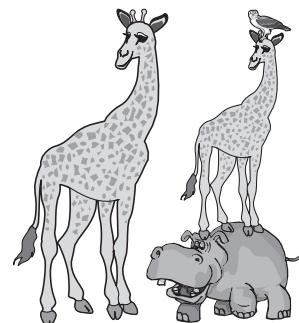
Things can be the **same** or = in lots of ways.



same length



same weight

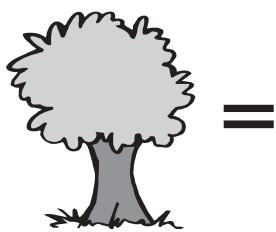


same height

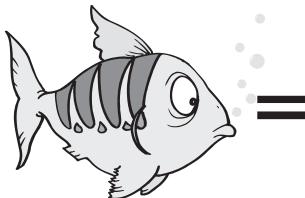
How else can things be the same?

1 Draw:

- a A tree that is the same height.



- b A fish that is the same length.



If things are not the same or not equal we put a line through the equals sign. ≠

2 Draw:

- a A person who is **not** the same height.



≠

- b A caterpillar that is **not** the same length.



Number relationships – equivalence

You will need:

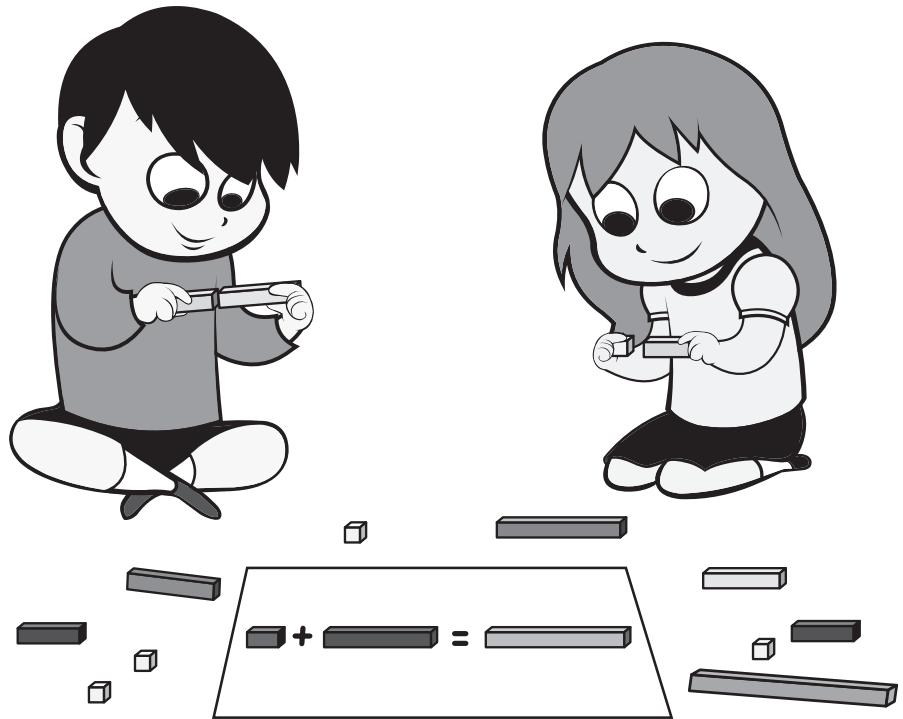
- a partner
- coloured pencils
- scissors
- a copy of page 20

What to do:

Colour the rods on page 20 and cut them out carefully

Look at the brown rod.
Now put a yellow and a light green rod together.
What do you notice?

Together, a yellow and a light green rod are the same length as a brown rod.



We can record this as: yellow + light green = brown

$$\text{or } y + lg = b$$

How many different rod combinations can you find that are the same length as the brown rod?

Record your findings below.

Number relationships – equivalence

white



red

light green

purple

yellow

dark green

black

brown

blue

orange

What to do next:

Choose a different rod and find combinations that match it.

Number relationships – equivalence

You will need:  a partner  the rods from page 20

What to do:

This time, can you work out what the missing rods might be? Colour the words below and use the rods from page 20 to help you.

a red + light green = _____

b yellow + white = _____

c light green + _____ = purple

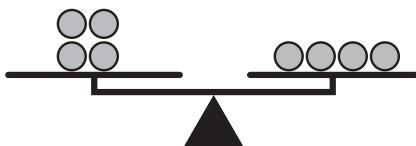
d yellow = _____ + white

What to do next:

Design 3 of your own problems and get your partner to solve them. Record the problems and solutions here.

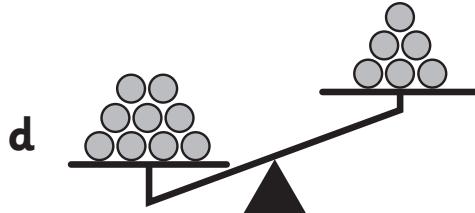
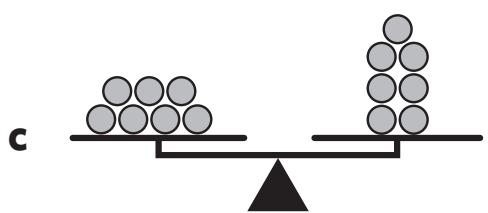
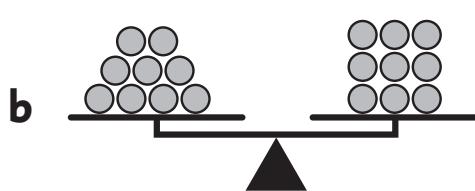
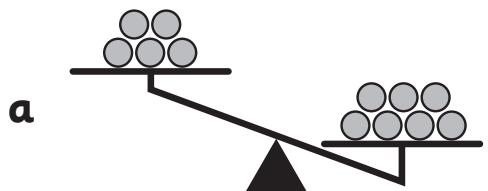
Number relationships – equivalence

In Maths we often use $=$ when we are talking about the **same amount** of things. To help us decide if amounts are equal, we can think about balancing them on a scale.

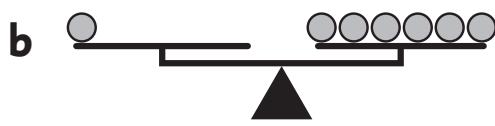


Are these the same amount? Yes, there are 4 on each side.

- 1 Is each scale balanced? This means it has the same amount on both sides. If it is, write $=$. If it isn't balanced, write \neq .

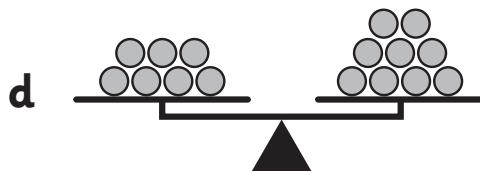
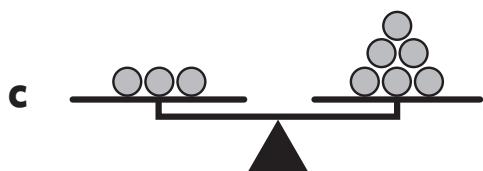


- 2 Draw more counters on the left of each scale to make the sides equal. How many did you draw each time? Write it in the box.



I drew

I drew



I drew

I drew

Number relationships – equivalence

Did you know that we are balancing or making the sides the same when we solve number problems?

Think about $2 + 2 = 4$.

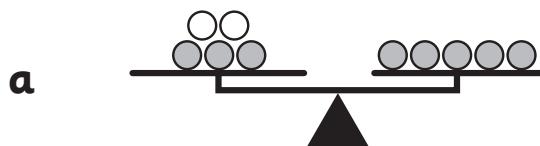


On the scales it looks like this.

$2 + 2 = 4$ is another way of saying 2 and 2 **is the same as** 4.

1 Write the addition problems shown on each scale 2 ways.

Say them out loud to a partner.



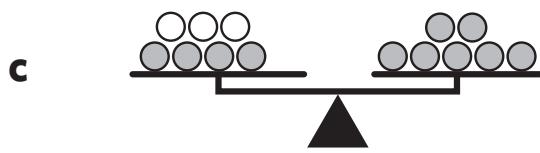
$$3 + 2 = 5$$

3 and ___ is the same as 5



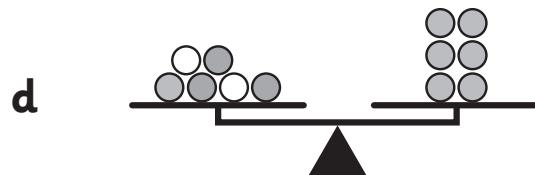
$$\underline{\quad} + \underline{\quad} = 4$$

___ and ___ is the same as ___



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

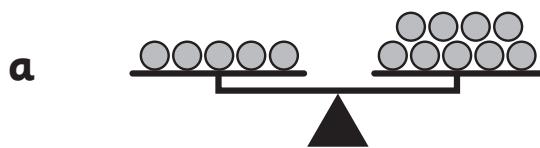
___ and ___ is the same as ___



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

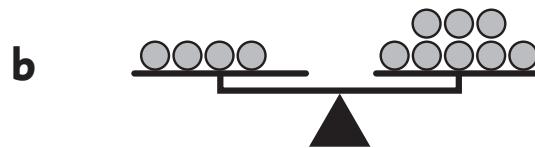
___ and ___ is the same as ___

2 Now draw the missing counters and fill in the missing numbers.



$$5 + 4 = 9$$

___ and ___ is the same as 9

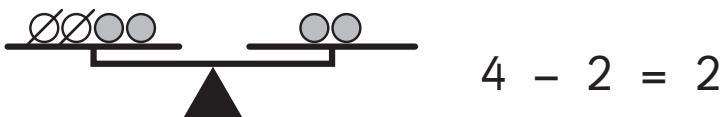


$$4 + 4 = \underline{\quad}$$

___ and 4 is the same as ___

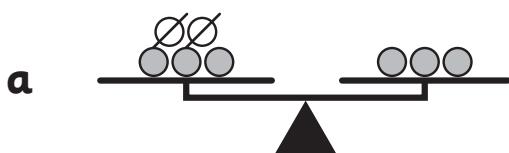
Number relationships – equivalence

We are balancing or **making sides the same** when we solve all kinds of number problems, not just addition problems.

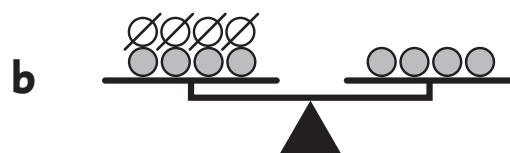


This shows that 4 subtract 2 is the same as 2.

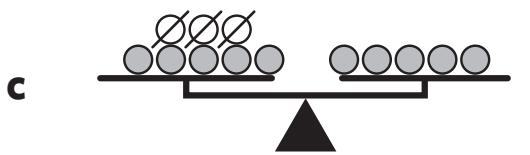
- 1 Write the subtraction problems shown on each scale.



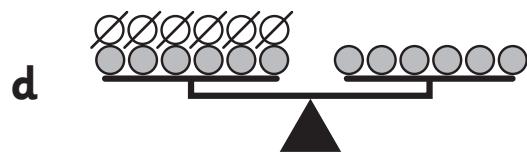
$$5 - \underline{\quad} = 3$$



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

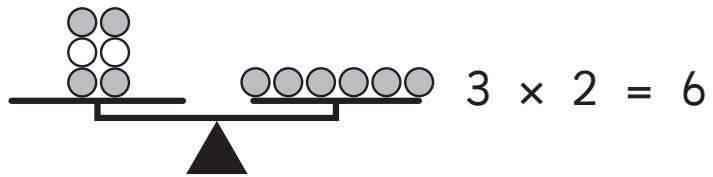


$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

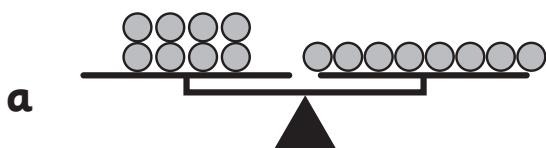


$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

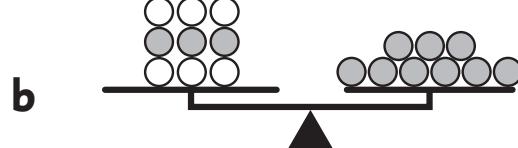
This shows that 3 rows of 2 is the same as 1 row of 6.



- 2 Fill in the missing numbers to match each scale.



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

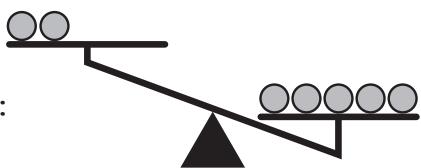


$$3 \times \underline{\quad} = \underline{\quad}$$

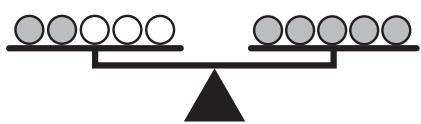
Number relationships – finding the unknown

Sometimes we have to work out the missing part of a problem. We call this **finding the unknown**. We can use symbols like squares or circles to stand for what we don't know.

Think about $2 + \blacksquare = 5$ Look at the scale:



How many more counters do we need to add to the left side to equal 5? We add 3 more.



Our unknown is 3. $2 + 3 = 5$

- 1 Put on your detective cap and find the unknowns in these problems. Draw more counters on the left of each scale to make the sides equal. Fill in the missing numbers below to match.

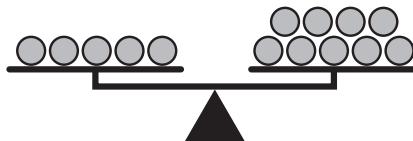
a $3 + \blacksquare = 6$



The unknown is 3

$$3 + 3 = 6$$

b $5 + \star = \underline{\hspace{2cm}}$



The unknown is 5

$$5 + 5 = 10$$

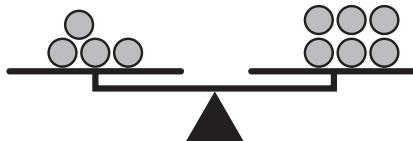
c $1 + \triangle = 5$



The unknown is 4

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

d $4 + \bullet = \underline{\hspace{2cm}}$



The unknown is 4

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Number relationships – finding the unknown

You will need:  counters

What to do:

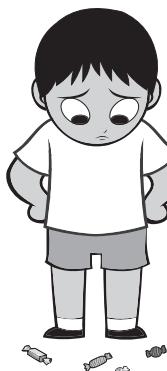
Help! While at a party, someone stole some lollies from these children's party bags. Your job is to work out how many lollies are missing from each bag.

Pretend counters are the lollies and work out the unknown amount. Write it in the number sentence.



Melody

I had
8 lollies
and
now
there
are only
3 left!



Hoa

I had
10 lollies
and
now
there
are only
4 left!



Jack

I had
9 lollies
and
now
there
are only
2 left!

$$8 - \square = 3$$

$$10 - \circ = 4$$

$$9 - \triangle = 2$$

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

$$10 - \underline{\quad} = 4$$

$$9 - \underline{\quad} = 2$$

What to do next:

These kids on the right had already eaten all their lollies.

They say a mum gave them some more but 1 person is not telling the truth.

This person has exactly the number of stolen lollies.

Who stole the lollies?



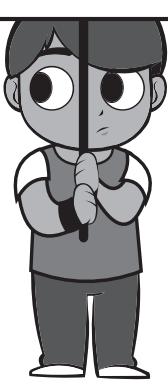
Ellie

18 lollies



Thomas

12 lollies



Danny

Number relationships – combinations

We can make the sides of a problem equal in many different ways.
How can we make 5?

$$0 + 5 = 5 \quad \bullet \bullet \bullet \bullet \bullet$$

or $1 + 4 = 5$

or $2 + 3 = 5$

or $3 + 2 = 5$

or $4 + 1 = 5$

or $5 + 0 = 5$

Do you notice the patterns?

- 1 How can we make 7? Choose 2 coloured pencils. Colour the counters to show the different ways. Write the matching number sentences.

$$\underline{0} + \underline{7} = 7 \quad \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft$$

$$\underline{1} + \underline{6} = 7 \quad \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft$$

$$\underline{\quad} + \underline{6} = 7 \quad \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft$$

$$\underline{\quad} + \underline{6} = 7 \quad \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft$$

$$\underline{\quad} + \underline{6} = 7 \quad \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft$$

$$\underline{\quad} + \underline{6} = 7 \quad \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft$$

$$\underline{\quad} + \underline{6} = 7 \quad \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft$$

$$\underline{\quad} + \underline{6} = 7 \quad \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft \circlearrowleft$$

Number relationships – combinations

2 Now you have the hang of this, can you find all the possibilities for these without using counters? If you still want to use counters, that's fine too.

a

6

$$0 + 6 = 6$$

$$1 + \underline{\quad} = 6$$

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

b

8

$$0 + 8 = 8$$

$$1 + \underline{\quad} = 8$$

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

3 Fill in the missing numbers in these addition combinations.

a

$$0 + 4 = \underline{\quad}$$

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

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

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

$$\underline{\quad} + 0 = 4$$

b

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

$$1 + \underline{\quad} = 2$$

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

Number relationships – combinations

You will need:



a partner



counters

What to do:

What subtraction problems can you think of that equal 5?

$$\triangle - \square = 5$$

Work with your partner to find at least 10 options. Can you find patterns to help you? Record your answers below.

$$5 - 0 = 5$$

$$6 - 1 = 5$$

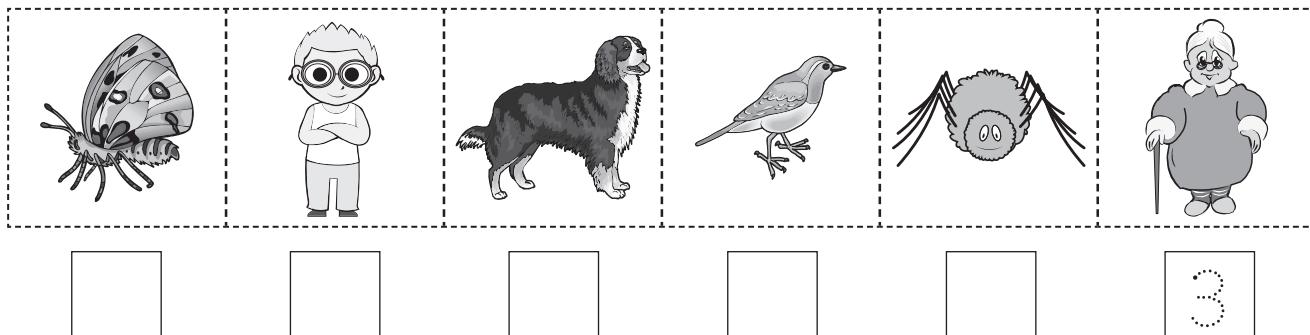
What to do next:

Can you find more than 10 options?

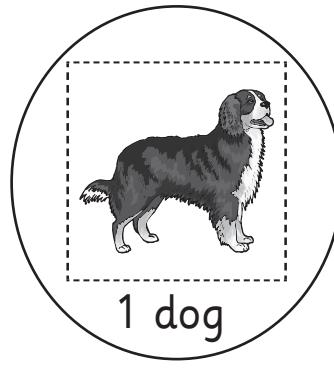
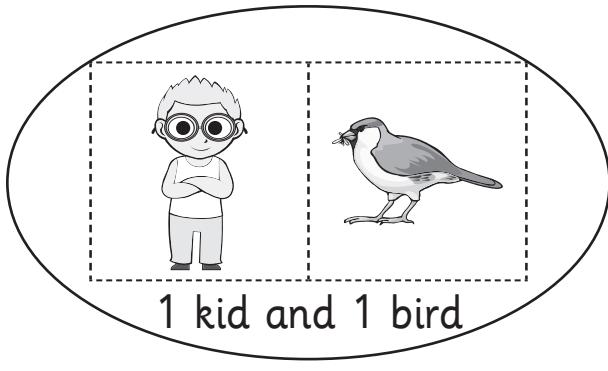
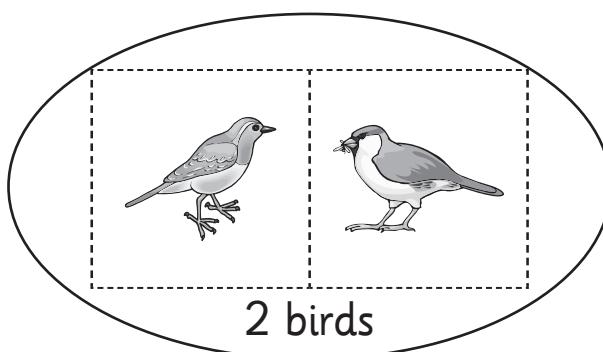
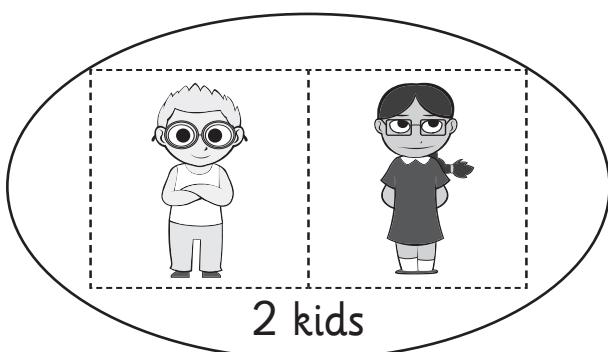
Number relationships – combinations

You will need:  a partner  scissors  pages 31 and 32

1 In a park we might find



- a How many legs does each creature have? Write the numbers in the boxes above.
- b If there are **4 legs** in the park one day, who could be there?
There could be:



There couldn't be a butterfly as it has 6 legs.

There couldn't be a spider as it has 8 legs.

There couldn't be an old lady as she has 3 legs (if we include her walking stick)!

Number relationships – combinations (continued)

What to do:

Work with your partner to work out who could be in the park if there are **10 legs**. You can cut out the people and animals on page 32 to help you.

Record your findings here.

What to do next:

Compare your findings with those of another group. Have they found any different ones? How will you know when you have found all the options?

Ready for a challenge? What if there were 24 legs in the park? You will need another piece of paper to record your findings on.

Number relationships – combinations

(continued)

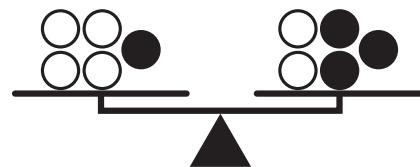


Number relationships – equivalent statements

What is one way to make 5? $4 + 1 = 5$

What is another way to make 5? $2 + 3 = 5$

They both make 5 so they are the same.

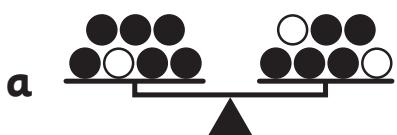


They are **equivalent statements**.

$$4 + 1 = 2 + 3$$

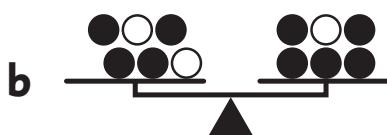
They both = 5

1 Fill in the missing numbers for these equivalent statements.



$$6 + 1 = 5 + 2$$

They both = ___



$$4 + ___ = 5 + ___$$

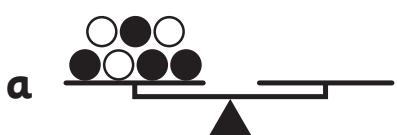
They both = ___



$$___ + ___ = ___ + ___$$

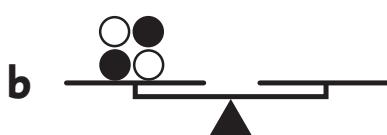
They both = ___

2 Use 2 colours and draw counters on the right side of these scales to create equivalent statements. Fill in the missing numbers.



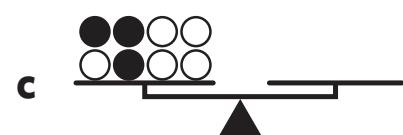
$$4 + 3 = ___ + ___$$

They both = ___



$$___ + ___ = ___ + ___$$

They both = ___



$$___ + ___ = ___ + ___$$

They both = ___



equivalent means the same or equal

a **statement** is
a number fact

Number relationships – equivalent statements

You will need:

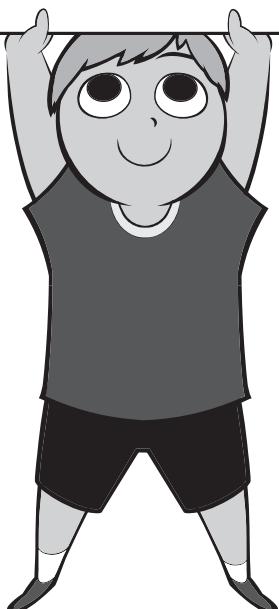


a partner



counters

$$\begin{aligned}3 + 2 &= 1 + 5 \\4 + 7 &= 9 + 2 \\5 + 3 &= 3 + 8 \\9 + 6 &= 10 + 4 \\1 + 7 &= 4 + 4 \\5 + 5 &= 2 + 8\end{aligned}$$



What to do:

Wally has created 6 sets of equivalent statements and is very proud of himself.

Unfortunately, 3 of them are wrong.

Poor Wally.

Help put a smile back on Wally's face by finding the mistakes. In each box, show how you know which ones are wrong and which are right.



$$3 + 2 = 1 + 5$$

$$5 \neq 6$$

$$4 + 7 = 9 + 2$$

$$5 + 3 = 3 + 8$$

$$9 + 6 = 10 + 4$$

$$1 + 7 = 4 + 4$$

$$5 + 5 = 2 + 8$$



equivalent means the same or equal

a **statement** is a number fact

Number relationships – equivalent statements

You will need:



a partner



a copy of this page



10 counters in 4 different colours, 40 in all



What to do:

Divide up the coloured counters so you have 2 different colours each. You should have 20 counters. Mix up your own counters. Decide who will go first.

Player 1: take a handful of your own counters. Count how many counters you have altogether and how they are made up. For example, you might have 12 counters: 4 red and 8 blue. Write 12 in the small box and the addition statement you have made.

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

Player 2: make an equivalent statement with your own counters. Fill in your statement on the other side of the equals sign.

What to do next:

Swap jobs and make 3 more sets of equivalent statements. If you want to add some excitement, you could add a time limit or a penalty for an incorrect answer. How about 5 push ups for an incorrect statement?

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

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

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

Number relationships – turnarounds

A turnaround means we can put the numbers **before** the equals sign in any order and we still get the same number after the equals sign.

$$6 + 7 = 13$$

6 and 7
are before

13 is
after

Can we make turnarounds when we **add**?

What about when we **subtract**?

1 Answer these pairs of addition problems.

a $12 + 1 = 13$

b $11 + 3 = \underline{\hspace{2cm}}$

c $3 + 6 = \underline{\hspace{2cm}}$

$1 + 12 = \underline{\hspace{2cm}}$

$3 + 11 = \underline{\hspace{2cm}}$

$6 + 3 = \underline{\hspace{2cm}}$

d $5 + 2 = \underline{\hspace{2cm}}$

e $1 + 22 = \underline{\hspace{2cm}}$

f $14 + 4 = \underline{\hspace{2cm}}$

$2 + 5 = \underline{\hspace{2cm}}$

$22 + 1 = \underline{\hspace{2cm}}$

$4 + 14 = \underline{\hspace{2cm}}$

g Can we make turnarounds when we add?

2 Now try these subtraction problems. If you can't work out the answer, draw a **X**.

a $5 - 2 = \underline{\hspace{2cm}}$

b $6 - 4 = \underline{\hspace{2cm}}$

c $7 - 4 = \underline{\hspace{2cm}}$

$2 - 5 = \underline{\hspace{2cm}}$

$4 - 6 = \underline{\hspace{2cm}}$

$4 - 7 = \underline{\hspace{2cm}}$

d Can you do all these problems? Do the answers in each pair match?

e Can we make turnarounds when we subtract?

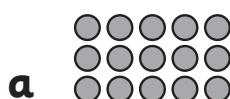
Number relationships – turnarounds

We know we can make turnarounds when we **add**.

We know we can't make turnarounds when we **subtract**.

What about when we **multiply**?

- 1 Use the dots to help you solve these pairs of multiplication problems. If you think they are turnarounds, tick them.



a 3 rows of 5 = 15



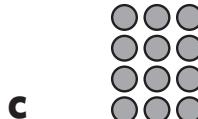
5 rows of 3 = _____



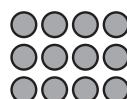
b 5 rows of ___ = ___



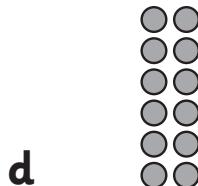
___ rows of ___ = ___



c $4 \times 3 =$ _____



___ \times ___ = ___



d $6 \times$ ___ = ___

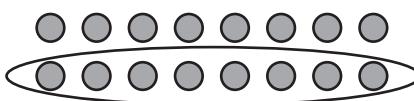


___ \times ___ = ___

- e Can we make turnarounds when we multiply?

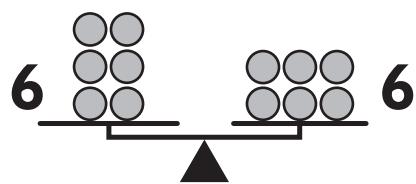


This is a row.



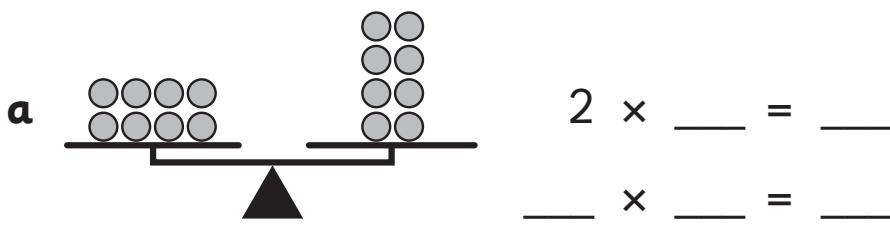
Number relationships – turnarounds

Look at these scales. We can see that 3 rows of 2 are the same as 2 rows of 3. Our turnarounds are:

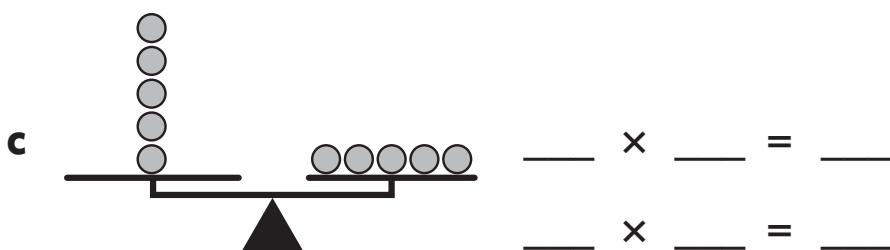
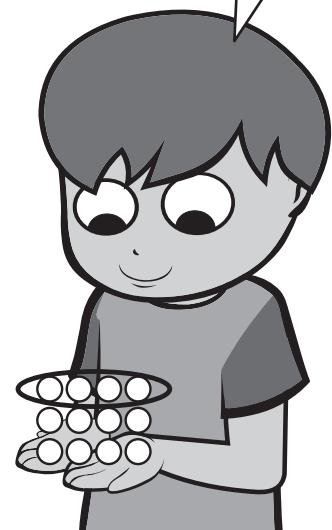
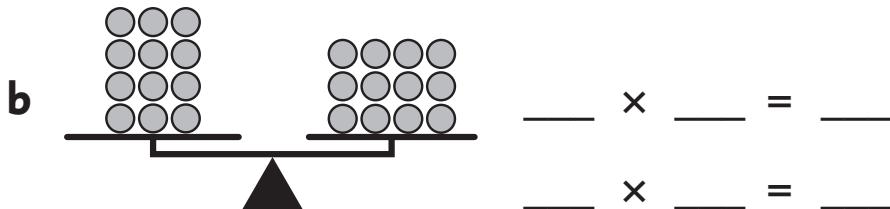


$$3 \times 2 = 6 \quad 2 \times 3 = 6$$

- 1 Look at the scales and write the turnarounds to match.



Remember
this is
a row!



- 2 Draw some turnarounds on the scales and get a partner to write the matching statements. Are they right?



Number relationships – zero

1 Do you know any other words for zero? Write them here.

2 What happens when we **add** zero to a number or a number to zero?
Try these.

a $13 + 0 = \underline{\quad}$ b $19 + 0 = \underline{\quad}$ c $23 + 0 = \underline{\quad}$

d $0 + 4 = \underline{\quad}$ e $0 + 27 = \underline{\quad}$ f $0 + 38 = \underline{\quad}$

g What do you notice?

3 What about if we **subtract** zero from a number? Try these.

a $10 - 0 = \underline{\quad}$ b $13 - 0 = \underline{\quad}$ c $8 - 0 = \underline{\quad}$

d $67 - 0 = \underline{\quad}$ e $16 - 0 = \underline{\quad}$ f $28 - 0 = \underline{\quad}$

g What do you notice?

4 What is the largest ‘add zero’ problem you can think of? Write it here.

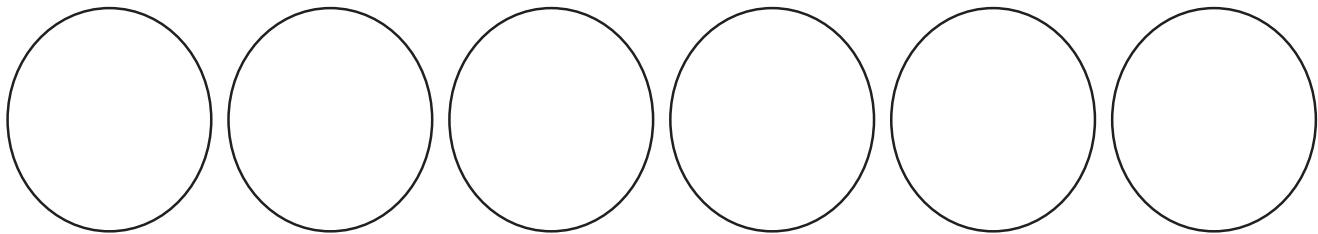
Number relationships – zero

What happens when we use zero in multiplication problems?

Think about $6 \times 0 = \text{ } \circlearrowleft$ or $0 \times 6 = \text{ } \triangleleft$

Let's explore.

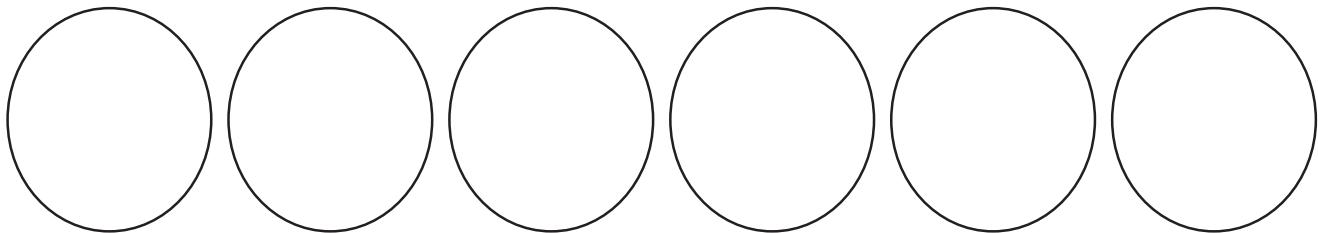
- 1 You are at a cake shop. There are 6 plates, and on each plate there are 2 cakes. Draw the cakes on the plates.



How many cakes do you have?

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

- 2 Now draw 0 cakes on each of the plates.



How many cakes do you have now? $\underline{6} \times \underline{\quad} = \underline{\quad}$ Sad, but true.

- 3 The cake shop lady says you can have as many cakes as you like but only if you put them on plates. You look **everywhere** but can't find any plates. How many cakes can you have?

$$\underline{0} \times \underline{\quad} = \underline{\quad}$$

It's OK to cry a little.

- 4 What happens when you multiply by zero?