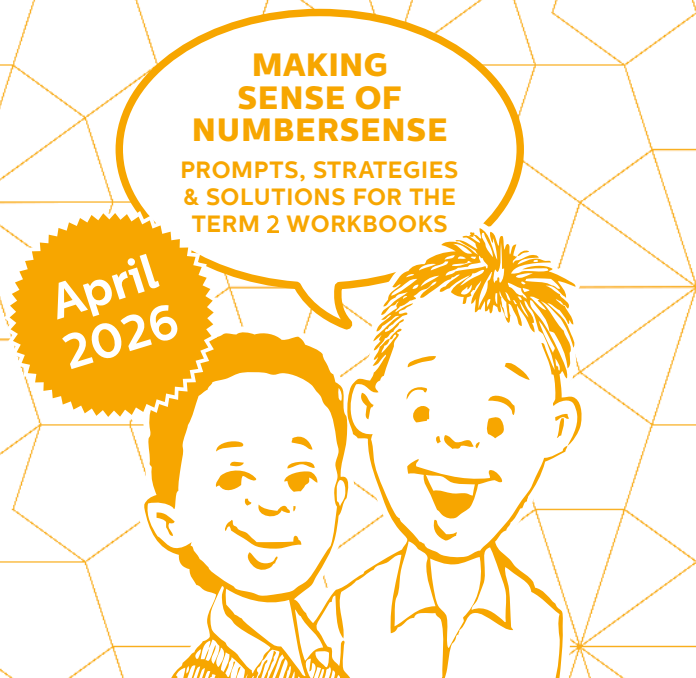
10 NumberSense

PROMPTS, STRATEGIES & SOLUTIONS

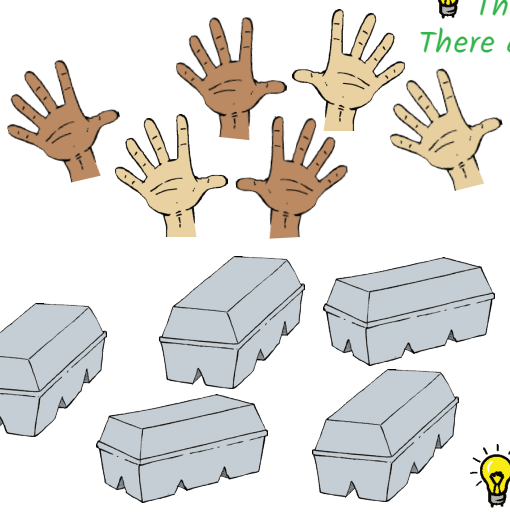
English

Teacher's Guide



? What do you notice? ? What is the same? What is different?

1. How many?



They are both 30.
There are 30 fingers and 30 eggs.

6 hands
30 fingers

5 boxes
30 eggs

6 groups of 5 is the same as 5 groups of 6.

2. Complete the tables.

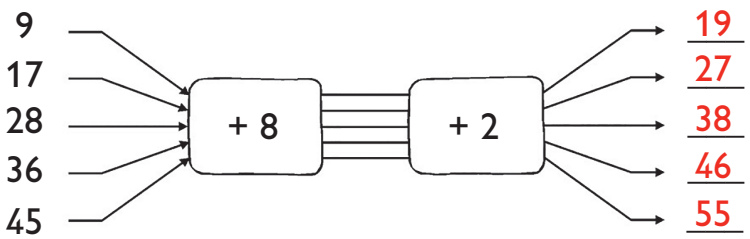
Egg boxes	1	2	4	5	7	8	10	12
Eggs	6	12	24	30	42	48	60	72

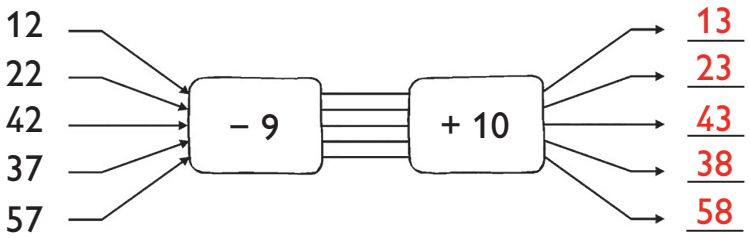
? Can we use the 1st table to help us with the 2nd table?

Eggs	6	12	18	36	42	48	54	66
Egg boxes	1	2	3	6	7	8	9	11

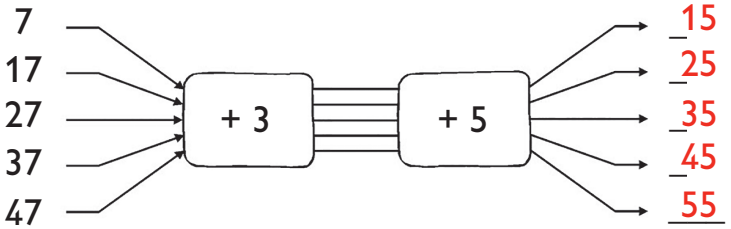
3. Complete.

I know that 8 + 2 is 10, so I just added 10.





I noticed that the answer is just one more. This makes sense because -9 and +10 is the same as just +1.



Adding 3 to 7 always makes a 10, then adding 5 is easy.

Adding 3 + 5 is the same as adding 8.

Activity 2: Tables

This activity introduces two ways of representing the relationship between egg boxes and eggs using tables.
The first table is familiar, showing the relationships × 6 (vertical) and + 6 (horizontal).
The second table reverses this relationship, with eggs as the input and egg boxes as the output.
This is the first time this table structure appears in the workbook.
Children may complete it by:

- recognising the reversal
- using grouping (sharing into groups of 6)
- referring to values from the first table.

Although division is not yet formally introduced, children may apply the concept informally.

Ideas for teaching:
Use Activity 1's counting context to support discussion. Model a similar situation (e.g. using hands and fingers). Ask children to explain how they completed their tables, discuss a few different options and compare how the second table is similar to and different from the first.

Activity 3: Two-step flow diagrams

While two-step (double) flow diagrams were first introduced in Workbook 9, take the time to practise a few examples with the class before children complete the page independently. These flow diagrams provide practise in exploring patterns, rules and relationships through breaking down and building up numbers in different ways.

Ask questions such as:

? What do you notice?

? How does this make calculating easier? Is there another way?

The **Thinking girl** icon is present alongside many of the two-step flow diagrams, and you can use this to initiate discussion and reflection.

Extension: Use a single flow diagram (+8) to illustrate that +3 +5 is the same as +8. and how the double flow diagram breaks up the numbers helps to make calculating easier.

1. Complete.

201	202				206				
	212							219	
		223					228		
						237			
				245					
		253							
	262								
271									
281									
		293							300

2. Mrs Setati sells apples. She puts 4 apples in a packet. Complete the table.

Packets	1	2	4	5	6	8	10	20
Apples	4	8	16	20	24	32	40	80

- How many apples are there in 20 packets? 80 apples
- How many apples are there in 22 packets? 88 apples

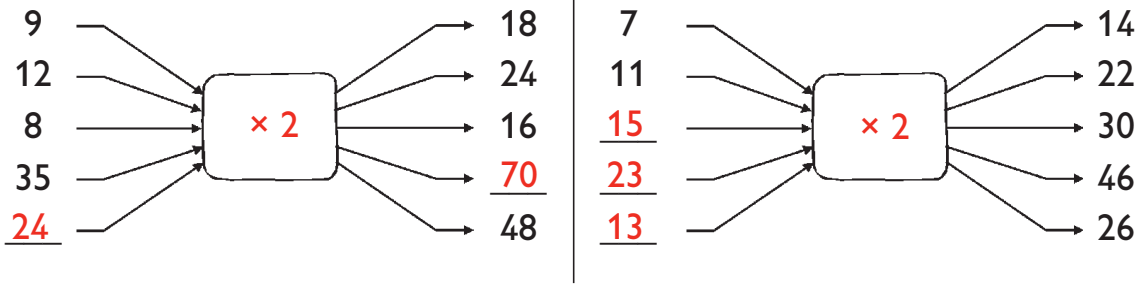
? *What is the same? What is different?*

3. Fundi sells apples. She puts 8 apples in a packet. Complete the table.

Packets	1	2	3	4	5	6	8	10
Apples	8	16	24	32	40	48	65	80

- How many apples are there in 10 packets? 80 apples
- How many apples are there in 11 packets? 88 apples

4. Complete. ? *How did you work these out?*



Activity 2 and 3: Tables

What is the same and what is different about the two tables?

Mrs Setati and Fundi are both selling apples.

Mrs Setati puts 4 apples in a packet. Fundi puts 8 apples in a packet.

Fundi puts double the amount of apples in a packet that Mrs Setati does.

2. Mrs Setati sells apples. She puts 4 apples in a packet. Complete the table.

Packets	1	2	4	5	6	8	10	20
Apples	4	8	16	20	24	32	40	80

- How many apples are there in 20 packets? 80 apples
- How many apples are there in 22 packets? 88 apples

Be curious as to how children worked out the number of apples in 22 packets.

3. Fundi sells apples. She puts 8 apples in a packet. Complete the table.

Packets	1	2	3	4	5	6	8	10
Apples	8	16	24	32	40	48	65	80

- How many apples are there in 10 packets? 80 apples
- How many apples are there in 11 packets? 88 apples

The number of apples is the same but the number of packets is different.

Mrs Setati uses double the number of packets that Fundi does.

Fundi uses half the number of packets that Mrs Setati does.

Activity 4: Flow diagrams

Explain to children that they need to determine the 'rule' or operation and then use it to complete the flow diagrams.

Ask questions such as:

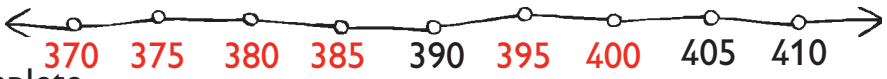
What did you use as your 'rule'? How did you work it out?

Is there another way?

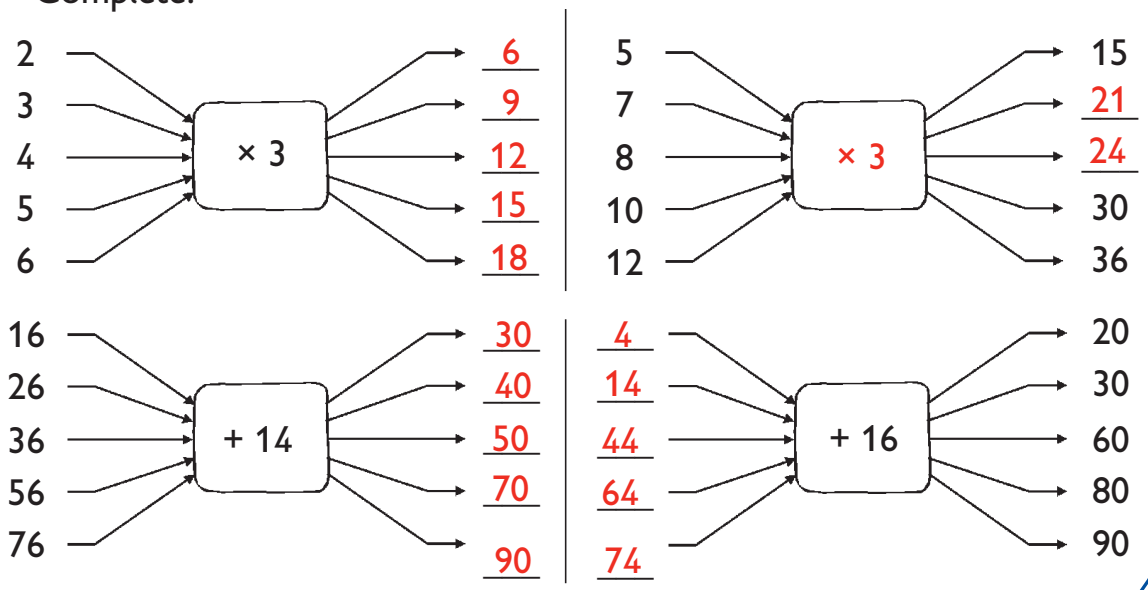
I used 'x2' because 9 x 2 = 18 and 12 x 2 = 24.

I used doubling as my rule. Double 9 is 18 and double 12 is 24.

1. Complete.



2. Complete.

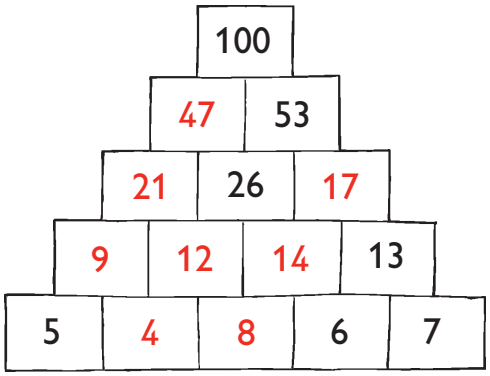


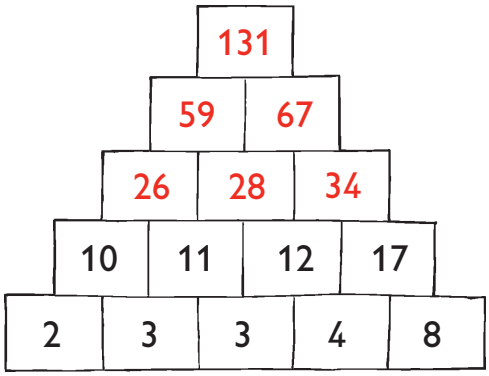
3. Complete the table.

Number	1	2	3	6	8	4	5	7
Number's friend	3	6	9	18	24	12	15	21

? *Can we use any of the flow digrams to help us with the table?*

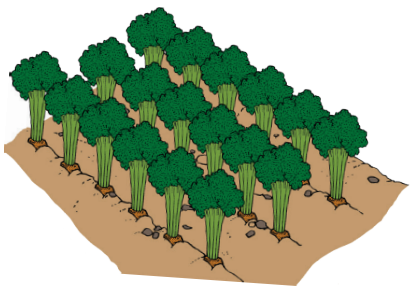
4. Work out the rule and complete.





5. Fundi, Sara, Jan and Yusuf helped Mr Twala in his garden. He paid them R76 altogether. They must divide the money equally. How much will each child get?

R19



p.6

Activity 3: Tables

Tables up to this point have illustrated relationships that can be easily modeled and counted, e.g. fingers on hands, value of coins.

The tables on this page show relationships that are not based on a counting situation, but require children to determine what the relationship is and then extend that relationship. This lays the foundation for what will in the future be known as "functions".

x 3

Number	1	2	3	6	8	4	5	7
Number's friend	3	6	9	18	24	12	15	21

+ 3 + 3 + 3

Activity 4: Pyramids

Pyramids with an additional rule were first introduced in Workbook 9 and are revisited here for the first time in Workbook 10. In previous workbooks, all of the pyramids involved the addition of the numbers in two adjacent cells. Each pyramid must now be examined carefully to determine if there is an additional rule and what that rule is.

Use a teacher-led activity to introduce pyramids with an extra rule.

You could scaffold as follows:

1

What is 2 plus 3?

2 plus 3 is 5

What must I do to 5 to get 10?

I must add 5.

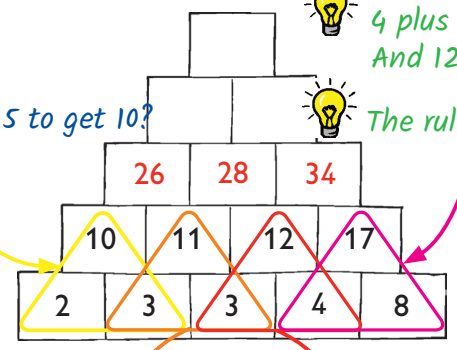
In this particular case, children may also choose doubling or 'x2'. Allow them to persevere and realise for themselves that it does not work for the other calculations.

2

Let's double check if the rule works.

4 plus 8 is 12.
And 12 plus 5 is 17.

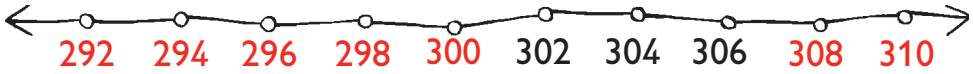
The rule for this pyramid is + 5.



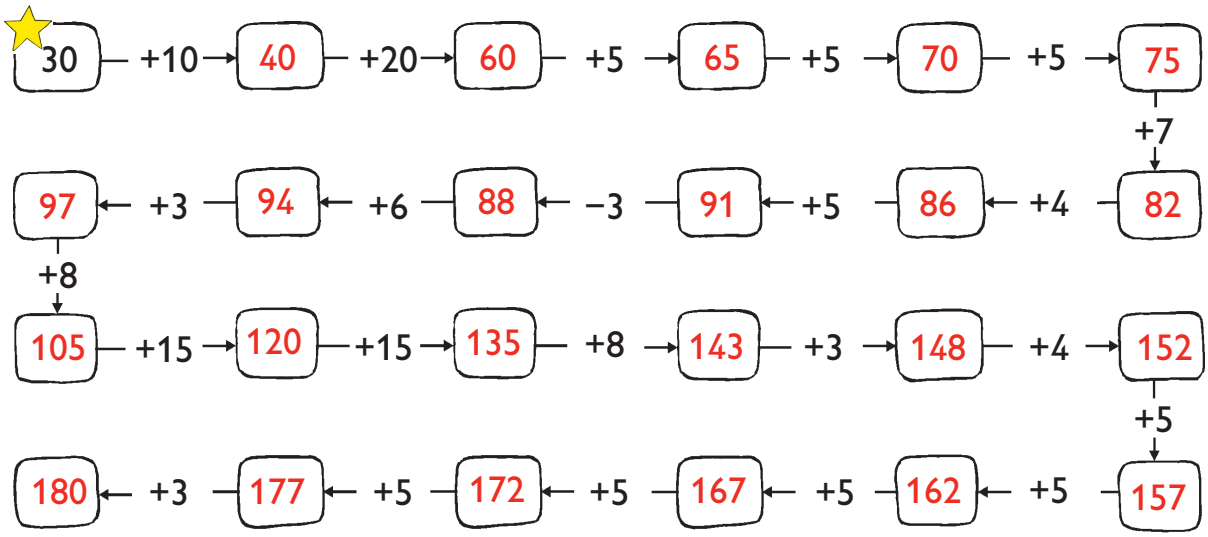
3 3 + 3 = 6 + 5 = 11

4 3 + 4 = 7 + 5 = 12

1. Complete.

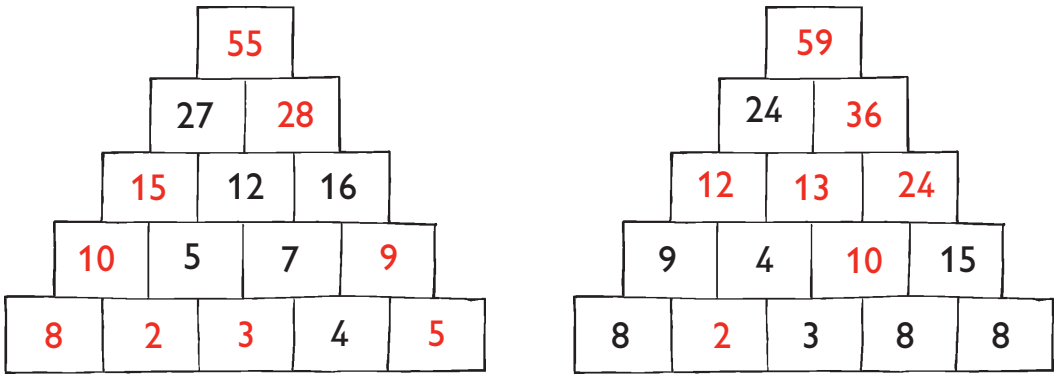


2. Complete.



3. Work out the rule and complete.

p.21



4. • Three children share 5 chocolate bars equally.
Show how they must do it.
1 and 2-thirds

• Four children share 6 chocolate bars equally.
Show how they must do it.
1 and 2-fourths or 1 and 1-half

Activity 4: Fraction problems

This page introduces two new fraction concepts.

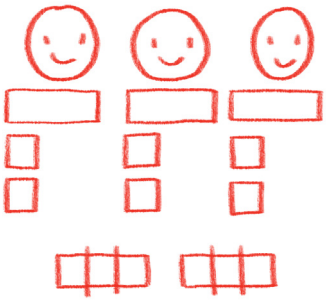
The first problem introduces non-unitary fractions for the first time. While these problems are familiar, this case illustrates how each child receives one whole chocolate bar and two additional pieces. Up to this point, children have only shared chocolate bars in ways that result in whole bars and a single extra piece (unitary fractions).

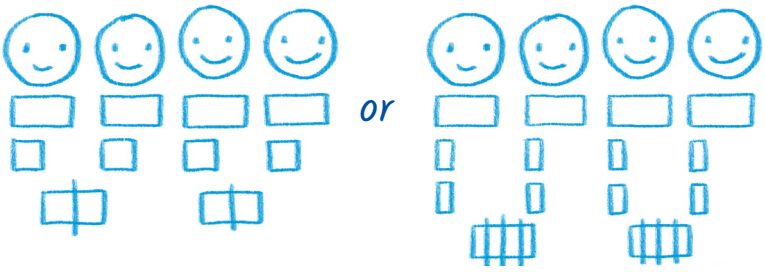
The second problem introduces equivalent fractions for the first time revealing that there are two possible solutions depending on how the learners share the remaining two chocolate bars. (This is because the number of chocolate bars left over is a factor of the number of children sharing the chocolate bars)'''''. The role of the teacher is to encourage children to reflect on the two solutions and encourage them to recognise that both fractions ($\frac{2}{4}$ and $\frac{1}{2}$) describe the same amount in different ways.

* Note that children are not yet required to know this terminology (e.g. non-unitary and equivalent). However, it is important for the teacher to observe and understand how they approach and solve these problems.

  Note also how the question reverts back to "Show how they must do it". Because non-unitary fractions and equivalent fractions are new concepts, the focus is on 'making a plan' by means of a picture rather than using formal fraction notation. This is introduced later in Workbook II.

Anticipated strategies could include:





Extension:

Six children share 8 chocolate bars equally. Show how they must do it.

How did you complete the flow diagrams? Did you notice any patterns?

I noticed that '+15 +5' is the same as '+5 + 15'.

I noticed that '+15 +5' is the same as '+20'.

p.1

1. Complete.

15, 20, 25, 30, 45	+ 15	+ 5 → 35, 40, 45, 50, 65
15, 20, 25, 30, 45	+ 5	+ 15 → 35, 40, 45, 50, 65
20, 21, 22, 23, 24	+ 13	+ 7 → 40, 41, 42, 43, 44
20, 21, 22, 23, 24	+ 6	+ 14 → 40, 41, 42, 43, 44

All of the double flow diagrams add up to 20.

How could we break up these two flow diagrams to make calculating easier?

17, 18, 19, 20, 21	+ 12	→ 29, 30, 31, 32, 33
43, 42, 41, 40, 39	− 12	→ 31, 30, 29, 28, 27

A short way of writing one half is $\frac{1}{2}$

A short way of writing one third is $\frac{1}{3}$

A short way of writing one quarter is $\frac{1}{4}$

A short way of writing one fifth is $\frac{1}{5}$

2. Three children share 7 chocolate bars equally. How much chocolate will each child get?

$2\frac{1}{3}$

*Remember that the **Thinking girl** conveys that there is a pattern or relationship between the activities on the page. Ask questions to help children reflect on what they noticed.*

Activity 2: Fraction notation

*Remember that the **New Idea** icon alerts you to a new activity, concept or notation.*

This is the first introduction to fraction notation.
It is important that while the notation has been introduced, teachers and children should still use the fraction names that were previously introduced.

For example:
$\frac{1}{3}$ should be read as "1-third" and not "1 over 3"; $\frac{1}{5}$ should be read as "1-fifth" and not "1 over 5".
Problems such as the illustrative problems previously discussed, can be asked again with the expectation that learners will now describe their solution using the fraction notation. While the use of fraction notation should be encouraged at this stage, teachers should allow some flexibility between the fraction words and fraction notation.

1. Complete.

   11 ; 22 ; 33 ; 44 ; 55 ; 66 ; 77 ; 88 ; 99 ; 110 ;

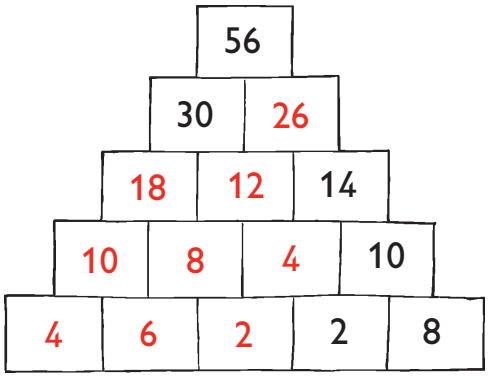
   121 ; 132 ; 143

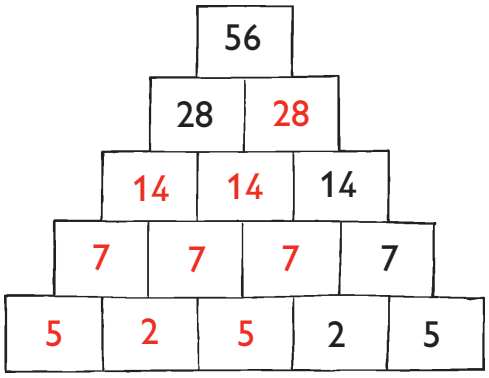
2. One metre of ribbon costs 8c. Complete the table. *How did you do it?*

Length in metres	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$
Cost in cents	8	12	16	20	24	28	32	36

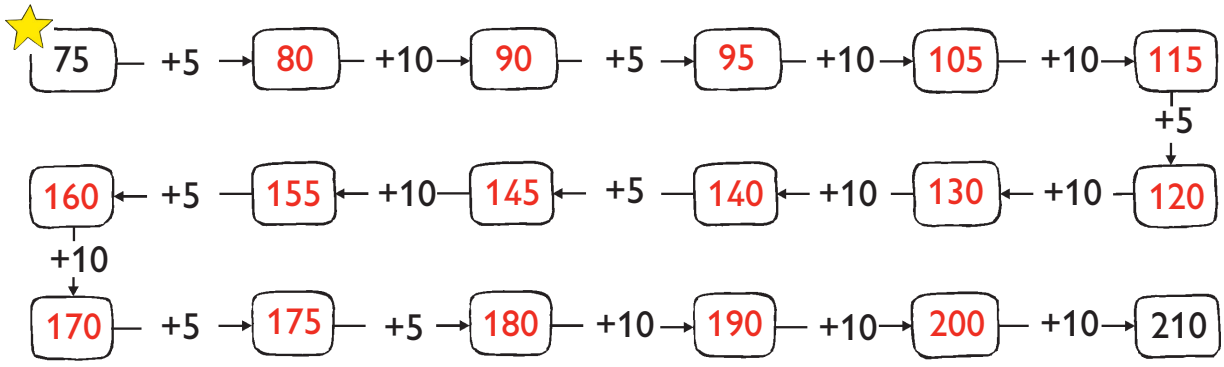
1 metre = 8 c so $\frac{1}{2}$ metre = 4 c,
So I just added 4 c each time.

3. Work out the rule and complete.





4. Complete.



5. Mrs Twala has 20 metres of material. One dress uses $2\frac{1}{2}$ metres of material. Mrs Twala makes four dresses.
   How much material will she have left?

   10 metres

Activity 2: Tables with fractions (measurement)

Be aware that this is the first time that fractions have been used in a table. However, do not make a 'fuss' about it. Spend time revising fraction notation (i.e. $1\frac{1}{2}$). You may also wish to work through a similar activity in groups or as a class before children complete the page independently. Be sure to ask children how they completed the activity.

Ideas for teaching

Practise a similar activity using tables. This could be scaffolded or extended depending on your group:

One metre of rope costs 6c. Complete the table.

Length in metres	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$
Cost in cents	6	9	12	15	18	21	24	27

+ 3 + 3 + 3

Ask questions such as:

- How many slices are there in one pizza? And 2 pizza's? And 3 pizza's?
- How many slices will there be in half a pizza? And 1 and a half pizza's?
- Do you notice a pattern?

Activity 5: Problems with fractions

Anticipated strategies could include:

I added $2\frac{1}{2}$ metres four times.

$2\frac{1}{2} + 2\frac{1}{2} + 2\frac{1}{2} + 2\frac{1}{2} =$ 10 metres

I subtracted $2\frac{1}{2}$ metres four times.

$20 - 2\frac{1}{2} - 2\frac{1}{2} - 2\frac{1}{2} - 2\frac{1}{2} =$ 10 metres

I used doubling to work out the problem.

Double $2\frac{1}{2}$ metres → 5 metres (2 dresses)

Double 5 metres → 10 metres (4 dresses)

Mrs Twala will have 10 metres left.

1. Complete.

Can we use the number line to help us with Activity 2?

2. There are 60 minutes in one hour. Complete the table.

How did you do it?

Hours	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$
Minutes	60	90	120	150	180	210	240	270

p.39

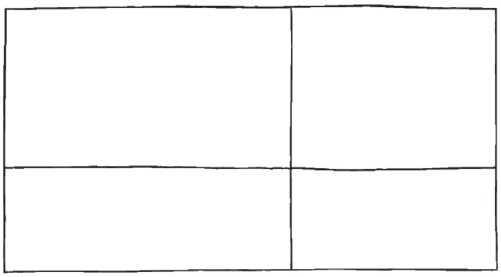
1 hour = 60 minutes so $\frac{1}{2}$ hour = 30 mins. So I just added 30 minutes each time

3. Complete in different ways.

25	+ →		+ →	100
25	+ →		+ →	100
	+ →		+ →	100
	+ →		+ →	100
	+ →		+ →	100

p.16

4. How many different rectangles can you count?



Investigations support resource

5.
- There are 12 boys sitting in a row. There are 5 rows. How many boys altogether?

  60 boys

- There are 15 girls sitting in a row. There are 5 rows. How many girls altogether?

  75 girls

- There are 25 children in a row. There are 5 rows. How many children altogether?

  125 children

Activity 2: Tables with fractions (measurement)

Fractions in tables were first introduced on the previous page (p.39). Note that this activity also incorporates the concept of time as a context and may require a teacher-led introduction or a similar warm-up activity to get children started.

Ideas for teaching

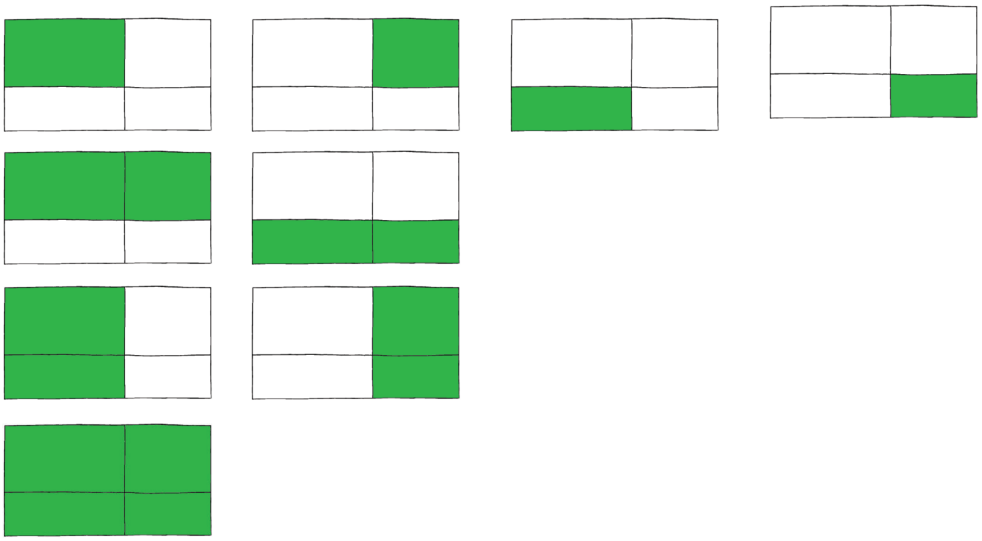
Practise a similar activity using tables and time, or remind children of the activity on the previous page. This could be scaffolded or extended depending on your group.

Ask questions such as:

- Have we seen something like this before?
- How is it the same? How is it different?
- Could we think of a similar strategy to solve this table?
- How many minutes are there in one hour? And 2 hours? And 4 hours?
- How many minutes are there in half an hour?

  How many minutes is one hour + half an hour?

Activity 4: Investigation



Activity 5: Multiplication and division-type problems

Anticipated strategies could include:

I drew a picture to help me.

12 12 12 12 12

10 + 10 + 10 + 10 + 10 = 50
2 + 2 + 2 + 2 + 2 = 10
50 + 10 = 60 boys

I added 12 five times.
12 + 12 + 12 + 12 + 12 = 60 boys

I know that 12 x 5 = 60 boys

What counting activity can I do to support this page?

What do you notice? *What is the same? What is different?*

1. Complete the tables.

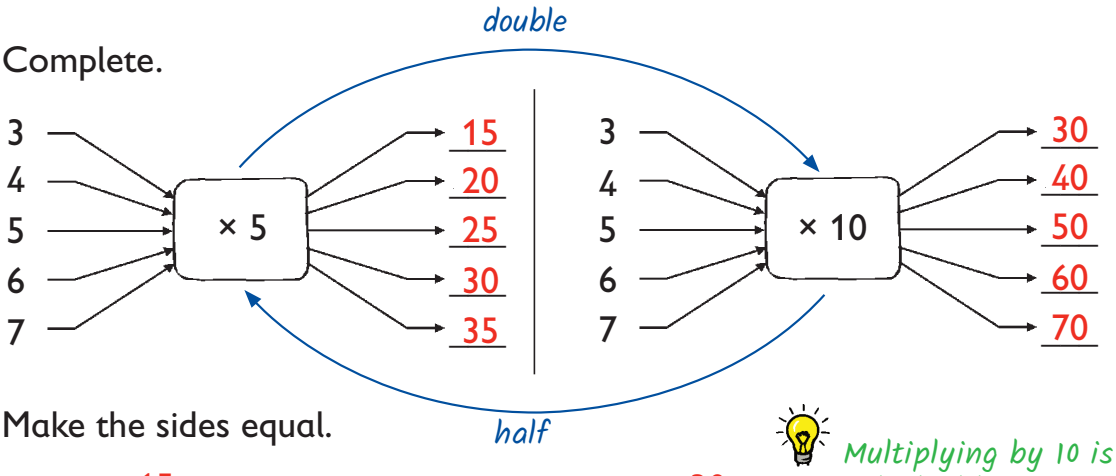
Hands	10	11	12	13	14	15	16	17
Fingers	50	55	60	65	70	75	80	85

half *double*

Children	10	11	12	13	14	15	16	17
Fingers	100	110	120	130	140	150	160	170

2. Complete.

The answers on the left are half of the answers on the right.



3. Make the sides equal.

Multiplying by 10 is easy... It looks like I just add a 0. Multiplying by 5 is also easy because 5 is half of 10. 12 x 10 = 120 and 12 x 5 is just half of that... 60.

3 × 5 = 15	*double* →	3 × 10 = 30
6 × 5 = 30		6 × 10 = 60
12 × 5 = 60	← *half*	12 × 10 = 120
13 × 5 = 65		13 × 10 = 130

4. Mrs Sibusa has 24 mealie plants. Determine the different ways in which she can plant them in rows. Each row must have the same number of plants.

Can we use the activity on the previous page to help us?

5. Make the sides equal in different ways.

24 = 12 × 2	24 = 6 × 4
24 = 8 × 3	24 = 1 × 24

We could use this activity to revise the relationship between a grid arrangement and the multiplication sign.

Planning a lesson

Understanding the page: key prompts

As part of your preparation, complete the workbook page and these key prompts.

Notice

What do we expect children to notice?

Doubling and halving

Plan

Parallel activities: Which activities on the page require a similar activity to sufficiently prepare the children for the page by scaffolding, checking for understanding (consolidating) or extending?

Counting:

Rational counting
- estimate +/- 200 beans
- count in 5s, regroup to count in 10s

Manipulating number:

Use the Mental Arithmetic booklet to prepare children for the page.

Ask questions such as:

- *What is 2 x 10?*
- *What is 2 x 5?*
- *What is 4 x 10?*
- *What is 4 x 5?*
- *What do you notice?*

Problem solving:

Jacob has 12 mielie plants.

- *Determine the different ways in which he can plant them in rows.*

- *Can we write these ways as a number sentence? (12 = 2 x 6 ; 12 = 4 x 3 ; etc)*

Reflect

Use the question bank to select specific questions to ask about this page during the reflection session (to reveal what we want the children to notice).

Have we seen a problem like this before?
Can we solve it in a similar way?
What is the same? What is different?

48	Date:	Answers
1	3 × 5 = ☐	
2	3 × 10 = ☐	
3	30 halved = ☐	
	What do you notice?	
4	4 × 5 = ☐	
5	4 × 10 = ☐	
6	40 halved = ☐	
	How did you get your answer?	
7	5 × 5 = ☐	
8	5 × 10 = ☐	
9	6 × 5 = ☐	
10	6 × 10 = ☐	
	How did you get your answer?	
11	7 × 5 = ☐	
12	7 × 10 = ☐	
13	70 halved = ☐	
	What do you notice?	
14	12 × 10 = ☐	
15	12 × 5 = ☐	
16	13 × 10 = ☐	
17	13 × 5 = ☐	
18	3 × 5 = ☐	
19	3 × 10 = ☐	
20	3 × 15 = ☐	
	How did you get your answer?	

What is the same about all of the shapes? Each shape has 3 sides.

What is different?

Space & Shape support resource

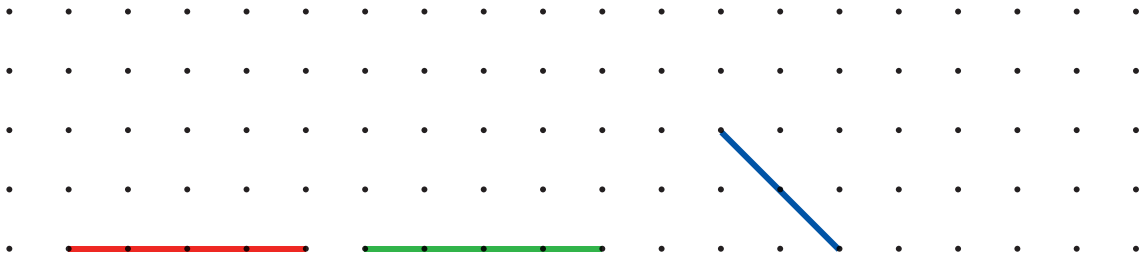
The corners can be different sizes.

GEOBOARD ACTIVITIES

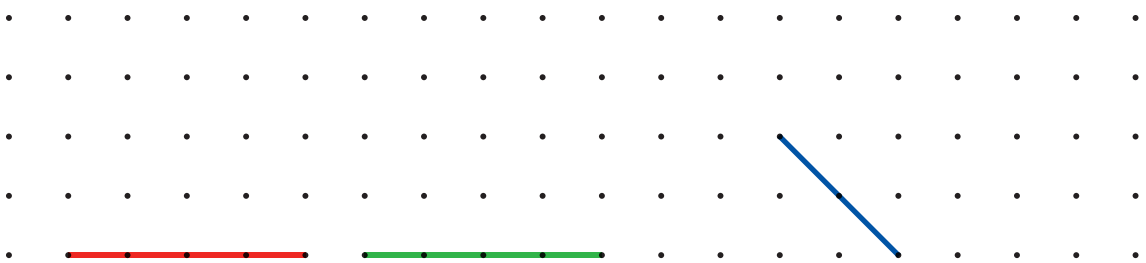
Complete card #5

1. In each case, use a Geoboard to solve the problem. Record your solutions on the dotty grid.

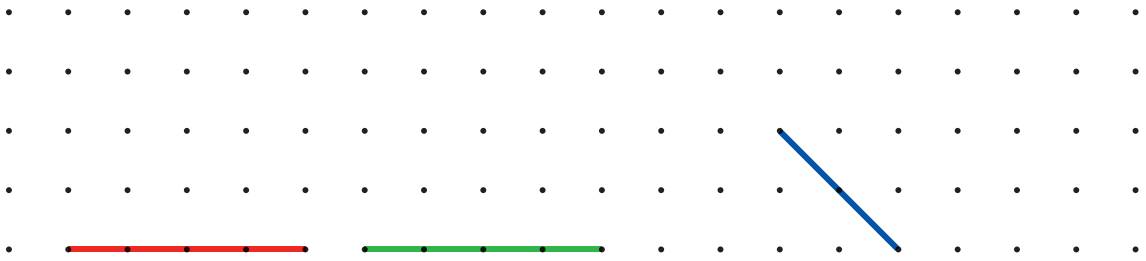
   Add lines to make three different triangles, each of which has one right angle. How do you know that you have made a right angle?



   Add lines to make three different triangles, each of which has two equal sides. Two of the corners are the same size.



   Add lines to make three different triangles, each of which has one angle that is greater than a right angle.



How do you know that one angle is bigger than a right angle?

Compare your solutions with a friend.

Activity: Geoboard Activity Card #5

In this activity we expect children to develop:

- Confidence in recognising, identifying, and describing 2D shapes, with a particular focus on triangles
- An increased awareness of the properties of these shapes, as well as the relationships between their edges and angles.

Teacher's role:

Give children the allocated Geoboard Activity Card and a 5-by-5 geoboard with elastic bands. If the children have larger geoboards, you may want to restrict their use to 5-by-5 pins, otherwise there will be too many solutions for some of the investigations. The children are able to work on these cards independently of the teacher.

The children will need square-dotted paper and a pencil for recording their solutions. The nature of the work on geoboards means that important learning often goes unrecorded. In these tasks the children are required to record what they do on the geoboard onto square-dotted paper so that the properties of the shapes can be discussed. It is recommended that children stick this square-dotted paper into their mathematics jotters.

The teacher should discuss the activity with the children after they have completed it. The real learning lies in the reflective discussion that the teacher facilitates.

What to expect from the children:

Children should begin to recognise the properties of triangles, for example, that they have three edges and three corners (angles). Right angles were formally introduced in Workbook 9, so children should be able to use this terminology when describing or drawing certain shapes.

Space & Shape support resource

What is the same about all of the shapes?

Each shape has 4 sides.

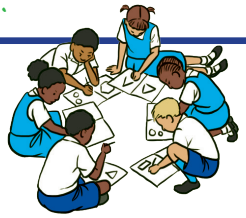
What is different?

All four corners are right angles.

The opposite sides are the same.

GEOBOARD ACTIVITIES

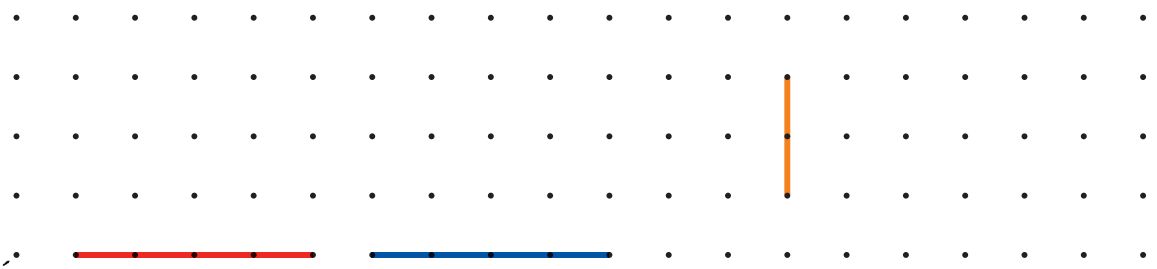
Complete card #6



1. In each case, use a Geoboard to solve the problem. Record your solutions on the dotty grid.

   Add lines to make three different rectangles.

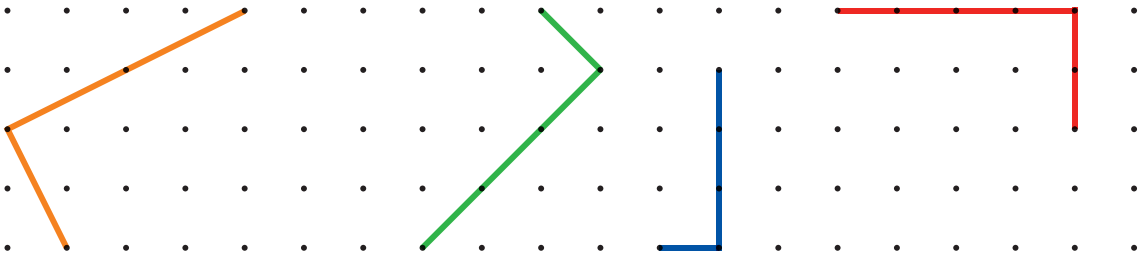
   How do you know that you have made a rectangle?



The opposite sides are the same length and all of the corners are right-angles.

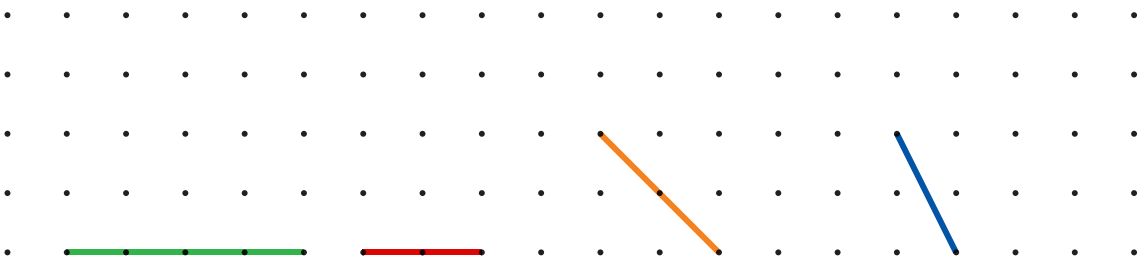
   Add lines to complete the rectangles.

What made this activity more difficult?



   Add lines to make squares.

How do you know that you have made a square?



All of the sides are the same length and all of the corners are right-angles.

   Compare your solutions with a friend.

Is a square also a rectangle?

Is a rectangle also a square?

Activity: Geoboard Activity Card #6

In this activity we expect children to develop:

- Confidence in recognising, identifying, and describing 2D shapes, with a particular focus on squares and rectangles
- An increased awareness of the properties of these shapes, as well as the relationships between their edges and angles.

Teacher's role:

Give children the allocated Geoboard Activity Card and a 5-by-5 geoboard with elastic bands. If the children have larger geoboards, you may want to restrict their use to 5-by-5 pins, otherwise there will be too many solutions for some of the investigations. The children are able to work on these cards independently of the teacher.

The children will need square-dotted paper and a pencil for recording their solutions. The nature of the work on geoboards means that important learning often goes unrecorded. In these tasks the children are required to record what they do on the geoboard onto square-dotted paper so that the properties of the shapes can be discussed. It is recommended that children stick this square-dotted paper into their mathematics jotters.

The teacher should discuss the activity with the children after they have completed it. The real learning lies in the reflective discussion that the teacher facilitates.

What to expect from the children:

Children should begin to recognise the properties of squares and rectangles, for example, that rectangles (squares included) have four edges and four corners (angles). Right angles were formally introduced in Workbook 9, so children should be able to use this terminology when describing or drawing these shapes.

The children should start to notice the differences and similarities between squares and other rectangles, and the similarities and differences between rectangles and other quadrilaterals. The children may not yet recognise that a square is a special rectangle.