



**Brombacher
& Associates**

Patterns and Patterning

(Developing the Function Concept)

A workshop for primary school teachers



Contents

Patterns and Graphs	1
A sequence of activities to support the development of graphs	3
Pre-graphing pattern development (Foundation Phase)	3
Border patterns	3
Number patterns	4
Tables – relationships	6
Intermediate/Senior Phase pattern sequence	9
Extending patterns sequence	10
Input/output numbers	17
Equivalence	20
Graphs	36
Equations	54

Patterns and Graphs

Mathematics is, among other things, the study of patterns.

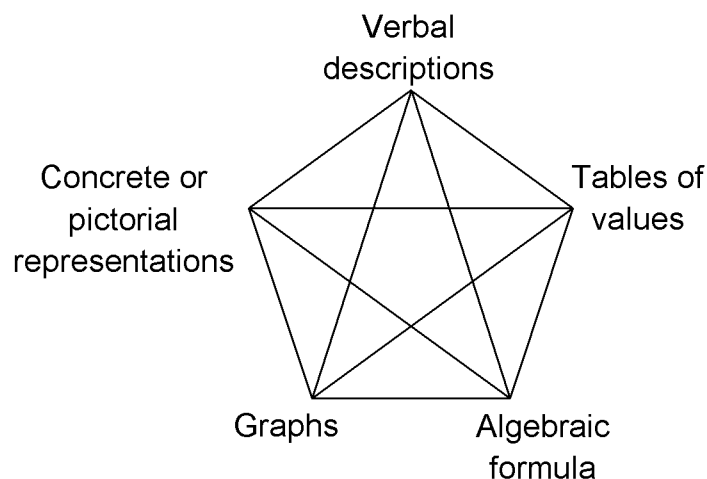
Patterns enable us to describe a changing world. From a young age we need to nurture the young child's ability to describe and predict variation.

Patterns enable us to make predictions:

- Predictions about what will happen under certain conditions; and
- Predictions about the conditions needed for certain events to occur.

The study of patterns introduces children to variables, relations and functions. From an early stage it is important that children learn to represent patterns in a variety of different ways and to translate between these representations.

Graphs represent relationships in a particular way that enables us to “see” the relationship in ways that other representations don't necessarily allow.



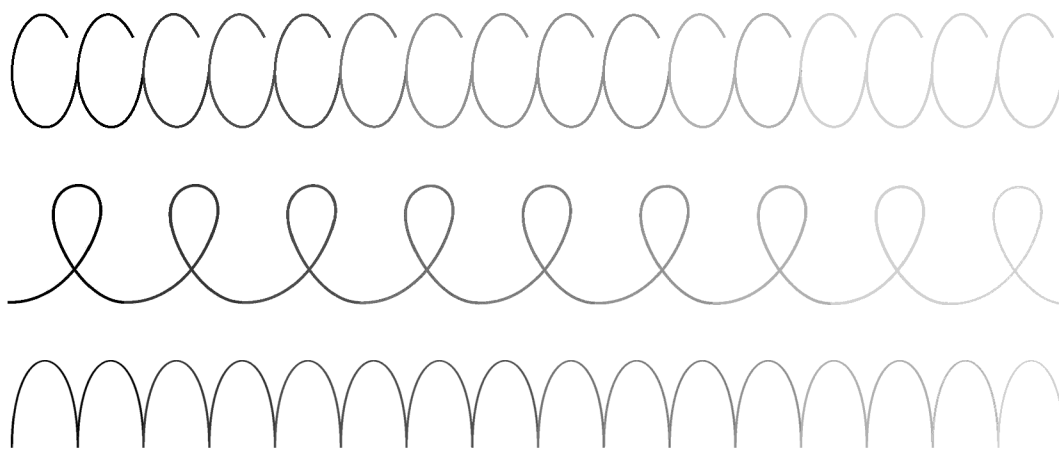
A sequence of activities to support the development of graphs

Pre-graphing pattern development (Foundation Phase)

Border patterns

Activity 1 (Workbook 1 page 3)

Trace.



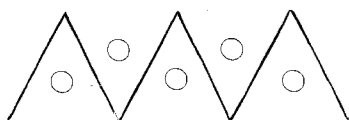
Activity 2 (Workbook 2 page 7)

Extend the pattern.



Activity 3 (Workbook 2 page 30)

Extend and colour the pattern.



Activity 4 (Workbook 2 page 39)

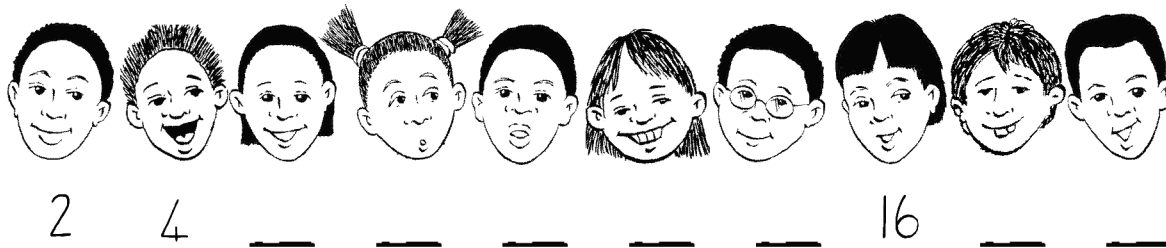
Extend and colour the pattern.


Activity 5 (Workbook 11 page 13)

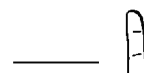
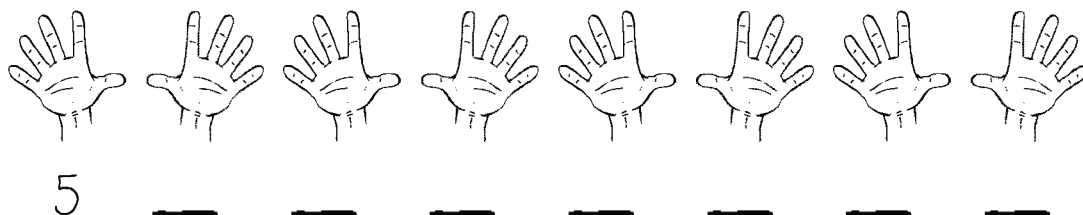
Extend and colour the pattern.

**Number patterns**Activity 1 (Workbook 1 page 34)

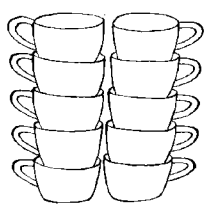
Count. 

Activity 2 (Workbook 1 page 39)

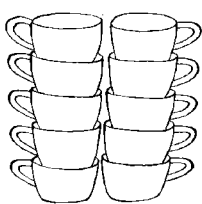
Count. 



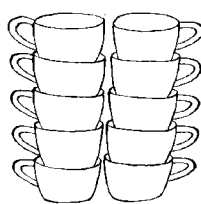
Count.



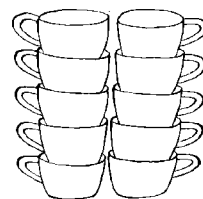
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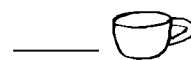
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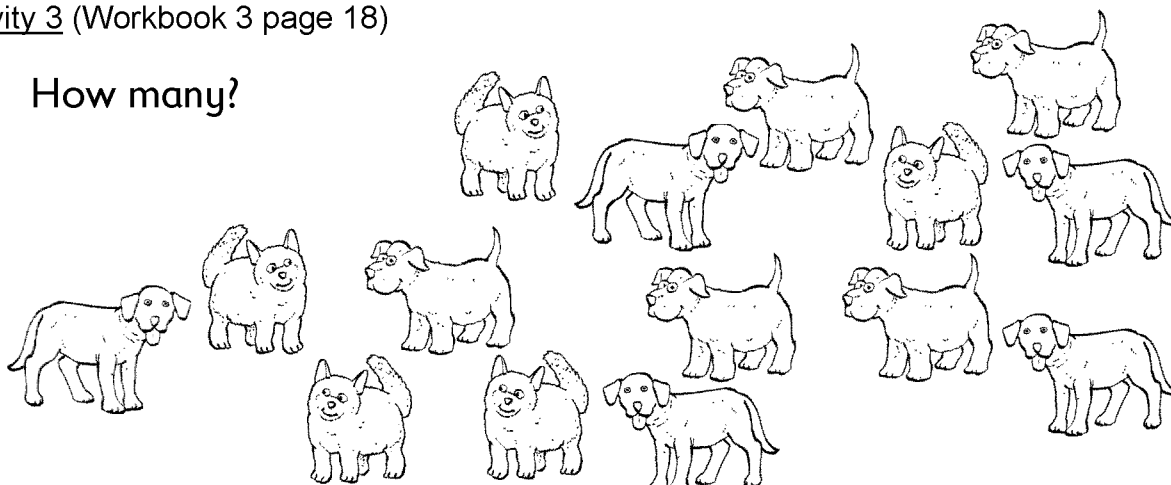


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Activity 3 (Workbook 3 page 18)

1. How many?



— dogs

— paws

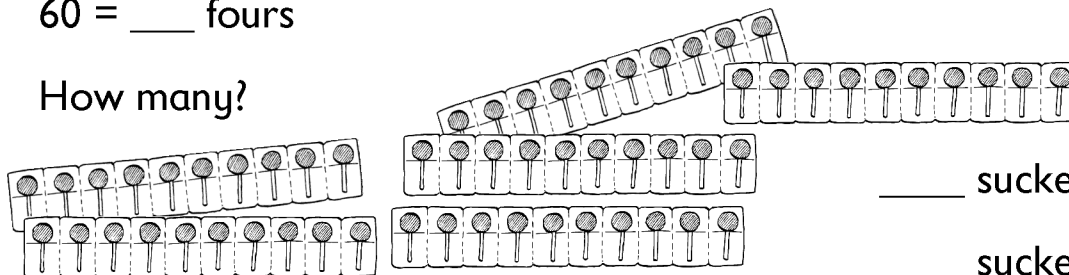
2. Complete.

4 ; 8 ; 12 ; — ; — ; — ; — ; — ; — ;

— ; — ; — ; — ; — ; —

60 = — fours

3. How many?



— sucker strips

— suckers

4. Complete.

10 ; 20 ; — ; — ; — ; —

60 = — tens

Activity 5 (Workbook 12 page 46)

Complete each row of numbers.

36 ; 43 ; 50 ; ____ ; ____ ; ____

53 ; 61 ; 69 ; ____ ; ____ ; ____

147 ; 151 ; 155 ; ____ ; ____ ; ____

- What will the eighth number in each row be?
Row 1 ____ Row 2 ____ Row 3 ____
- What will the tenth number in each row be?
Row 1 ____ Row 2 ____ Row 3 ____
- What will the fifteenth number in each row be?
Row 1 ____ Row 2 ____ Row 3 ____

Tables – relationshipsActivity 1 (Workbook 2 page 25)

Complete.

Children	1	2	3	4	5	6
Hands	2	4				



Hands	1	2	3	4	5	6
Fingers	5	10				

Activity 2 (Workbook 2 page 34)

Complete.

Hands	1	2	3	4	5			8
Fingers	5					30	35	

Children	1	2	3	4	5			8
Fingers	10	20				60	70	

Activity 3 (Workbook 6 page 16)

Complete the table and the number sentences.

Girls	1	2	3	4	6	7	8	9
Eyes	2							

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

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

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

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

Activity 4 (Workbook 6 page 36)

Complete the table and the number sentences.

Cars	1	2						
Wheels	4	8	12	16	20	28	36	44

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

$6 \times 4 = \underline{\quad}$

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

$7 \times 4 = \underline{\quad}$

Activity 5 (Workbook 8 page 16)

Yusuf's granny gives him a money box. It has R15 in it. Yusuf saves R4 every month. Complete the table.

Months	0	1	2	3	4	5	6	7
Money in box	15	19						

- How much money will there be after 6 months? $\underline{\quad}$
- How much money will there be after 10 months? $\underline{\quad}$

One ice-cream costs R6. Complete the table.

Use your answers in the table above to complete this table.

Use the tables to find the cost of:

- 15 ice-creams
- 32 ice-creams
- 64 ice-creams

This image shows a full page of white paper with horizontal dashed lines, typical of primary school writing paper. The lines are evenly spaced and run across the entire width of the page. There are no margins, text, or other markings present.

Notes:

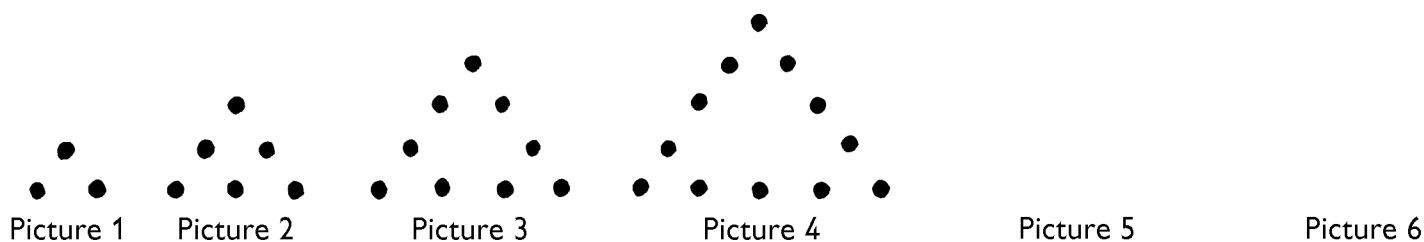
This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting or typing. There are no margins, text, or other markings on the page.

Intermediate/Senior Phase pattern sequence

Extending patterns sequence

Activity 1 (Workbook 13 page 12)

1. Beth makes pictures with dots like this. The first 4 pictures make a pattern.



- Draw the fifth and sixth pictures in the pattern.
- Complete the table.

Picture number	1	2	3	4	5	6	7	8	9	10
Number of dots	3									

- How many dots does she need for picture 12? _____

Activity 2 (Workbook 14 page 4)

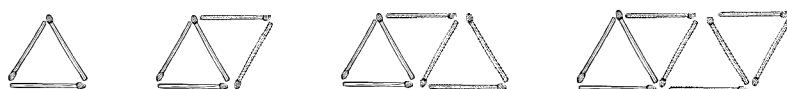
1. Jan makes pictures with matches like this. The first four pictures make a pattern.



- Draw the fifth picture in the pattern.
- Complete the table for the number of matches in each picture.

Picture number	1	2	3	4	5	6	12	13	14	20
Number of matches	3	6								

2. Suzi makes pictures with matches like this. The first four pictures make a pattern.



- a. Draw the fifth picture in the pattern.
- b. Complete the table for the number of matches in each picture.

Picture number	1	2	3	4	5	6	12	13	14	20
Number of matches	3	5								

c.



Suzi is calculating the number of matches needed for each picture.

*For picture 1, I need 1 times 2 plus 1, and $1 \times 2 + 1$ is 3.
For picture 2, I need 2 times 2 plus 1, and $2 \times 2 + 1$ is 5.*



Use Suzi's method to calculate the number of matches needed.

Picture 1 $1 \times 2 + 1 = 3$

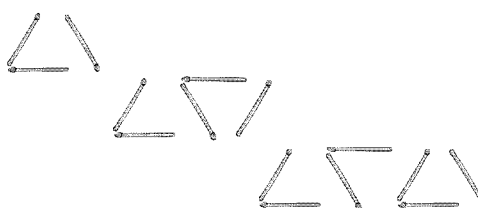
Picture 2 $2 \times 2 + 1 = 5$

Picture 3 $\underline{\hspace{1cm}} + 1 = \underline{\hspace{1cm}}$

Picture 4 $\underline{\hspace{1cm}} + 1 = \underline{\hspace{1cm}}$

Picture 5 $\underline{\hspace{1cm}} + 1 = 11$

Picture 6 $6 \times 2 + 1 = \underline{\hspace{1cm}}$



- d. How many matches will Suzi need to make a picture with 45 triangles?

Activity 2 continued (Workbook 14 page 8)

1. Themba makes pictures with matches like this. The first 4 pictures make a pattern.



- a. Draw the fifth picture.
b. Complete the table for the number of matches in each picture.

Picture number	1	2	3	4	5	6	12	13	14	20
Number of matches	4	7								

c.



Themba is calculating the number of matches needed for each picture.

For picture 1, I need 1 times 3 plus 1, and $1 \times 3 + 1$ is 4.
For picture 2, I need 2 times 3 plus 1, and $2 \times 3 + 1$ is 7.



Use Themba's method to calculate the number of matches needed.

Picture 1 $1 \times 3 + 1 = 4$

Picture 2 $2 \times 3 + 1 = 7$

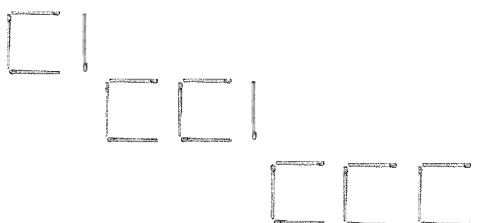
Picture 3 $\underline{\hspace{1cm}} + 1 = \underline{\hspace{1cm}}$

Picture 4 $\underline{\hspace{1cm}} + 1 = \underline{\hspace{1cm}}$

Picture 5 $\underline{\hspace{1cm}} + 1 = 16$

Picture 6 $6 \times 3 + 1 = \underline{\hspace{1cm}}$

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

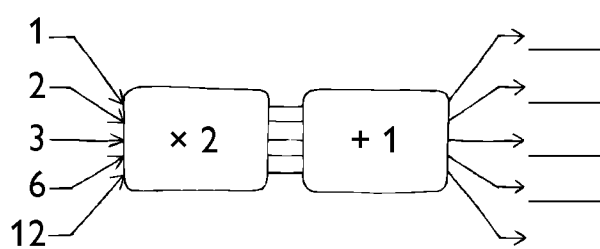


- d. Themba has 91 matches. How many squares can he make?
- e. How many squares can he make if he has 302 matches? How many matches will he have left over?

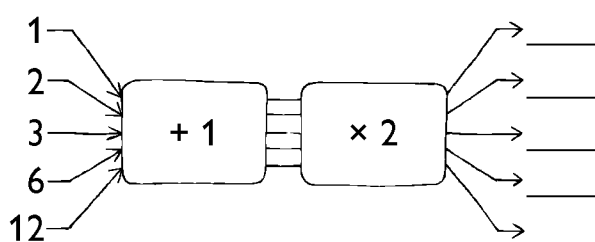
Activity 2 continued (Workbook 14 page 9)

1. a. Complete the following flow diagrams.

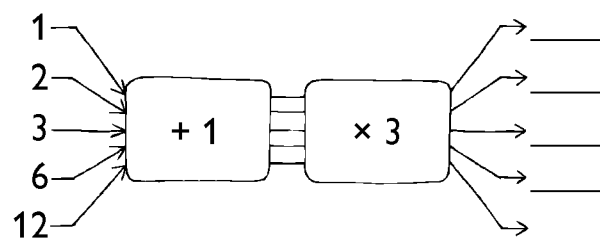
A.



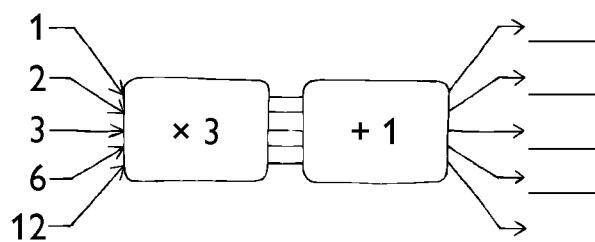
B.



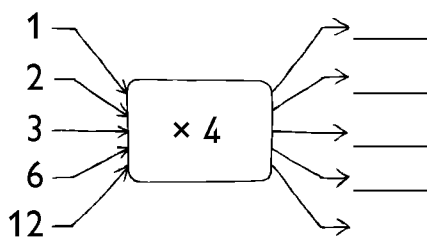
C.



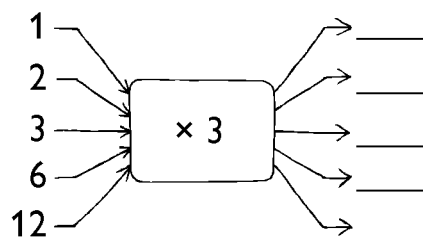
D.



E.

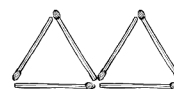


F.



- b. Which of the flow diagrams summarise the methods used by Jan, Suzi and Themba? Write down the letter only.

• Jan's pattern with triangles on page 4. _____



• Susi's pattern with triangles on page 4. _____



• Themba's pattern with squares on page 8. _____



Activity 3 (Workbook 17 page 18)

1. Look at these matchstick patterns of triangles, squares, pentagons and hexagons.

- a. Draw the fourth and fifth pictures in each pattern.



	Picture 1	Picture 2	Picture 3	Picture 4	Picture 5
Triangles					
Squares					
Pentagons					
Hexagons					

- b. Complete the table.

Picture number	1	2	3	4	5	6	7	8	10	12
Number of matches Triangles (3 sides)										
Number of matches Squares (4 sides)										
Number of matches Pentagons (5 sides)										
Number of matches Hexagons (6 sides)										
Number of matches Octagons (8 sides)										

- c. Draw flow diagrams to show how you would calculate the number of matches for each of the patterns.

Activity 3 continued (Workbook 17 page 19)

1. a.



Vusi, remind us how you calculated the number of matches for the square pattern.

For picture 1, I need 1 times 3 plus 1. I write $1 \times 3 + 1 = 4$.

For picture 2, I need 2 times 3 plus 1. I write $2 \times 3 + 1 = 7$.



Use Vusi's method to calculate the number of matches for each of the shapes by extending the pattern.

Triangles	Squares	Pentagons	Hexagons
$1 \times 2 + 1 = 3$	$1 \times 3 + 1 = 4$		
	$2 \times 3 + 1 = 7$		
	$3 \times 3 + 1 = 10$		
	$4 \times 3 + 1 = 13$		
	$5 \times 3 + 1 = 16$		

b.



Dan is calculating the number of matches needed for 16 triangles.

I know that $16 = 2 \times 8$.

From my table I know that I need 17 matches for 8 triangles, so for 16 triangles I need 2×17 matches.


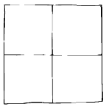
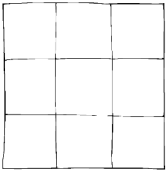


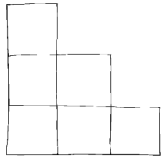

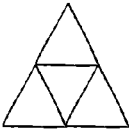
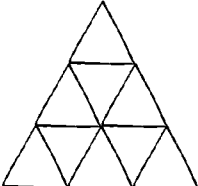


Is Dan correct? Explain.

- c. How many matches are needed to make picture 20 for each of the shapes?

Activity 4 (Workbook 18 page 46)

1. Pictures are made with squares and triangles like this. The first 3 pictures make a pattern.

	Picture 1	Picture 2	Picture 3	Picture 4
Pattern A				
Pattern B				
Pattern C				

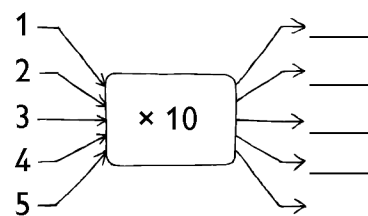
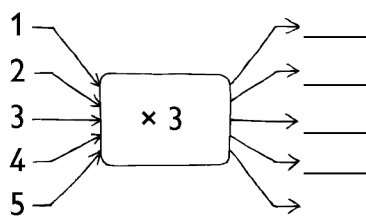
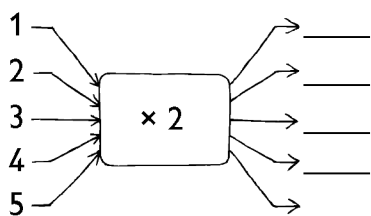
- a. Draw the fourth picture in each of the patterns.
- b. Complete the table.


Picture number	1	2	3	4	5	6	7	8	10	12
Number of squares (Pattern A)										
Number of squares (Pattern B)										
Number of triangles (Pattern C)										

Input/output numbers

Activity 1 (Workbook 15 page 28)


1. a. Complete the following flow diagrams.



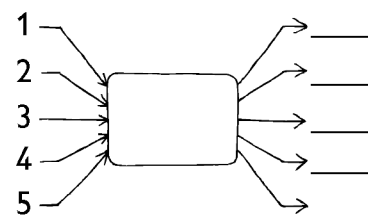
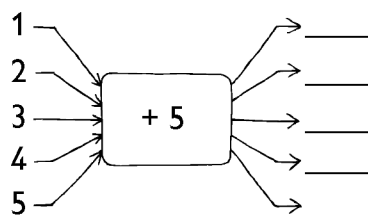
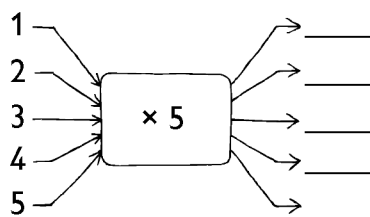


Sindi, can you see a pattern?

I notice that the input numbers go up by 1 but the output numbers go up by the amount we multiply by.



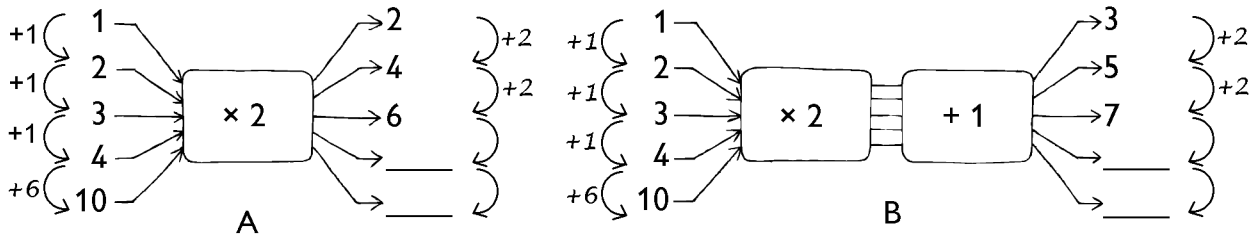
- b. Is Sindi's pattern always true? Investigate.



Activity 2 (Workbook 17 page 42)

1. a. Complete the following flow diagrams.

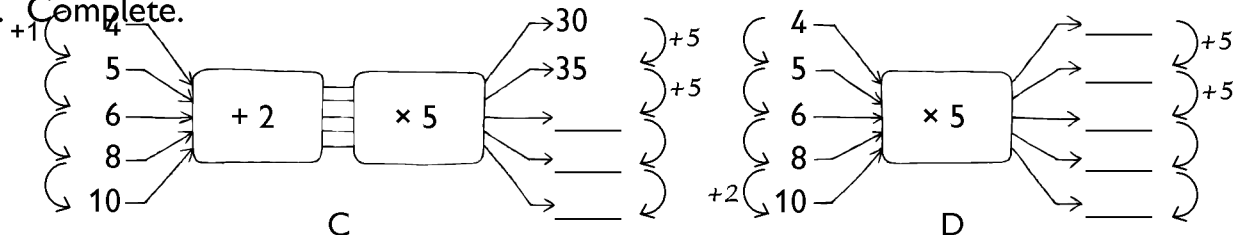
For each of the flow diagrams, find the difference between the consecutive input numbers and output numbers. Write the differences next to the flow diagrams as shown in the first one.



b. Complete the table for flow diagrams A and B.

Input	1	2	3	4	10	11	12	15	20	50
Output A	2	4								
Output B	3	5								

c. Complete.

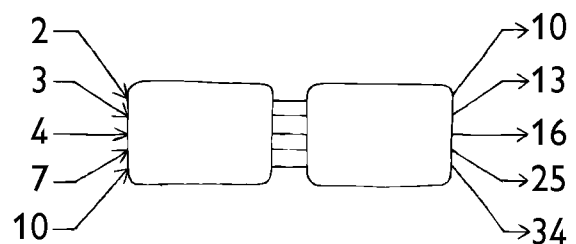


d. Complete the table for flow diagrams C and D.

Input	4	5	6	8	10	11	12	15	20	30
Output C	30	35								
Output D										

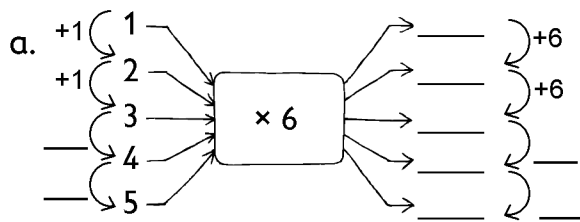
2. Complete the flow diagram for the table.

Input	2	3	4	7	10
Output	10	13	16	25	34



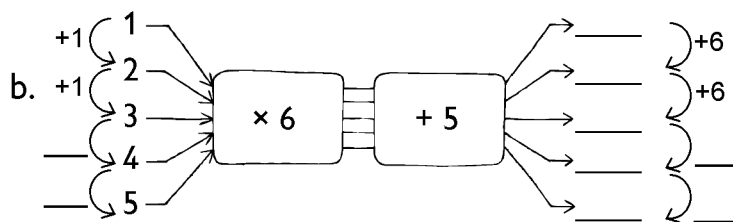
Activity 3 (Workbook 18 page 5)

1. Complete.



Input	1	2	3	4	5
Output	6				

Below the table, four '+1' labels with arrows connect the input boxes 1 to 5. Below the output boxes, a '+6' label with an arrow connects the first output box (6) to the next empty box.



Input	1	2	3	4	5
Output	11				

Below the table, four '+1' labels with arrows connect the input boxes 1 to 5. Below the output boxes, a '+6' label with an arrow connects the first output box (11) to the next empty box.



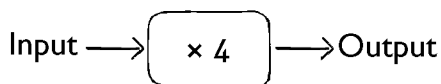
Have you noticed that flow diagrams describe the relationship between pairs of input and output numbers and tables are used to record pairs of input and output number?

The relationship between input and output numbers can be summarized by a general flow diagram.

For question 1.a: Input \rightarrow $\times 6$ \rightarrow Output

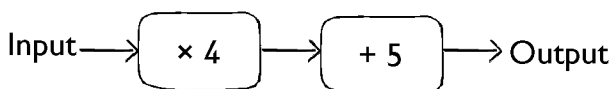
For question 1.b: Input \rightarrow $\times 6$ \rightarrow $+ 5$ \rightarrow Output

2. Complete.



Input	1	2	3	4	5
Output					

Below the table, four '+1' labels with arrows connect the input boxes 1 to 5. Below the output boxes, a '+4' label with an arrow connects the first output box to the next empty box.



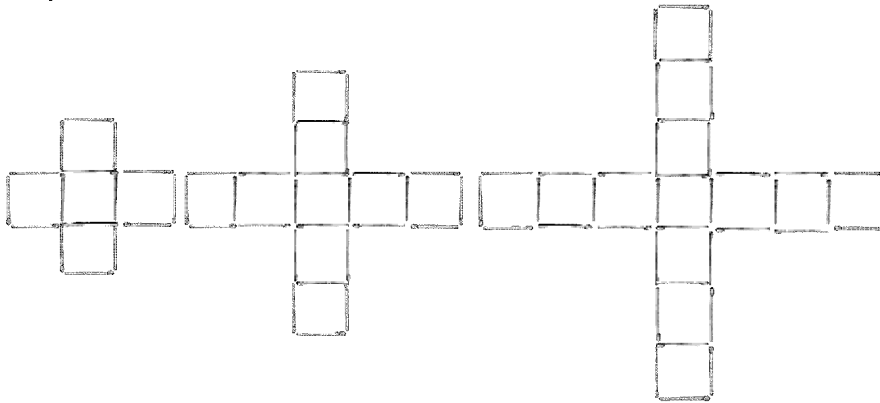
Input	1	2	3	4	5
Output					

Below the table, four '+1' labels with arrows connect the input boxes 1 to 5. Below the output boxes, a '+4' label with an arrow connects the first output box to the next empty box.

Equivalence

Activity 1 (Workbook 19 pages 18 & 19)

1. Neba makes pictures with matches like this. The first three pictures make a pattern.



Picture 1

Picture 2

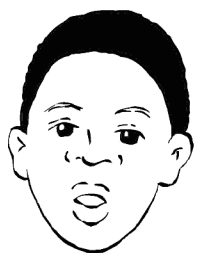
Picture 3

Picture 4

- Draw the fourth picture in the pattern.
- Complete the table for the picture number and the number of matches.

Picture number	1	2	3	4	5	6	7	8	10	12
Number of matches	16	28	40							

Here are 4 different methods to calculate the number of matches in picture 30.



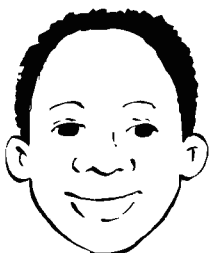
Ben

We need 12 more matches for each new cross. So, I keep on adding 12 to the number of matches until I get to picture 30.



Sara

I know how many matches we used for picture 10. I multiply that number by 3 because $3 \times 10 = 30$.



Vusi

There are 16 matches in picture 1. I add 12 matches for each new picture. For picture 30, I add 29×12 to 16.



Sindi

I see the cross has 4 matches in the middle. Each arm grows by 3 matches each time. So, I add $4 \times 3 = 12$ matches every time. The pattern is:
 $12 + 4$; $12 \times 2 + 4$;
 $12 \times 3 + 4$.

c. Use Sindi’s method to calculate the number of matches for picture 30.

Picture 1	$1 \times 12 + 4 = 16$	Picture 5	$\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} + 4 = \underline{\hspace{1cm}}$
Picture 2	$2 \times 12 + 4 = 28$	Picture 10	$\underline{\hspace{2cm}}$
Picture 3	$3 \times 12 + 4 = \underline{\hspace{1cm}}$	Picture 20	$\underline{\hspace{2cm}}$
Picture 4	$\underline{\hspace{1cm}} \times 12 + 4 = \underline{\hspace{1cm}}$	Picture 30	$\underline{\hspace{2cm}}$

2. a. Will Ben’s, Sara’s and Vusi’s methods all give the correct answer? Show your working.
- b. Use at least two valid methods to calculate the number of matches for picture 40.

Notes:

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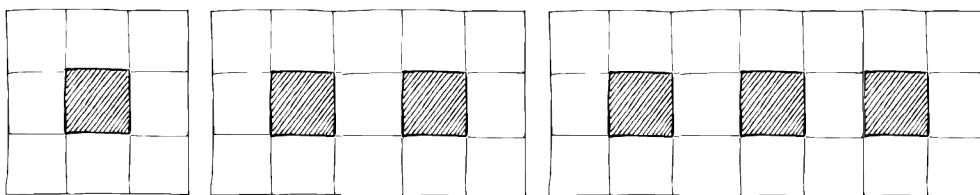
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Activity 2 (Workbook 19 page 30)

1. Chris makes pictures with grey and white tiles like this. The first three pictures make a pattern.



Picture 1

Picture 2

Picture 3

Picture 4

- a. Draw the fourth picture in the pattern.

- b. Complete the table.

Picture number	1	2	3	4	5	6	7	8	9	10
No. of grey tiles	1	2	3							
No. of white tiles	8	13	18							
Total no. of tiles	9	15	21							

- c. How many grey tiles will there be in picture 20?
- d. The following methods were used to calculate the number of white tiles in picture 20.



Dan

I add 5 white tiles for each new picture, so I need 20×5 white tiles. Picture 1 has $5 + 3$ white tiles, so for picture 20: $20 \times 5 + 3$



Adila

There are 8 white tiles in picture 1. I add 5 white tiles for each new picture. For picture 20: I add 19×5 to 8.



Sindi

*I noticed some patterns. There are 3; 5; 7 ... white tiles in the top and bottom rows, and there are 2; 3; 4 ... white tiles in the middle row. The pattern is:
 $3 + 3 + 2$; $5 + 5 + 3$; $7 + 7 + 4$*

Who will get the correct answer? Test all 3 methods.

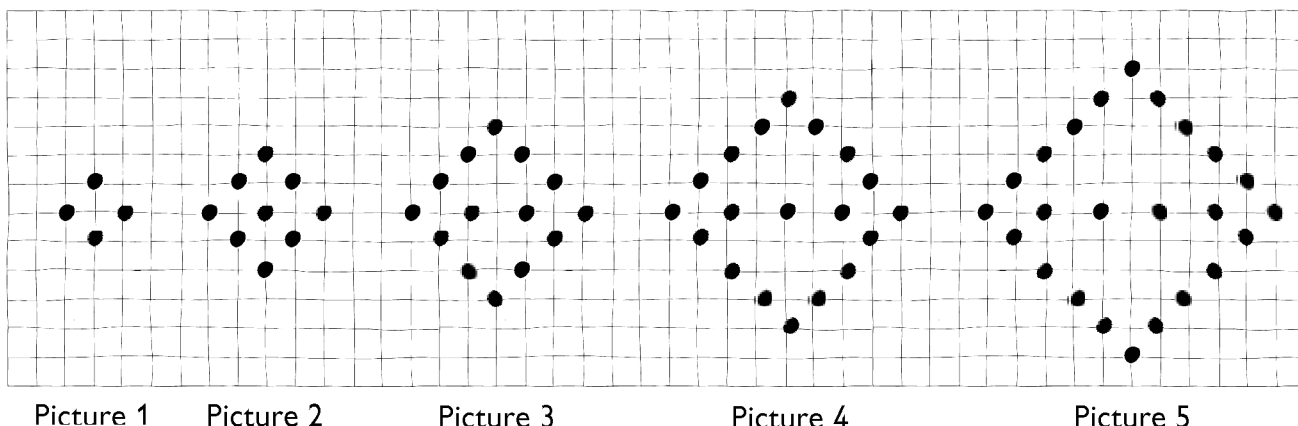
- e. Use the methods that give the correct answer to calculate the number of white tiles in picture 30. Show your working.

Notes:

[illegible]

Activity 3 (Workbook 19 pages 36 and 37)

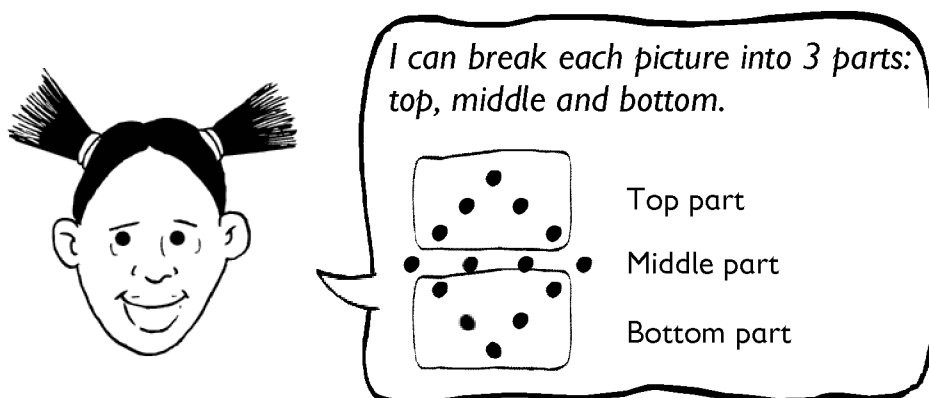
1. Nomsa draws pictures with dots like this. The first 5 pictures make a pattern.



- a. Complete the table.

Picture number	1	2	3	4	5	6	10	20	30	40
Number of dots	4	9	14							

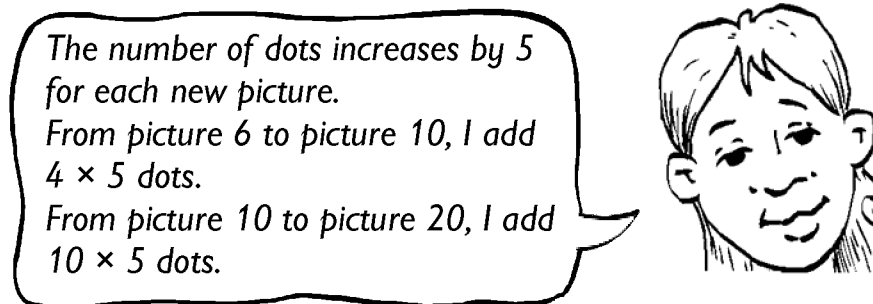
- b. Suzie completed the table by looking for a pattern in the picture.



Suzie writes the pattern that she sees, like this. Complete.

	Number of dots					
Row	Top		Middle		Bottom	
Picture 1	1	+	2	+	1	$= (1 \times 2 - 1) + 2 + (1 \times 2 - 1) = 4$
Picture 2	3	+	3	+	3	$= (2 \times 2 - 1) + 3 + (2 \times 2 - 1) = 9$
Picture 3	5	+	4	+	5	$= (3 \times 2 - 1) + 4 + (3 \times 2 - 1) = \underline{\hspace{1cm}}$
Picture 4	7	+	5	+	7	$= (4 \times 2 - 1) + 5 + (4 \times 2 - 1) = \underline{\hspace{1cm}}$
Picture 5	<u> </u>	+	<u> </u>	+	<u> </u>	$= (\underline{\hspace{1cm}} \times 2 - 1) + \underline{\hspace{1cm}} + (\underline{\hspace{1cm}} \times 2 - 1) = \underline{\hspace{1cm}}$
Picture 10	<u> </u>	+	<u> </u>	+	<u> </u>	$= (\underline{\hspace{1cm}} \times 2 - 1) + \underline{\hspace{1cm}} + (\underline{\hspace{1cm}} \times 2 - 1) = \underline{\hspace{1cm}}$
Picture 20	<u> </u>	+	<u> </u>	+	<u> </u>	$= (\underline{\hspace{1cm}} \times 2 - 1) + \underline{\hspace{1cm}} + (\underline{\hspace{1cm}} \times 2 - 1) = \underline{\hspace{1cm}}$
Picture 30	<u> </u>	+	<u> </u>	+	<u> </u>	$= (\underline{\hspace{1cm}} \times 2 - 1) + \underline{\hspace{1cm}} + (\underline{\hspace{1cm}} \times 2 - 1) = \underline{\hspace{1cm}}$

- c. Maria completes the table by looking for a pattern in the table.



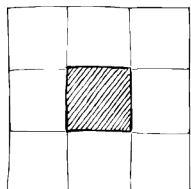
Show how Maria calculated the number of dots in picture 30 and picture 40.

- d. Use Suzie and Maria's methods to calculate the number of dots in picture 50.

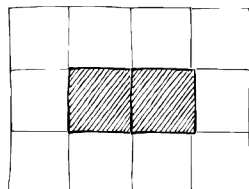
Activity 3 (Workbook 20 pages 18 and 19)

1. White and grey tiles are arranged like this. The arrangements make a pattern.

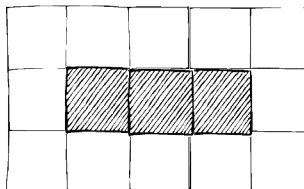
a. Draw the fourth arrangement in the pattern.



Arrangement 1



Arrangement 2



Arrangement 3

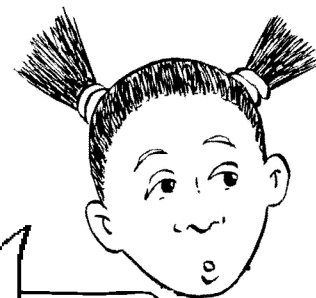
Arrangement 4

b. Complete the table.

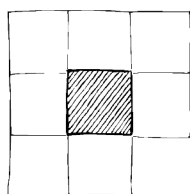
Arrangement number	1	2	3	4	5	6	7	8	9	10
Number of white tiles	8	10								



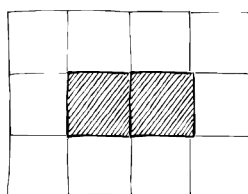
Thandi is calculating the number of white tiles for each arrangement.



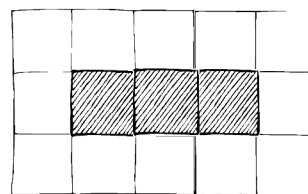
I noticed some patterns. There are 3; 4; 5... white tiles in the bottom and top rows, and there are 2 white tiles in the middle rows.



Arrangement 1



Arrangement 2



Arrangement 3

Top row

Middle row

Bottom row

We can write Thandi's pattern like this:

Number of white tiles

Row	Top		Bottom		Middle	
Arr. 1:	3	+	3	+	2	$= 2 \times 3 + 2 = 8$
Arr. 2:	4	+	4	+	2	$= 2 \times 4 + 2 = 10$

c. Complete.

Arr. 3: 5 + 5 + 2 = _____ = _____

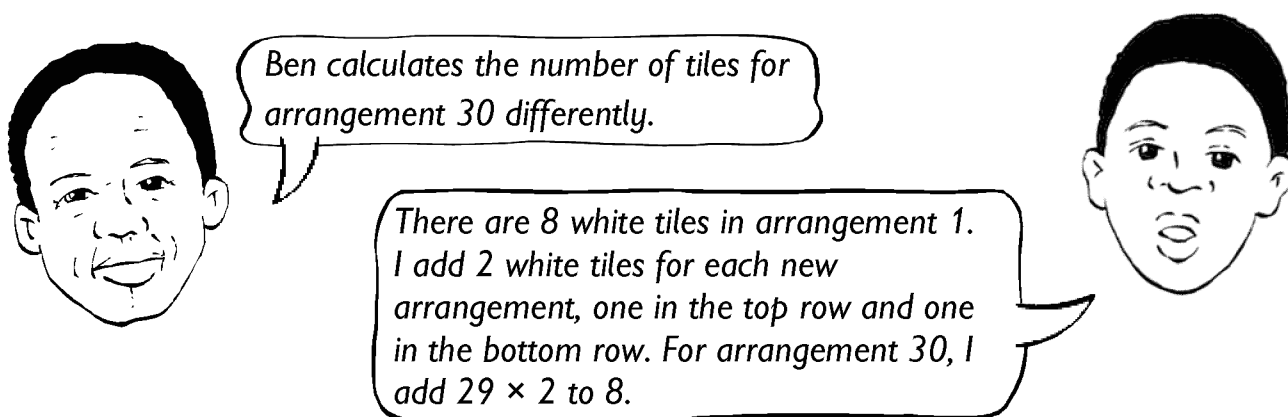
Arr. 4: _____ + _____ + _____ = _____ = _____

Arr. 5: _____ + _____ + _____ = _____ = _____

Arr. 6: _____ + _____ + _____ = _____ = _____

Arr. 10: _____ + _____ + _____ = _____ = _____

d. Use Thandi's method to calculate the number of tiles for arrangement 30.

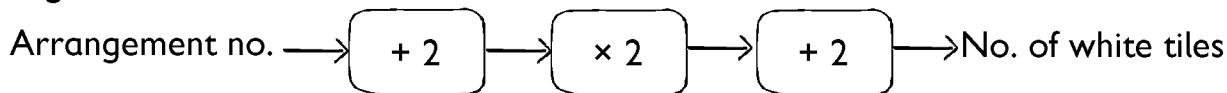


e. Use Ben's method to calculate the number of white tiles in arrangement 30.

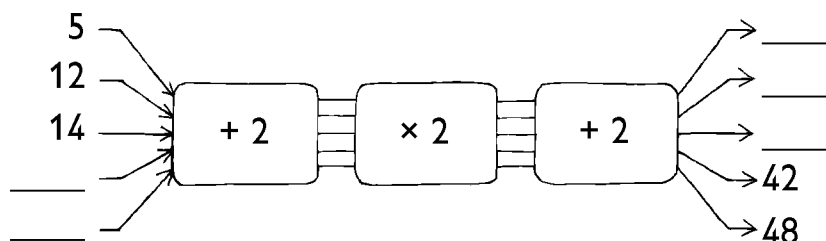
f. Calculate the number of white tiles in arrangement 40 using both Thandi and Ben's methods.

g. Which arrangement number can be made from 30 white tiles? How many grey tiles will be needed?

2. The number of white tiles for each arrangement can be calculated using this flow diagram.



a. Complete.



b. Which arrangement number can be made with 84 tiles? Explain. How many grey tiles will be needed?

Activity 4 (Workbook 21 pages 18 and 19)

Ayanda draws pictures with dots like this. The first three pictures make a pattern.



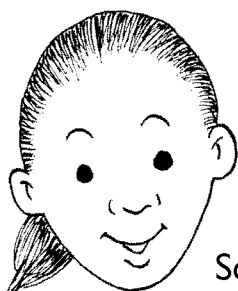
Picture 1 Picture 2 Picture 3 Picture 4 Picture 5

1. Draw the fourth and fifth pictures in the pattern.



The class wants to work out how many dots there will be in picture 100. Look at some of their ways and answer the questions.

- 2.

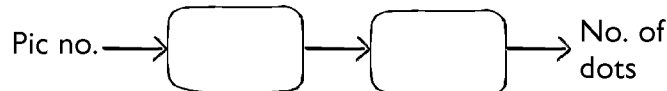


Sally

By now I know that when numbers in the top row of the table increase by one and the numbers in the second row increase by the same amount then I can make a flow diagram to calculate the answer.

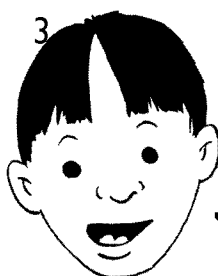
- a. Use Sally's thinking to complete the table and make a flow diagram.

Picture no.	1	2	3	4	5
No. of dots	6	9			



- b. Use the flow diagram to calculate the number of dots in picture 100.

- 3



Abdul

I just look at the pictures and notice three equal groups.



$$3 \times 2$$



$$3 \times 3$$

Use Abdul's method to calculate the number of dots in picture 100.

Picture 1: $3 \times 2 = 6$

Picture 2: $3 \times 3 = 9$

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

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

Picture 100: $3 \times \underline{\quad} = \underline{\quad}$

4.



Xolile

I break up the picture into a top bit and two side bits.



$$4 + 2 \times 1$$



$$5 + 2 \times 2$$

Use Xolile's method to calculate the number of dots in picture 100.

Picture 1: $4 + 2 \times 1 = 6$

Picture 2: $5 + 2 \times 2 = 9$

Picture 3: $\underline{\quad} + 2 \times \underline{\quad} = \underline{\quad}$

Picture 4: $\underline{\quad} + 2 \times \underline{\quad} = \underline{\quad}$

Picture 100: $\underline{\quad} + 2 \times \underline{\quad} = \underline{\quad}$

5.

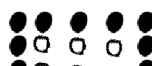


Zoliswa

I fill up the rectangle and compensate.



$$2 \times 4 - 1 \times 2$$



$$3 \times 5 - 2 \times 3$$

Use Zoliswa's method to calculate the number of dots in picture 100.

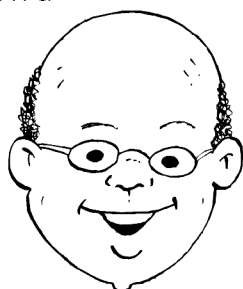
Picture 1: $2 \times 4 - 1 \times 2 = 6$

Picture 2: $3 \times 5 - 2 \times 3 = 9$

Picture 3: $\underline{\quad} \times \underline{\quad} - \underline{\quad} \times \underline{\quad} = \underline{\quad}$

Picture 4: $\underline{\quad} \times \underline{\quad} - \underline{\quad} \times \underline{\quad} = \underline{\quad}$

Picture 100: $\underline{\quad} \times \underline{\quad} - \underline{\quad} \times \underline{\quad} = \underline{\quad}$



Four different ways of calculating and writing their thinking! Different calculations, which result in the same answer, are called equal or equivalent.

6. The different methods for picture 1 are written next to each other. Complete for picture 100.

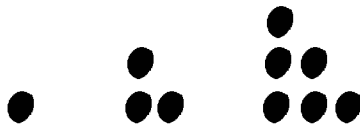
	Sally	Abdul	Xolile	Zoliswa
Picture 1:	$3 \times 1 + 3$	3×2	$4 + 2 \times 1$	$2 \times 4 - 1 \times 2$
Picture 100:				

7. Elsie saw the expressions in each child's method for picture 4 and calculated the answers. Explain why Elsie did not always get the correct answer.

	Sally	Abdul	Xolile	Zoliswa
Picture 4:	$3 \times 4 + 3$	$3 \times 5 = 15$	$7 + 2 \times 4$	$5 \times 7 - 4 \times 5$
	$= 12 + 3$		$= 9 \times 4$	$= 35 - 4 \times 5$
	$= 15$		$= 36$	$= 31 \times 5$
				$= 155$

Activity 5 (Workbook 21 pages 42 and 43)

1. Grace makes pictures with dots like this. The first 3 pictures make a pattern.



Picture 1

Picture 2

Picture 3

Picture 4

Picture 5

Picture 6

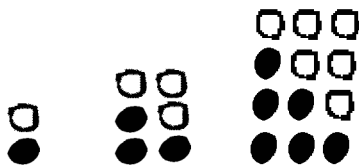
- a. Draw the fourth, fifth and sixth pictures in the pattern.
- b. Complete the table.

Picture number	1	2	3	4	5	6	7	8	9	10
Total number of dots	1	3	6							

- c. Describe, in words, how you completed the table. _____

- d. How many dots will there be in picture 15?

2. Lutho makes pictures with dots like this. The first 3 pictures make a pattern.



Picture 1

Picture 2

Picture 3

Picture 4

Picture 5

Picture 6

- a. Draw the fourth, fifth and sixth pictures in the pattern.
- b. Complete the table.

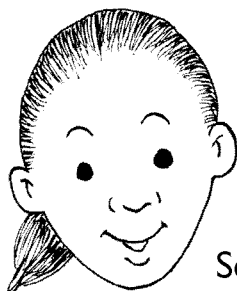
Picture number	1	2	3	4	5	6	7	8	9	10
Total number of dots	2	6	12	20						

- c. Describe, in words, how you completed the table. _____

- d. How many dots will there be altogether in picture 15?



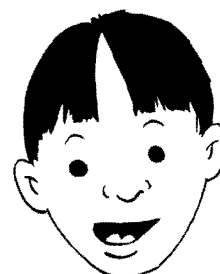
Sally and Abdul are calculating the number of dots needed for each picture in Lutho's pattern.



Sally

I notice that the dots make a rectangle. One side has the same number of dots as the picture number. The other side has one more dot. I write:
picture 2: no. of dots = $2 \times 3 = 6$
picture 3: no. of dots = $3 \times 4 = 12$

I see that each rectangle of dots consists of a row of dots and a square of dots.
picture 2: no. of dots = $2 + 2 \times 2 = 6$
picture 3: no. of dots = $3 + 3 \times 3 = 12$



Abdul

3. Complete.

Grace

Abdul

Picture 1	$_\times_\ = _\$	$_\ + _\times_\ = _\$
Picture 2	$2 \times 3 = 6$	$2 + 2 \times 2 = 6$
Picture 3	$3 \times 4 = 12$	$3 + 3 \times 3 = 12$
Picture 4	$_\times_\ = _\$	$_\ + _\times_\ = _\$
Picture 5	$_\times_\ = _\$	$_\ + _\times_\ = _\$
Picture 10	$_\times_\ = _\$	$_\ + _\times_\ = _\$
Picture 15	$_\times_\ = _\$	$_\ + _\times_\ = _\$
Picture 20	$_\times_\ = _\$	$_\ + _\times_\ = _\$



Here is the same issue again. It is possible to interpret Abdul's expression in different ways, but only one way gives the answer that Abdul wants!

- What does Abdul do when he calculates $3 + 3 \times 3$ to get the answer of 12?
- Use Sally and Abdul's thinking to see if you can work out a rule for calculating the number of dots needed for each picture in Grace's pattern.

Activity 5 (Workbook 22 pages 20 and 21)

1. Anwar makes pictures with square tiles. The first three pictures make a pattern.



Picture 4



Picture 5



a. Draw the fourth and fifth pictures in the pattern.

b. Complete the table and the flow diagram.

Picture no.	1	2	3	4	5
No. of tiles	3	4			



c. What picture number can Anwar make with:

- 15 tiles?
- 81 tiles?
- 27 tiles?

d. Describe how you calculated the answers to c.

2. Suzi makes pictures with matches. The first three pictures make a pattern.



Picture 1

Picture 2

Picture 3

Picture 4

Picture 5

a. Draw the fourth and fifth pictures in the pattern.

b. Complete the table and the flow diagram.

Picture no.	1	2	3	4	5
Matches	3	6			



c. What picture number can Suzi make with:

- 15 matches?
- 81 matches?
- 27 matches?

d. Describe how you calculated the answers to c.

3. Viv makes pictures with matches. The first three pictures make a pattern.



Picture 1

Picture 2

Picture 3

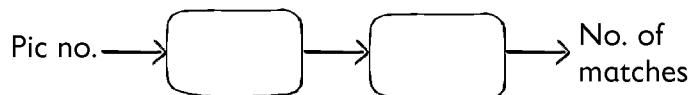
Picture 4

Picture 5

a. Draw the fourth and fifth pictures in the pattern.

b. Complete the table and the flow diagram.

Picture no.	1	2	3	4	5
Matches	3	5			

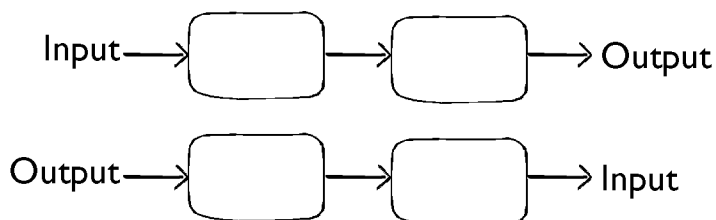
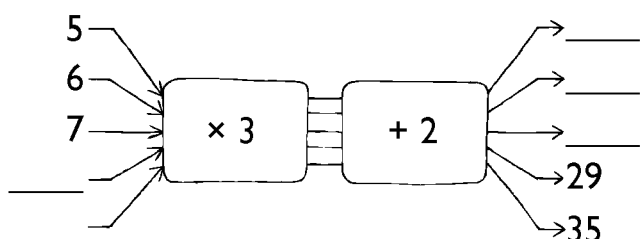
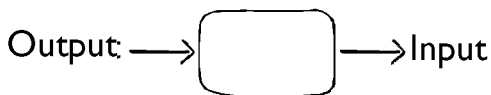
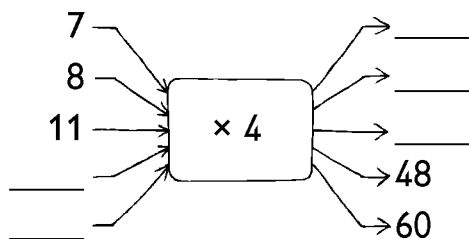
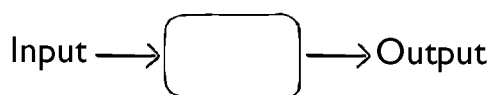
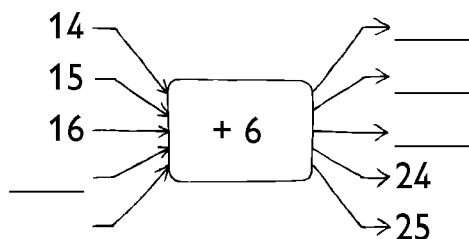


c. What picture number can Viv make with:

- 15 matches?
- 81 matches?
- 27 matches?

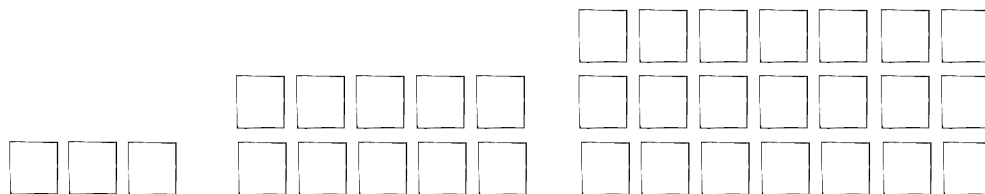
d. Describe how you calculated the answers to c.

4. Complete the flow diagrams.



Activity 6 (Workbook 22 pages 44 and 45)

1. Chris makes pictures with squares like this. The first three pictures make a pattern.



Picture 1

Picture 2

Picture 3

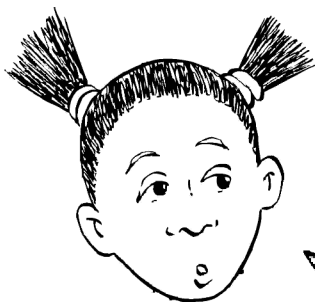
Picture 4

Draw the fourth picture in the pattern.



The class wants to calculate how many squares there will be in picture 10.

2. Use each child's method to calculate the number of squares in picture 10.



Thandi

I multiply the number of rows with the number of squares in each row.

I noticed the 3, 5, 7 pattern in Thandi's method. I think of that as a "plus 2" pattern.



Selwyn

Thandi's method

P1: $1 \times 3 = 3$

P2: $2 \times 5 = 10$

P3: $3 \times 7 = \underline{\hspace{2cm}}$

P4: $\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{2cm}}$

P5: $\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{2cm}}$

P10:

Selwyn's method

P1: $1 \times 3 = 1 \times (2 \times 1 + 1) = 3$

P2: $2 \times 5 = 2 \times (2 \times 2 + 1) = 10$

P3: $3 \times 7 = 3 \times (2 \times 3 + 1) = \underline{\hspace{2cm}}$

P4: $\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

P5: $\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

P10:



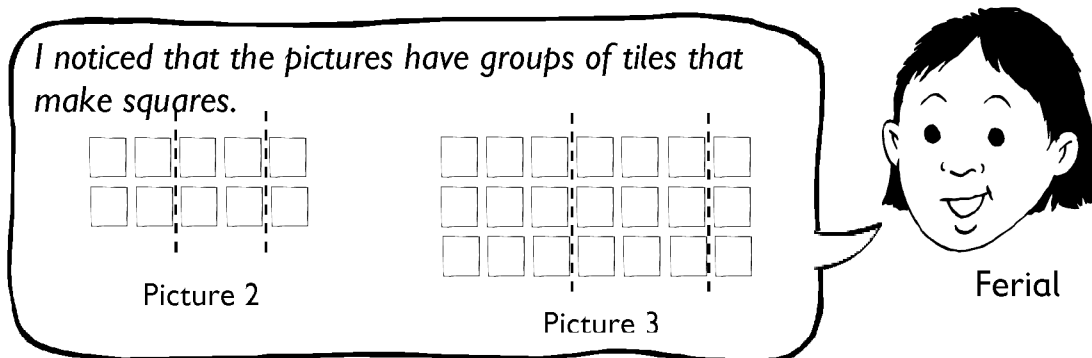
Anwar

I drew a table and noticed a pattern in the difference of the number of squares.

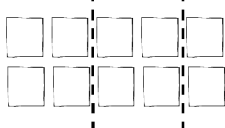
3. Complete Anwar's table to calculate the number of squares in picture 10.

Picture number	1	2	3	4	5	6	7	8	9	10
Number of squares	3	10	21	36						

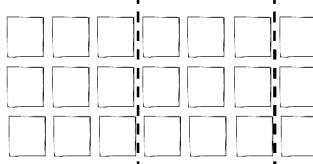
$+7$ $+11$ $+15$ $+$
 $+4$ $+4$ $+4$ $+$



I noticed that the pictures have groups of tiles that make squares.



Picture 2



Picture 3

Ferial

Ferial's method

P1: × + × + =

P2: $2 \times 2 + 2 \times 2 + 2 = 10$

P3: $3 \times 3 + 3 \times 3 + 3 = 21$

P4: × + × + =

P5: _____

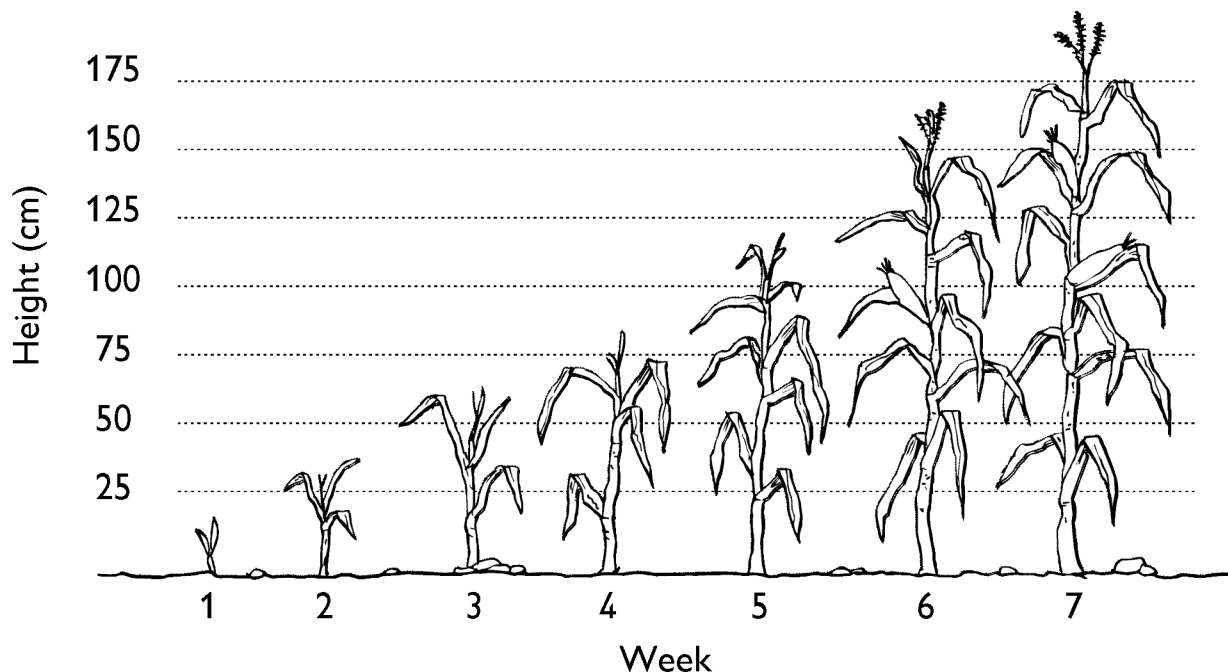
P10:

4. Whose method would be the most useful to calculate the number of squares in picture 100? Explain.
5. Calculate the number of tiles in picture 100.

Graphs

Activity 1 (Workbook 21 page 5)

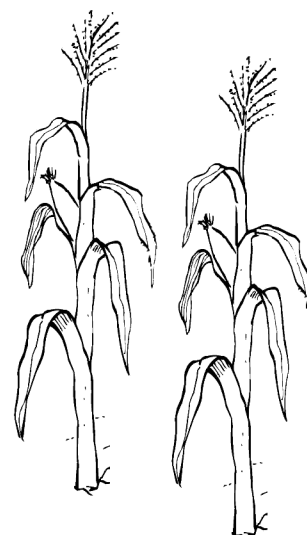
Andy planted a mealie seed for a science project. He took a picture of the plant at the end of each week and made the illustration below.



- Estimate, as carefully as you can, the height of the plant at the end of each week and complete the table.

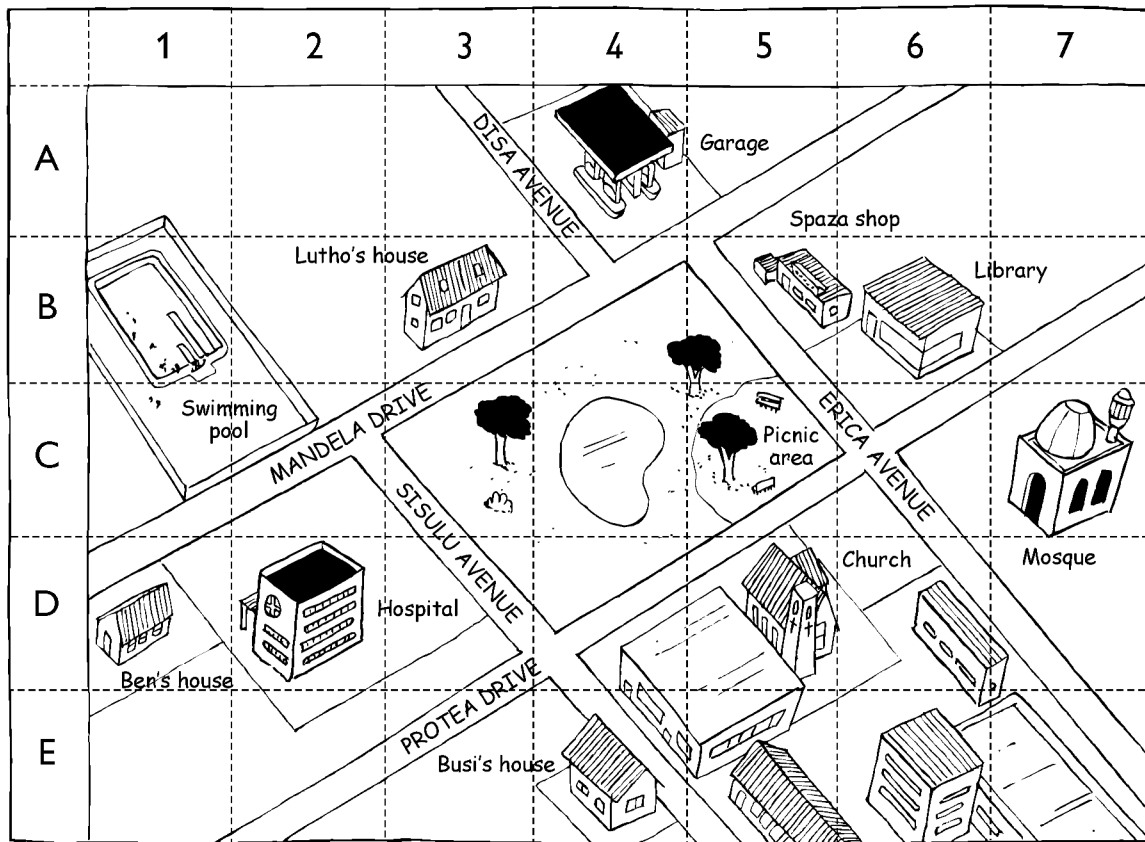
End of the week	1	2	3	4	5	6	7
Height (cm)	20	40					200

- By how much did the plant grow during each week?
 - Week 1: 20 cm
 - Week 2: 20 cm
 - Week 3: _____ cm
 - Week 4: _____ cm
 - Week 5: _____ cm
 - Week 6: _____ cm
 - Week 7: _____ cm
- During which week did the plant grow the most? _____
- During which week did the plant grow the least? _____
- Estimate, as well as you can, when the plant was:
 - 50 cm
 - 100 cm
 - 150 cm



Activity 2 (Workbook 21 page 26)

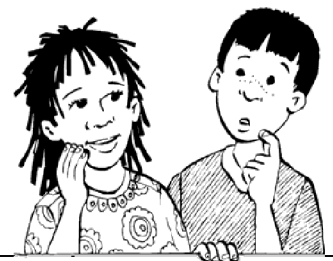
This is a map of the village where Ben lives.



Maps use grids to help us describe positions.

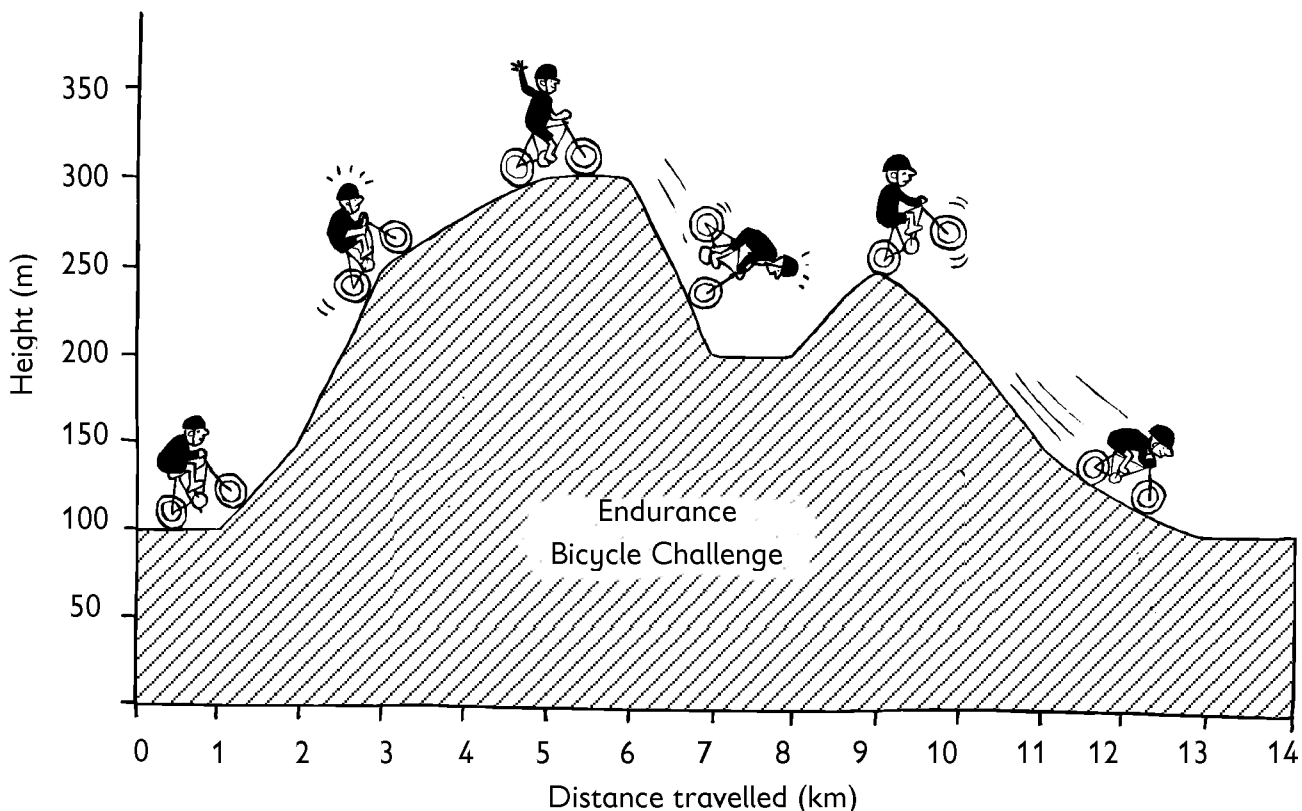
We say that the grid reference for the hospital is D2.

In B5 we find the spaza shop and the intersection of Mandela Drive and Erica Avenue.



- Give the grid references of:
 - The church _____
 - The mosque _____
 - The swimming pool _____
 - Busi's house _____
- Describe what is found in:
 - B3 _____
 - A4 _____
 - D1 _____
 - C5 _____
- Describe which roads you would use to:
 - Walk from Busi's house to the library. _____
 - Walk from the swimming pool to the picnic area. _____
- Ben leaves the church and turns left onto Protea Drive. At the intersection with Sisulu Avenue he turns right. Where is Ben most likely going?

Activity 3 (Workbook 21 page 27)



1. What is the height (above sea level) of the route at:
 - a. 1 km?
 - b. 3 km?
 - c. 5 km?
 - d. 9 km?
2. After how many km is the route:
 - a. 150 m above sea level?
 - b. 200 m above sea level?
 - c. 250 m above sea level?
 - d. 300 m above sea level?
3. After how many km do you reach the highest point? How high is it?
4.
 - a. How many metres do you go up as you travel from the 1 km to the 2 km mark?
 - b. How many metres do you go up as you travel from the 2 km to the 3 km mark?
 - c. How many metres do you go up as you travel from the 3 km to the 5 km mark?
 - d. Which one of these sections is the steepest? Justify.
5.
 - a. How many metres do you go down from the 9 km to the 11 km mark? _____
 - b. How many metres do you go down from the 11 km to the 13 km mark? _____
 - c. Which one of these sections is the steepest? Justify.



Activity 2 (Workbook 22 page 36)

Ayanda draws pictures with dots like this. The first three pictures make a pattern.

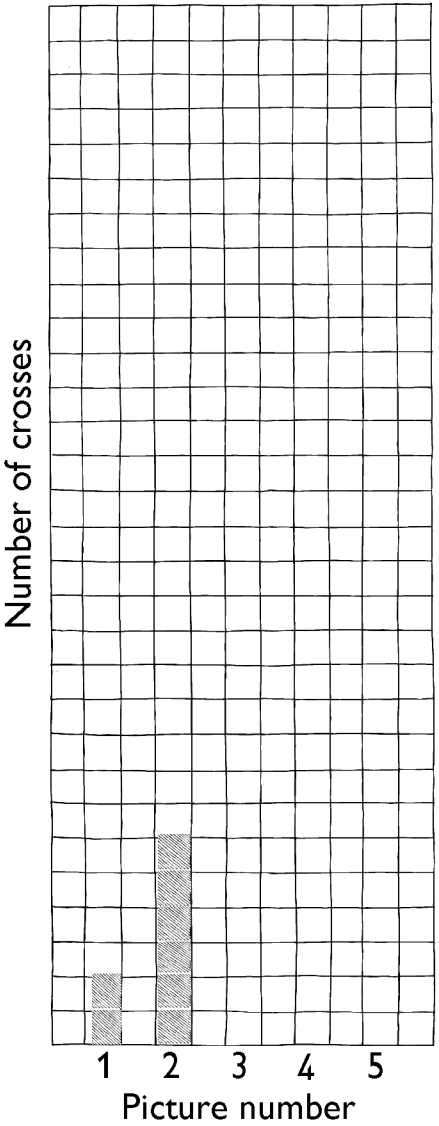
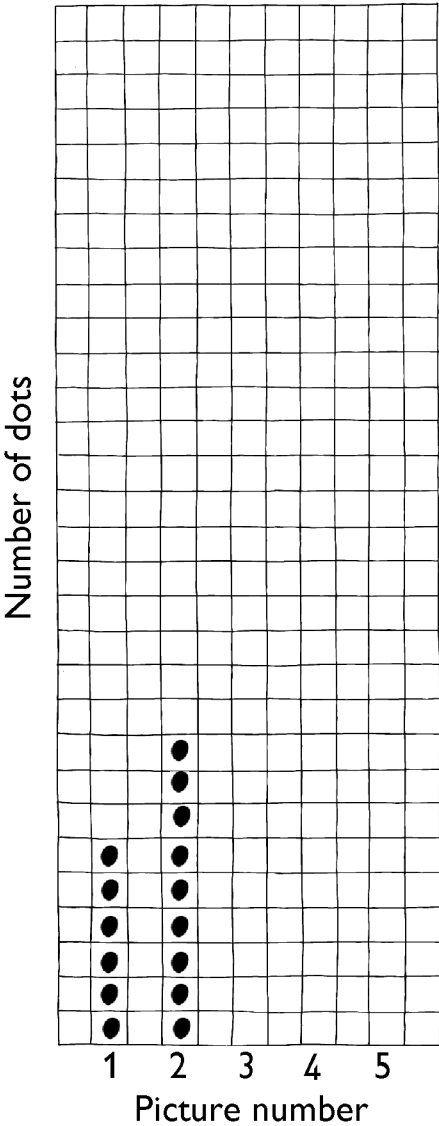


- Picture 1
- Picture 2
- Picture 3
- Picture 4
- Picture 5
1. Draw the fourth and fifth pictures.
 2. Complete the table.

Picture number	1	2	3	4	5	6	7	8	9	10
Number of dots	6	9	12							
Number of crosses	2	6	12							

3. Complete each graph.

Carla is drawing a graph to show the number of dots in each picture.
Danny is drawing a graph to represent the number of crosses in each picture.



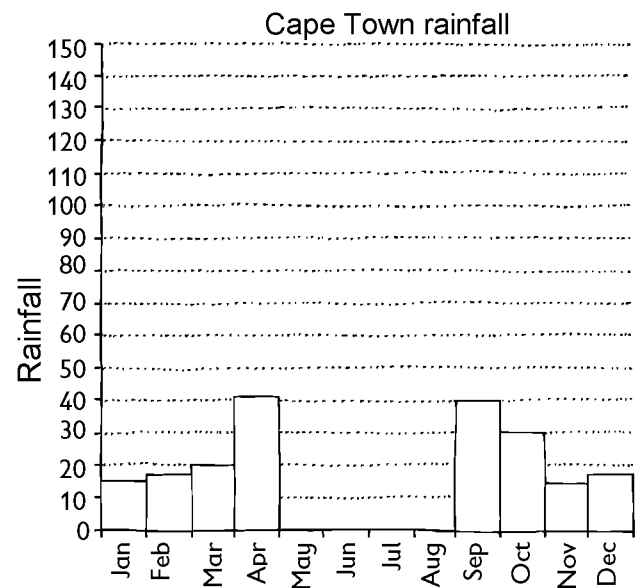
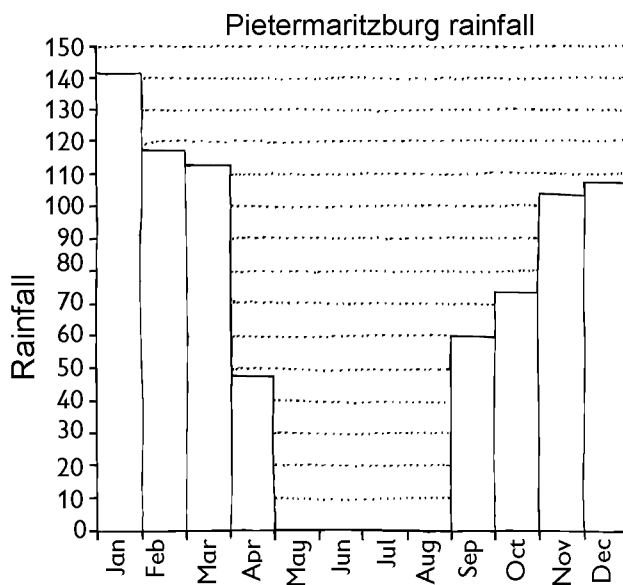
4. What is similar and what is different between the two graphs? Discuss.

Activity 3 (Workbook 23 page 3)

The typical monthly rainfall for Pietermaritzburg and Cape Town are summarised in the table and the graphs. Both the table and the graphs are missing information.

- Use the graphs to complete the table and the table to complete the graphs.

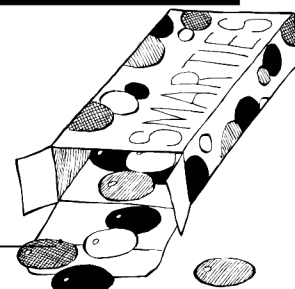
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pietermaritzburg rainfall (mm)	141	117	113	48	24	13	11	31				
Cape Town rainfall (mm)	15	17	20	41	69	93	82	77				



- Calculate the total typical yearly rainfall for each city.
 - Pietermaritzburg
 - Cape Town
- Describe the yearly rainfall pattern for each city.
 - Pietermaritzburg
 - Cape Town
- What is similar and what is different between the rainfall patterns for the two cities?
- Explain the rainfall pattern for each city in terms of the seasons of the year.
 - Pietermaritzburg
 - Cape Town

Activity 4 (Workbook 23 page 15)

A box of Smarties has 24 Smarties in it.



1. Complete.

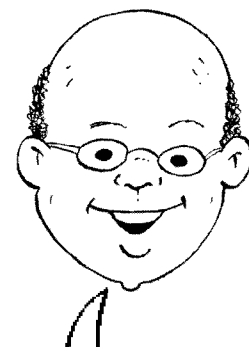
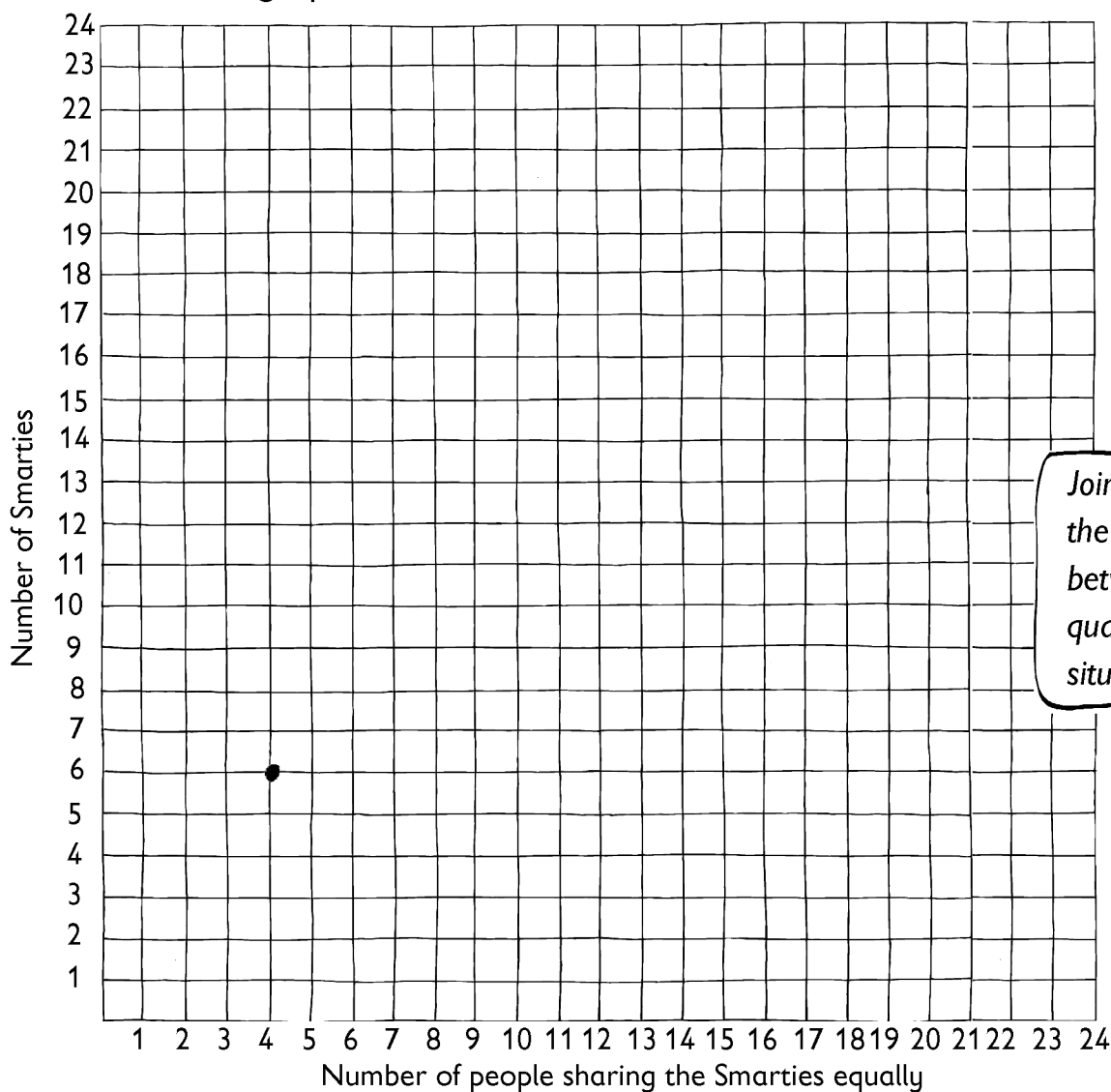
If two people share the box equally, they will each get _____.

If three people share the box equally, they will each get _____.

2. Complete the table with all the possibilities that do not involve breaking the Smarties.

No. of people sharing	1	2	3	4				
No. of Smarties				6				

3. Draw a graph of the values in the table.



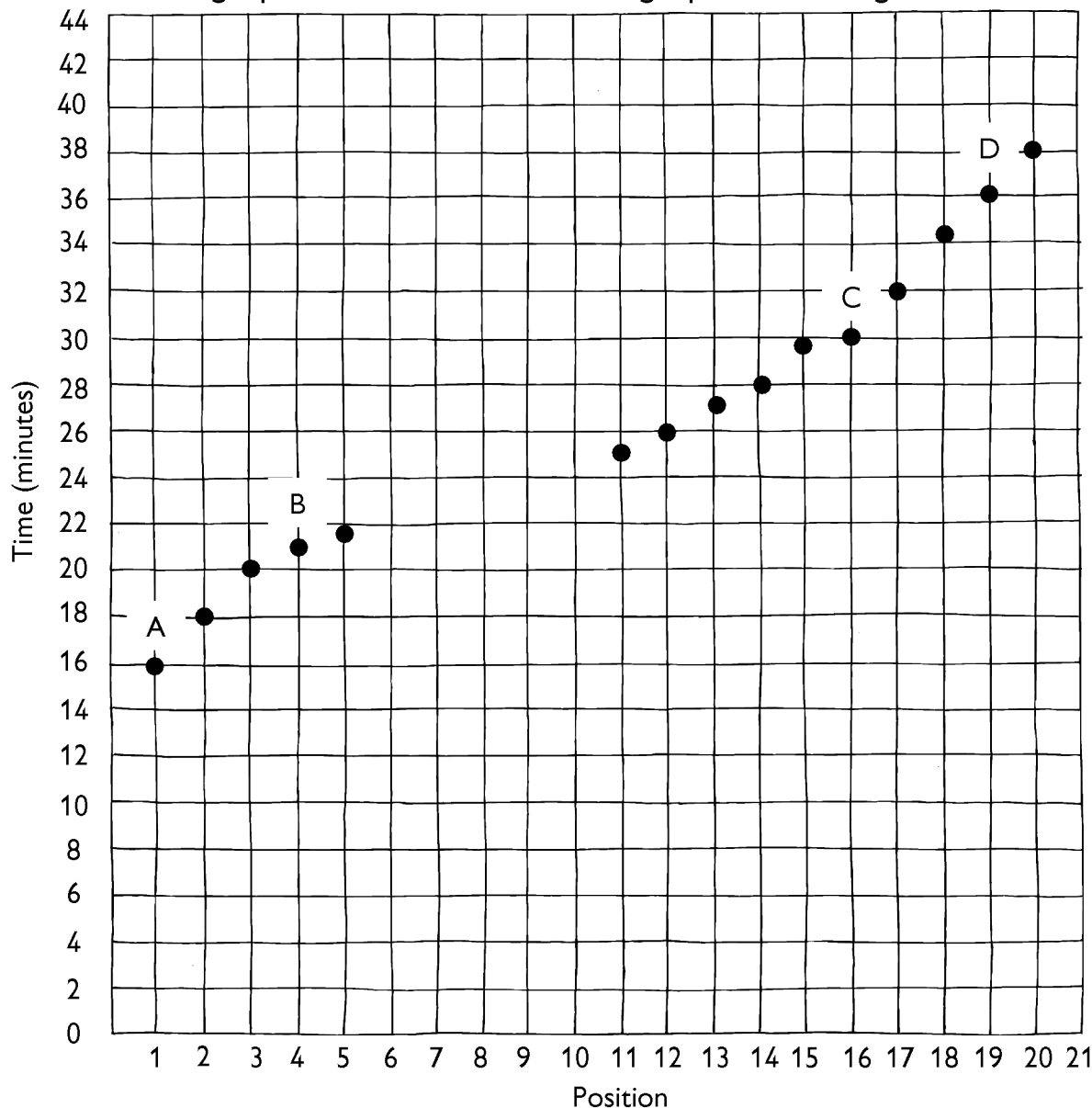
Join the points to see the relationship between the two quantities in the situation more clearly.

4. Describe the relationship in the situation by completing the sentence.

As the number of people sharing the Smarties _____, so the number of Smarties that each one gets _____.

Activity 5 (Workbook 23 page 25)

The results of the 5 km cross country race for Ms Adam's class are summarised in the table and graph. Both the table and the graph are missing information.



Name	Pos	Time (min)
Adam	6	22
Andile	8	23
Ann	9	23,5
Bernard		28
Bongani	15	
Busi		30
Conrad	19	
Dean	13	
Dudu	10	24
Fikile		34,5
Jabulani	4	21
Kholeka	5	21,5
Khulani	11	25
Lindiwe	7	22,5
Leon	12	
Mandisa	1	16
Nombeko	3	20
Thandi	17	32
Stacey		38
Steven	21	42
Vernon	2	18

- Use the graph to complete the table and use the table to complete the graph.
- Who is represented by:
A? B? C? D?
- How many people finished the race in:
 - 20 minutes or less?
 - 30 min or less but more than 20 min?
 - 40 min or less but more than 30 min?
 - More than 40 min?
- Calculate the pace in minutes per kilometer for:
Busi Lindiwe Nombeko



Notes:

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting or typing. There are no margins, text, or other markings on the page.

Activity 5 (Workbook 23 page 32)

Three children each have a money tin.

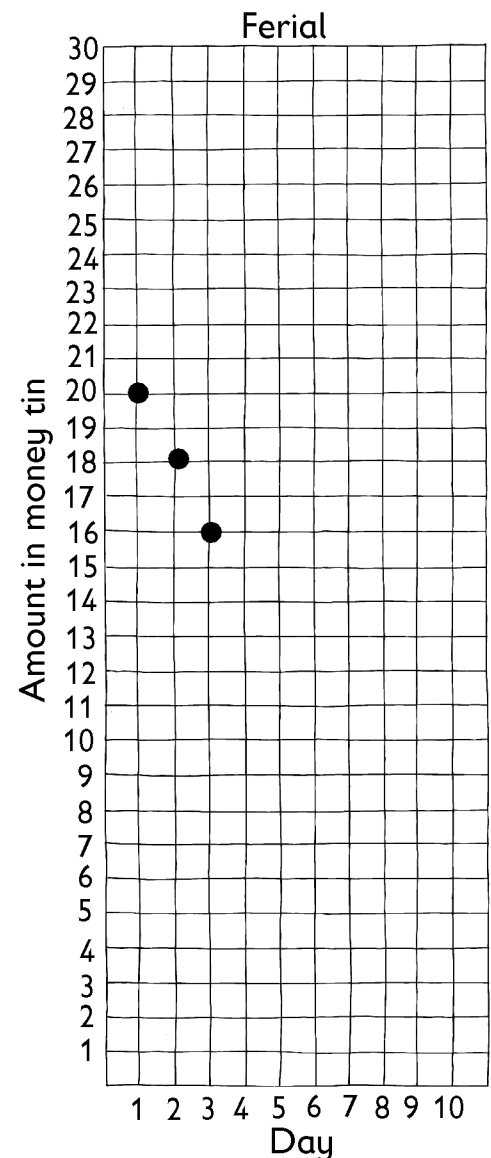
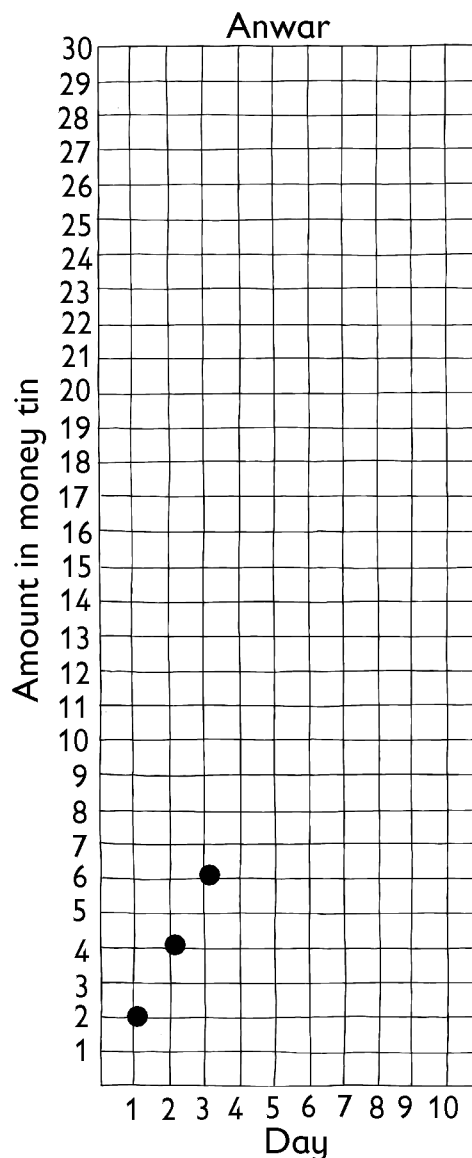
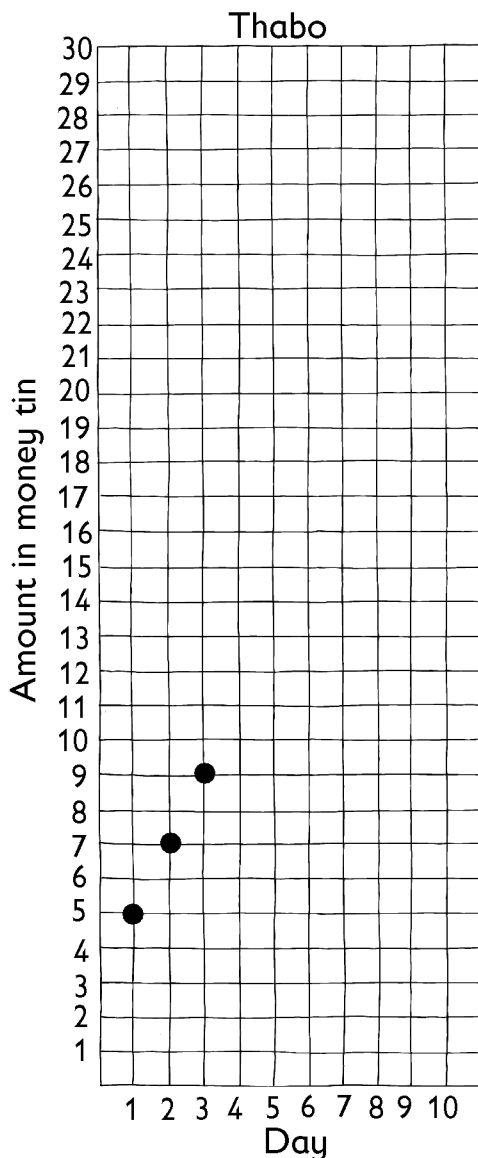


- Thabo puts R5 into his tin on the first day and adds another R2 every day after that.
- Anwar puts R2 into his tin on the first day and adds another R2 every day after that.
- Ferial puts R20 into her tin on the first day and takes out R2 every day after that.

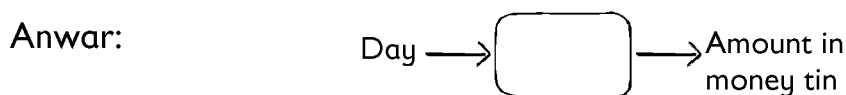
1. Complete the table for each child to show the amount in their tin on each day.

Day	1	2	3	4	5	6	7	8	9	10
Amount (Thabo)	5	7	9							
Amount (Anwar)	2	4	6							
Amount (Ferial)	20	18	16							

2. Complete the graph for each child.



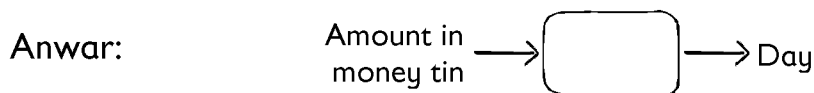
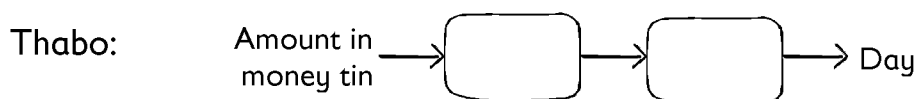
3. What is similar and what is different between the three graphs? Discuss.
4. a. Create flow diagrams to calculate the amount of money in Thabo and Anwar's money tins.



- b. What is similar and what is different between the two flow diagrams? Discuss.
- c. Use the flow diagrams to complete the table.

Day	20	25	30	37	55
Amount (Thabo)					
Amount (Anwar)					

5. a. Create flow diagrams to calculate the day on which Thabo and Anwar have a particular amount of money in their money tins.



- b. What is similar and what is different between the two flow diagrams? Compare these flow diagrams with those in question 4.
- c. Use the flow diagrams to complete the tables.

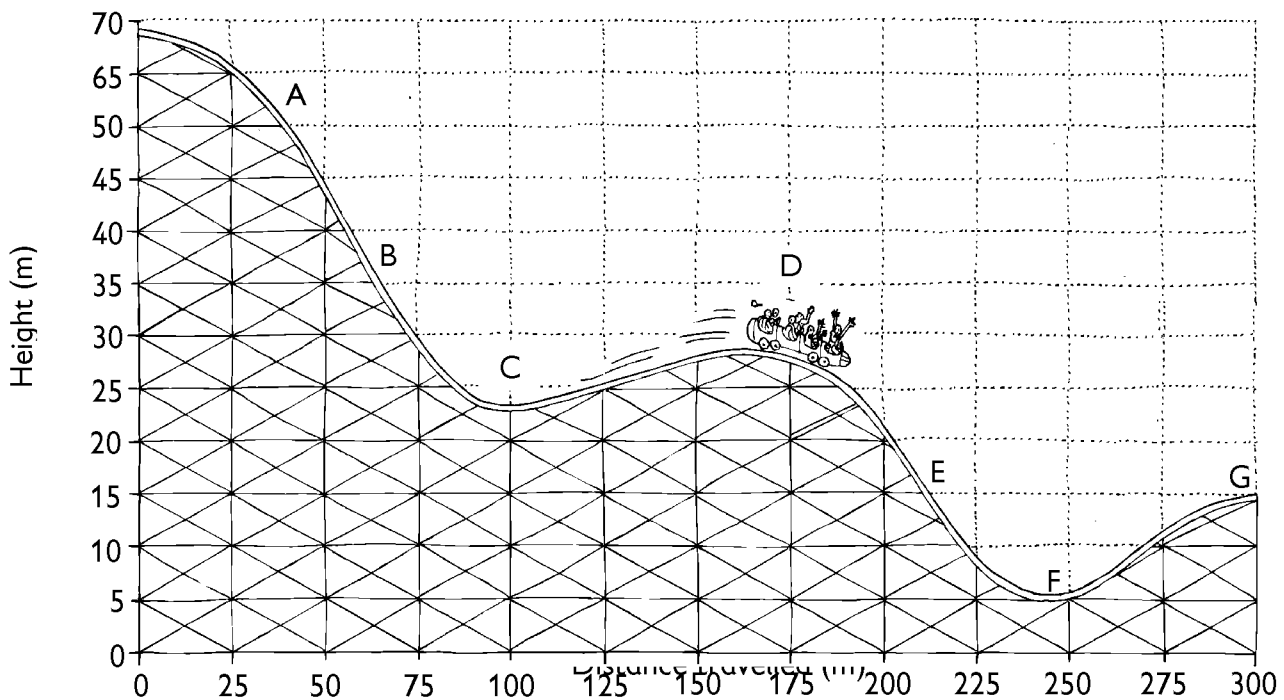
Amount	33	47	61	85	127
Day (Thabo)					

Amount	30	44	58	88	130
Day (Anwar)					

6. Describe in words what is happening to the amount of money in Ferial's money tin.
7. If Ferial put R60 into her tin on the first day and took out R2 each day after that, calculate on what day there will be R28 left in her tin.

Activity 6 (Workbook 23 page 39)

The rollercoaster ride



- What is the height of the roller coaster at:
 - The start of the ride?
 - 25 m?
 - 100 m?
 - The end of the ride?
- Find the distance travelled at the following heights:
 - 30 m
 - 25 m
 - 15 m
 - 10 m
- In which sections of the ride is the roller coaster:
 - Going up?
 - Going down?
- At which point is the roller coaster travelling faster:
 - A, B or C? Explain.
 - C or D? Explain.
 - D, E or F? Explain.
 - F or G? Explain.



I see that there is more than one answer for some of the questions.



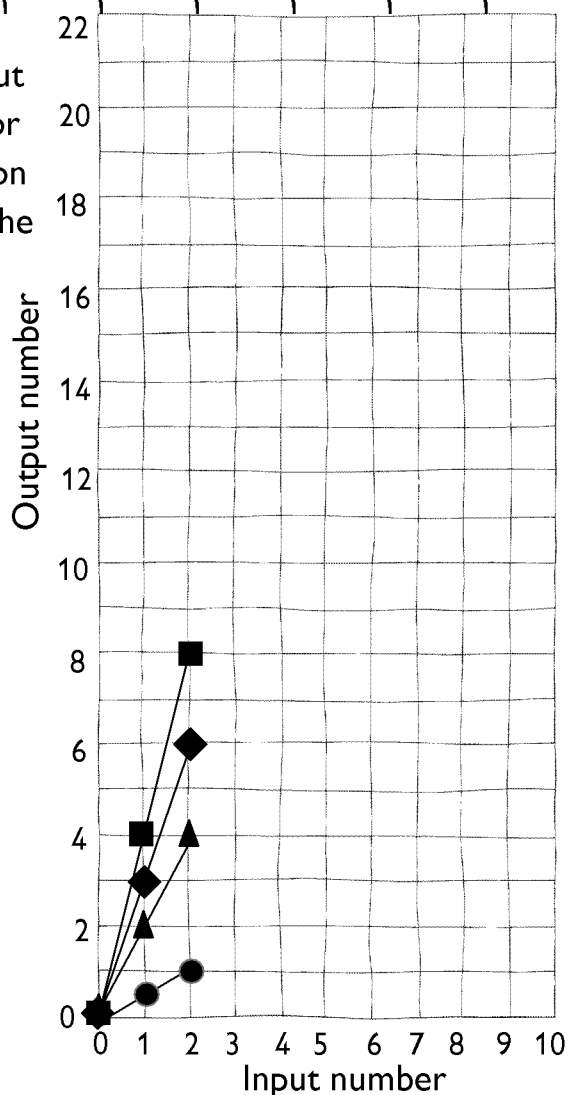
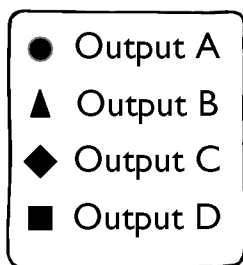
Activity 5 (Workbook 23 page 40)

A. Input \longrightarrow Halve \longrightarrow OutputC. Input \longrightarrow $\times 3$ \longrightarrow OutputB. Input \longrightarrow $\times 2$ \longrightarrow OutputD. Input \longrightarrow $\times 4$ \longrightarrow Output

1. Use the flow diagrams to complete the table.

Input no.	0	1	2	3	4	5	6	7	8	9	10
Output A	0	$\frac{1}{2}$	1	$1\frac{1}{2}$							
Output B	0	2	4								
Output C	0	3	6								
Output D	0	4	8								

2. Plot the pairs of input and output values for each flow diagram on the graph and join the marks as shown.



By joining the marks of each set of values you can observe the relationship between the input and output numbers more easily.



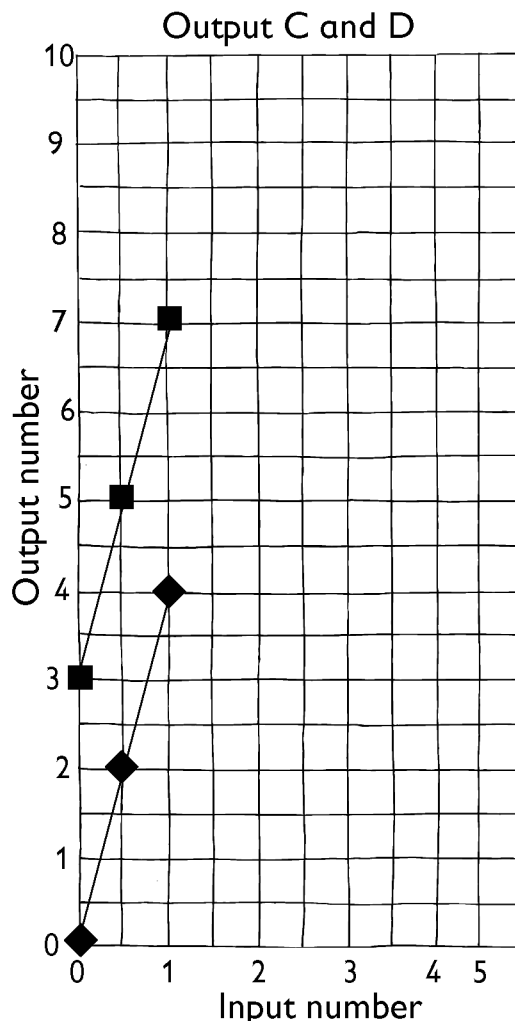
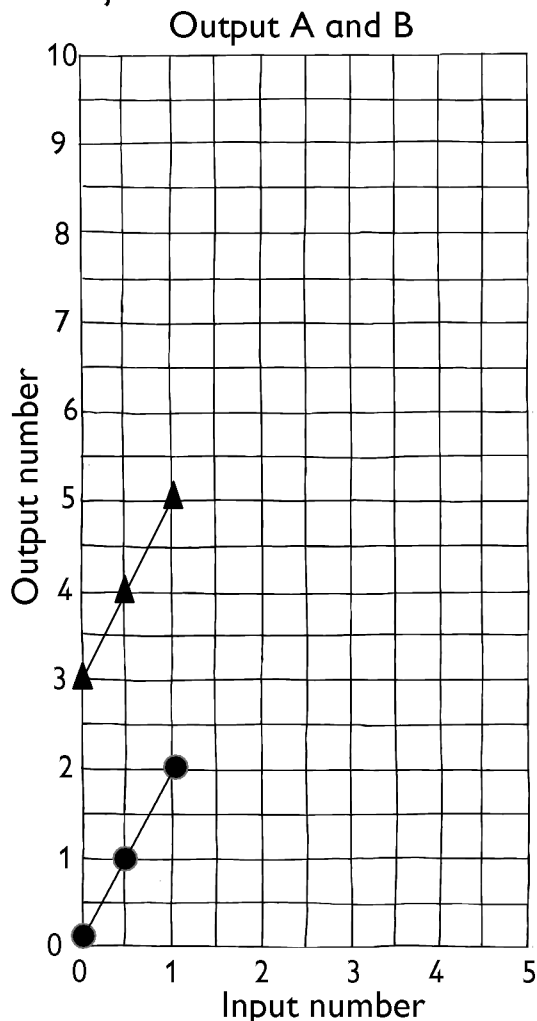
3. What is similar and what is different between:
- The four flow diagrams? Discuss.
 - The output values for each of the flow diagrams represented in the table? Discuss.
 - The four graphs? Discuss.

Activity 6 (Workbook 24 pages 8 & 9)

A. Input \rightarrow $\times 2$ \rightarrow $+ 0$ \rightarrow OutputC. Input \rightarrow $\times 4$ \rightarrow $+ 0$ \rightarrow OutputB. Input \rightarrow $\times 2$ \rightarrow $+ 3$ \rightarrow OutputD. Input \rightarrow $\times 4$ \rightarrow $+ 3$ \rightarrow Output

Input no.	0	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5
Output A	0	1	2	3							
Output B	3	4	5								
Output C	0	2	4								
Output D	3	5	7								

- Use the flow diagrams to complete the table.
- Plot the pairs of input and output values for each flow diagram on the graph and join the marks as shown.

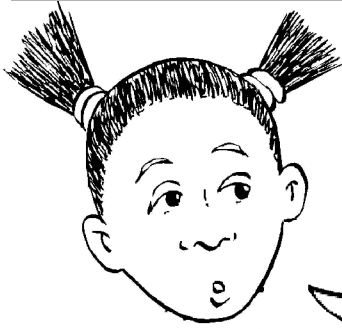


- Output A
- ▲ Output B
- ◆ Output C
- Output D

By joining the marks of each set of values you can observe the relationship between the input and output numbers more easily.



- What is similar and what is different between – discuss in each case:
 - The flow diagrams?
 - The graphs for output A and output B?
 - The graphs for output C and output D?
 - All four graphs? Discuss.



Thandi

Looking at the graphs I notice:

- If the multipliers in the flow diagram are the same, then the graphs are parallel.
- If the multipliers in the flow diagram are different, then the bigger the multiplier the steeper the graph.



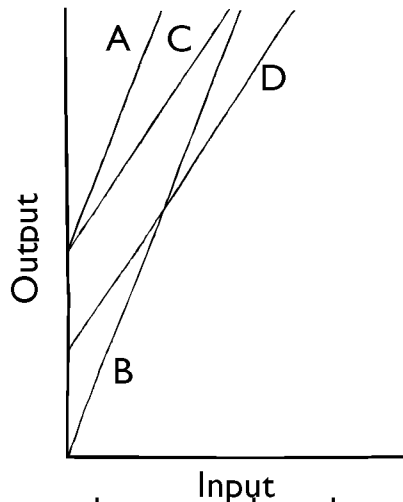
Selwyn

I notice that the number that gets added changes how high up the graph is.

4. Is Thandi correct? Explain.

5. Is Selwyn correct? Explain.

6. Match the flow diagram to the graph.



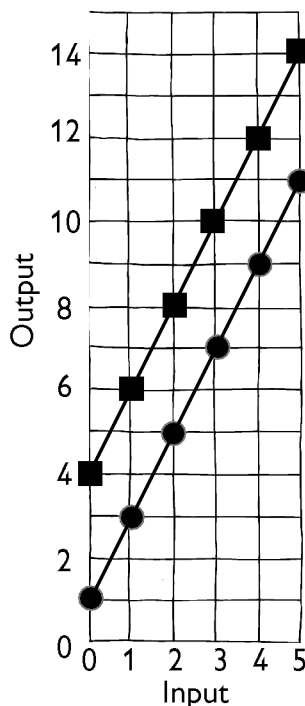
☐ Input \rightarrow $\times 3$ \rightarrow $+ 2$ \rightarrow Output

☐ Input \rightarrow $\times 3$ \rightarrow $+ 4$ \rightarrow Output

☐ Input \rightarrow $\times 5$ \rightarrow $+ 0$ \rightarrow Output

☐ Input \rightarrow $\times 5$ \rightarrow $+ 4$ \rightarrow Output

7. Use the graph to complete the table and the flow diagrams.



● Output A
■ Output B

Input no.	0	1	2	3	4	5
Output A	1	3				
Output B	4	6				

A. Input \rightarrow \rightarrow \rightarrow Output

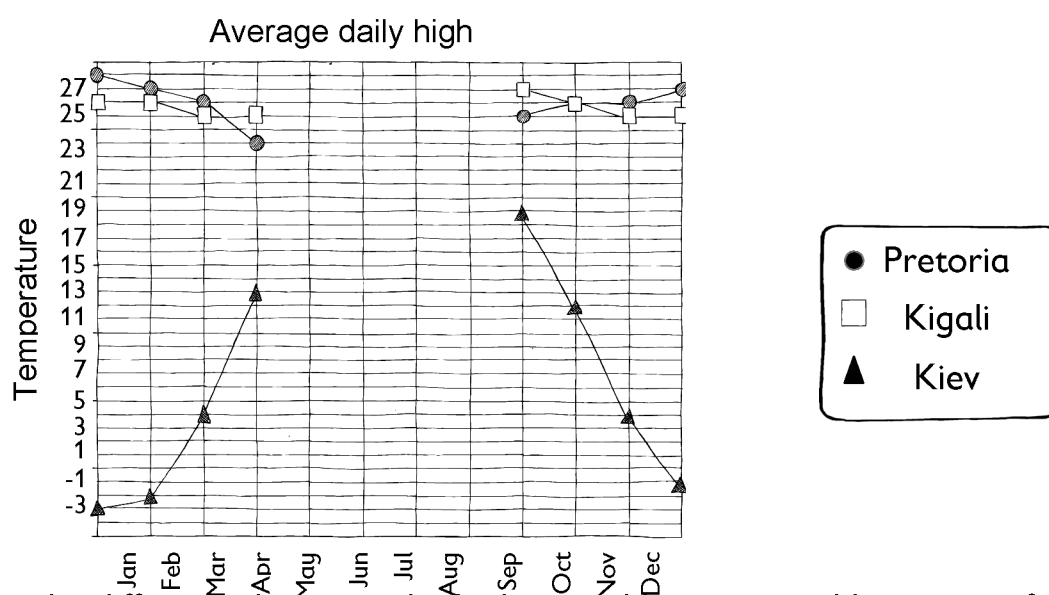
B. Input \rightarrow \rightarrow \rightarrow Output

Activity 7 (Workbook 24 page 12)

The monthly averages for the “daily high temperature” have been calculated for Pretoria (South Africa); Kigali (Rwanda) and Kiev (Ukraine). They are summarised in the table and the graph. Both the table and the graph are missing information.

1. Use the graph to complete the table and the table to complete the graph.

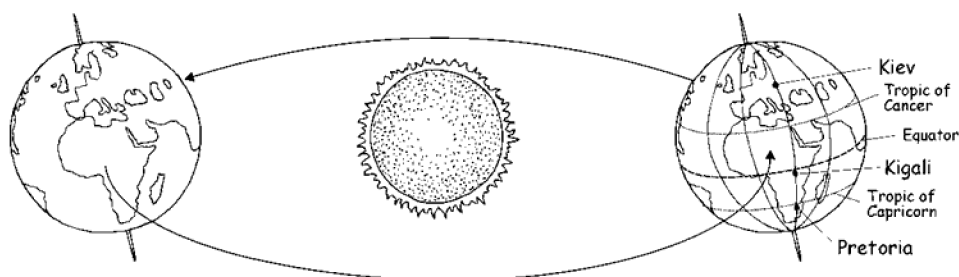
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pretoria Temperature (°C)	29	28	27	24	22	19	20	22				
Kigali Temperature (°C)	27	27	26	26	26	26	27	28				
Kiev Temperature (°C)	-3	-2	4	13	20	24	25	24				



2. Calculate the difference between the highest and lowest monthly average for each city.

- Pretoria
- Kigali
- Kiev

3. Refer to the sketch of the world.



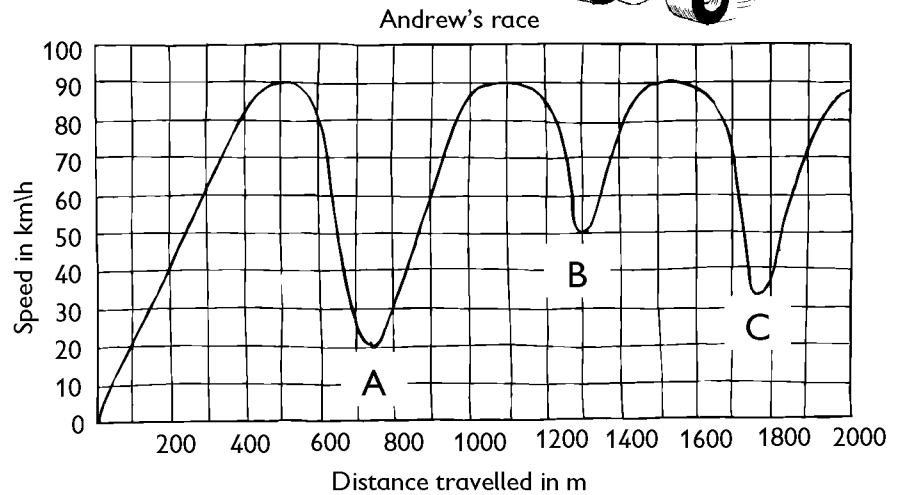
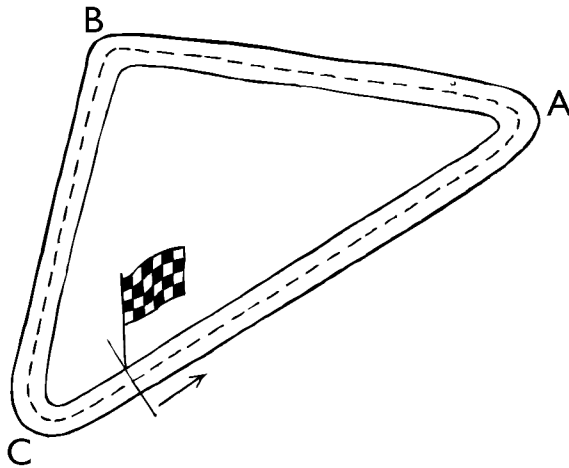
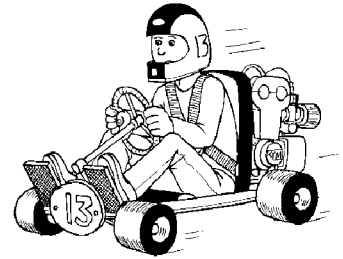
- Which city is closest to the equator?
 - Which city is furthest from the equator?
4. Is there a relationship between the distance from the equator and the difference between the highest and lowest monthly average for each city? Discuss.
5. Explain Ferial's observation. Think about the orbit of the earth and the seasons in each city.

I notice that Pretoria's temperature is highest when Kiev's is lowest and Kiev's is lowest when Pretoria's is highest.



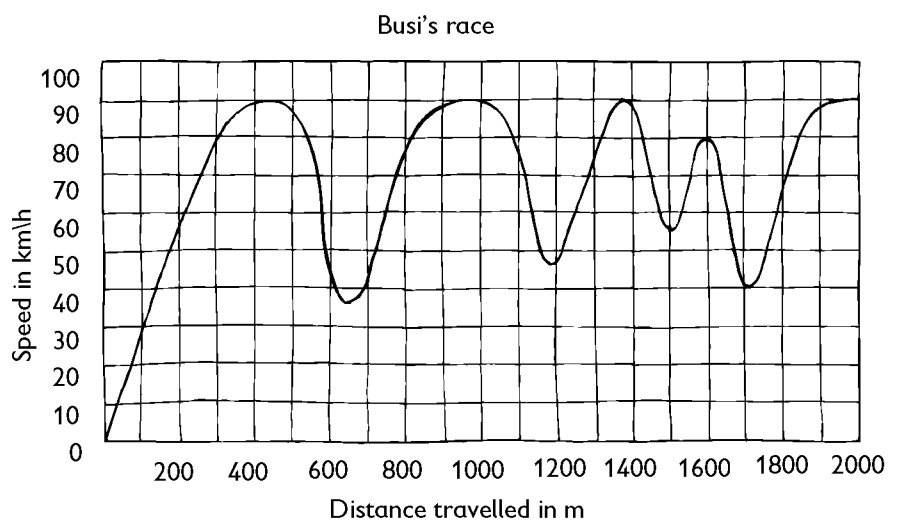
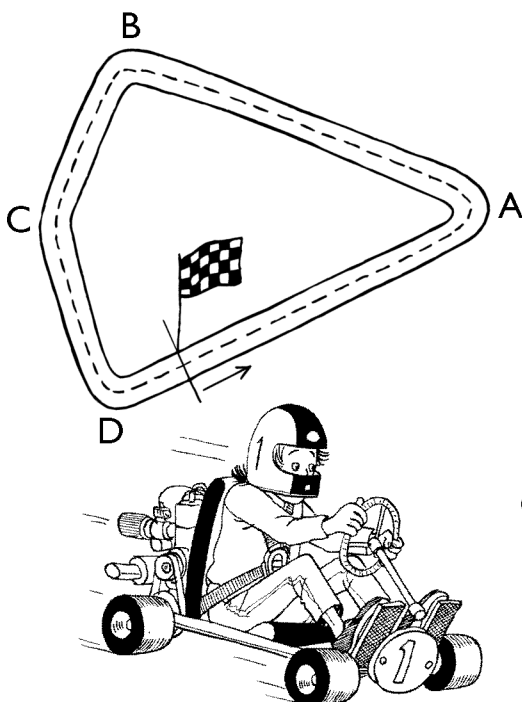
Activity 8 (Workbook 24 page 36)

1. Andrew's speed as he travels around a race track is summarised by the graph. The corners of the race track are marked A, B and C. Andrew's distance and speed at each corner can be read off the graph using the points A, B and C.



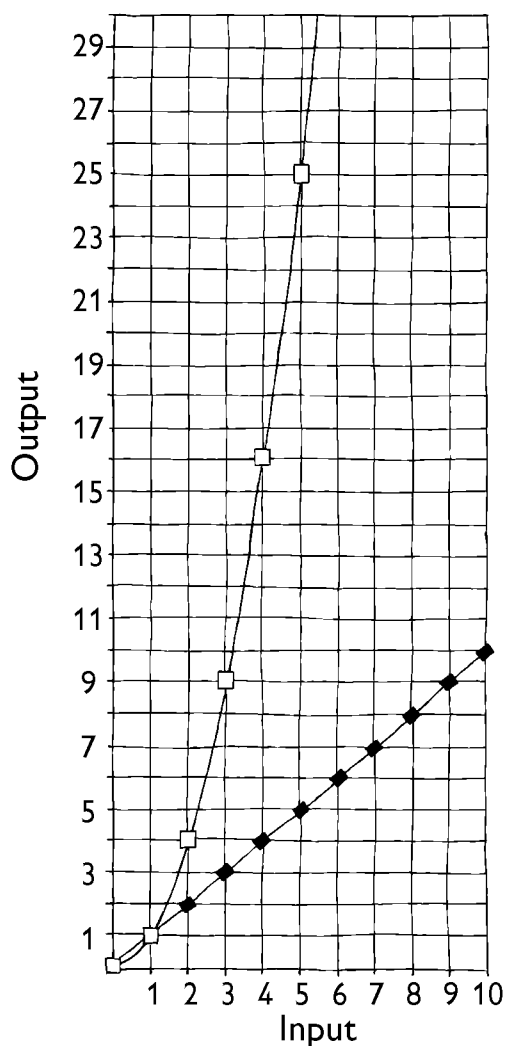
- a. How fast is Andrew's travelling at each corner?
 - A. _____
 - B. _____
 - C. _____
- b. In which corner is Andrew's travelling fastest and in which corner is he travelling slowest?
- c. Explain Andrew's speed in each corner of the track in terms of the shape of the track.

2. Busi's speed as she travels around a race track is summarised by the graph.



- a. Add the points A, B, C and D to the graph to show Busi's distance travelled and speed in each corner.
- b. Explain Busi's speed in each corner of the track in terms of the shape of the track.

Activity 9 (Workbook 24 page 39)



The graphs of the two different relationships are drawn.

1. Complete the tables for each relationship.

Relationship A ●

Input	1	2	3	4	5	6
Output	1	2				

Relationship B □

Input	1	2	3	4	5	6
Output	1	4				

2. Which relationship is summarised by each rule (\square = input number)?

Rule 1: output = $\square \times \square$

Rule 2: output = \square

3. Use the appropriate rule to complete the table.

Input	10	20	30	50	100	200
Output A						
Output B						

4. Discuss the shape, table values, rule and graph of relationship A.
5. Discuss the shape, table values, rule and graph of relationship B.
6. What is the same and what is different between the two relationships? Discuss.

Notes:

[illegible]

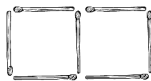
Equations

Activity 1 (Workbook 23 pages 8 and 9)

1. Tim makes pictures with matches. The first three pictures make a pattern.



Picture 1



Picture 2



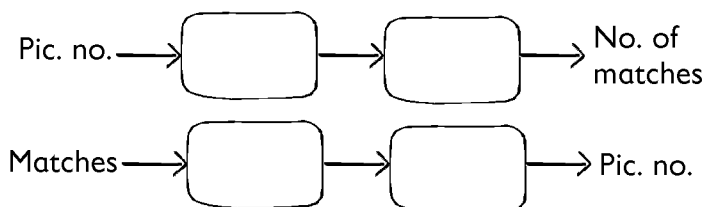
Picture 3

Picture 4

Picture 5

- Draw the fourth and fifth pictures in the pattern.
- Complete the table and the flow diagrams.

Picture no.	1	2	3	4	5
Matches	4	7			



We say that there exists a **relationship** between the picture number and the number of matches. As the picture number changes so does the number of matches. As the number of matches changes, so does the number of the picture that can be made. The pictures, table and flow diagrams all represent the relationship in different ways.

The relationship can also be represented by a **formula** or **rule**:

$$\text{picture no.} \times 3 + 1 = \text{no. of matches}$$

When we want to calculate the number of matches for a particular picture, we replace “picture no.” with the picture number.

e.g. For picture 5 we get: $5 \times 3 + 1 = \text{no. of matches}$

A shorter way of writing this is: $5 \times 3 + 1 = \square$

When we want to calculate which picture no. can be made with a given number of matches, we replace “no. of matches” with the given number of matches.

e.g. To calculate which picture number can be made with 28 matches we get:

$$\text{picture no.} \times 3 + 1 = 28. \text{ A shorter way of writing this is: } \square \times 3 + 1 = 28$$

$$5 \times 3 + 1 = \square \text{ and } \square \times 3 + 1 = 28 \text{ are known as **equations**.}$$

Calculating the value of the unknown number, \square , is referred to as **solving the equation**.

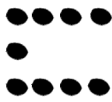
2. Buli makes pictures with dots. The first three pictures make a pattern.



Picture 1



Picture 2



Picture 3

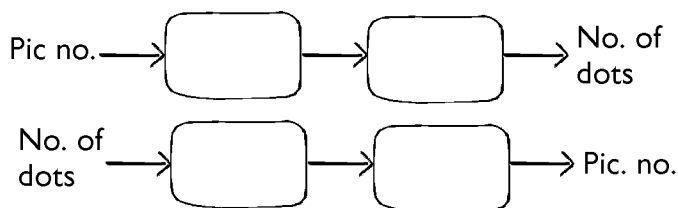
Picture 4

Picture 5

a. Draw the fourth and fifth pictures in the pattern.

b. Complete the table and the flow diagrams.

Picture no.	1	2	3	4	5
No. of dots	5	7			



c. Solve the equations.

• $6 \times 2 + 3 = \square$

• $15 \times 2 + 3 = \square$

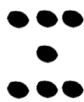
• $\square \times 2 + 3 = 53$

• $\square \times 2 + 3 = 15$

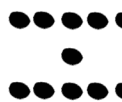
• $\square \times 2 + 3 = 33$

• $\square \times 2 + 3 = 81$

3. Tumi makes pictures with dots. The first three pictures make a pattern.



Picture 1



Picture 2



Picture 3

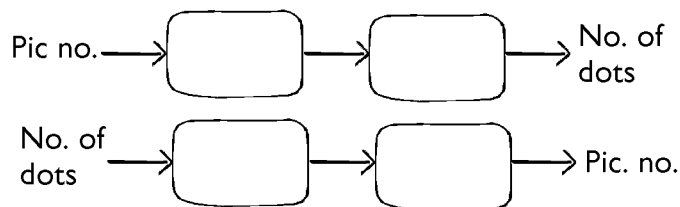
Picture 4

Picture 5

a. Draw the fourth and fifth pictures in the pattern.

b. Complete the table and the flow diagrams.

Picture no.	1	2	3	4	5
No of dots	7	11			



c. Solve the equations.

• $6 \times 4 + 3 = \square$

• $9 \times 4 + 3 = \square$

• $\square \times 4 + 3 = 67$

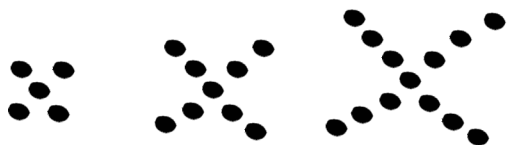
• $\square \times 4 + 3 = 27$

• $\square \times 4 + 3 = 39$

• $\square \times 4 + 3 = 123$

Activity 2 (Workbook 23 page 20)

1. Sindi makes pictures with dots. The first three pictures make a pattern.



Picture 1

Picture 2

Picture 3

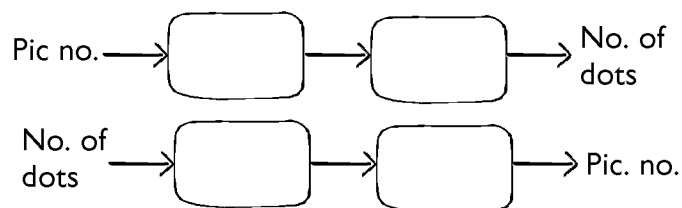
Picture 4

Picture 5

- a. Draw the fourth and fifth pictures in the pattern.

- b. Complete the table and the flow diagrams.

Picture no.	1	2	3	4	5
No. of dots	5	9			



- c. Solve the equations.

$$\bullet \quad 6 \times 4 + 1 = \square$$

$$\bullet \quad 15 \times 4 + 1 = \square$$

$$\bullet \quad \square \times 4 + 1 = 133$$

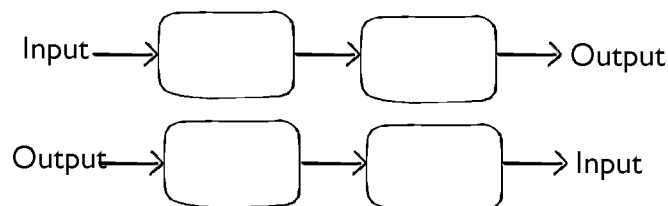
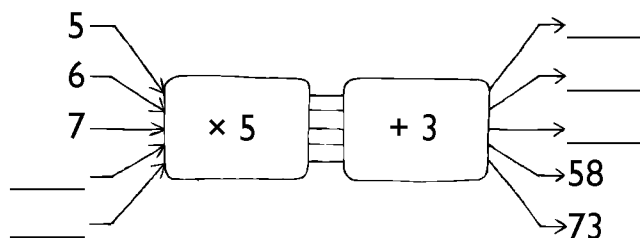
$$\bullet \quad \square \times 4 + 1 = 25$$

$$\bullet \quad \square \times 4 + 1 = 61$$

$$\bullet \quad \square \times 4 + 1 = 181$$

- d. Describe how the flow diagrams helped you to solve the equations.

2. a. Complete the flow diagrams.



- b. Solve the equations.

$$\bullet \quad 8 \times 5 + 3 = \square$$

$$\bullet \quad 15 \times 5 + 3 = \square$$

$$\bullet \quad \square \times 5 + 3 = 43$$

$$\bullet \quad \square \times 5 + 3 = 33$$

$$\bullet \quad \square \times 5 + 3 = 78$$

$$\bullet \quad \square \times 5 + 3 = 103$$

- c. Describe how the flow diagrams helped you to solve the equations.

Notes:

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This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.

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