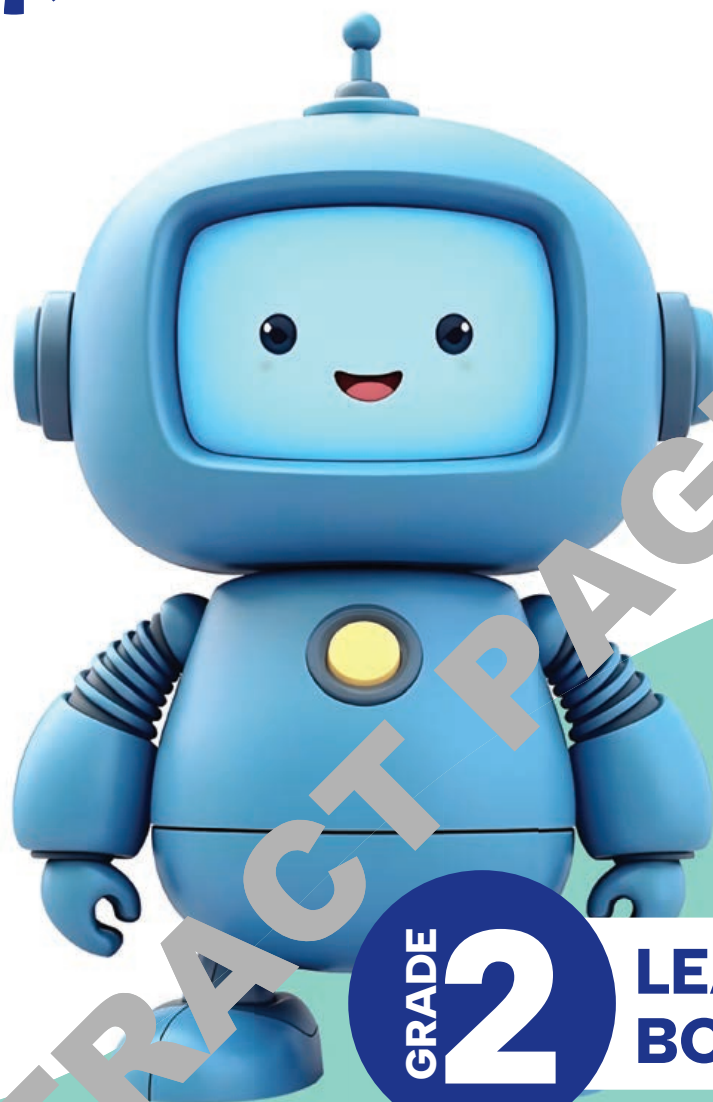


CAPS

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GRADE

2

LEARNER'S
BOOK

Platinum

Coding and Robotics

A. Elliot • K. Walstra • B. Willemse • M. Zeeman

Maskew Miller Learning

10 Freedom Way, Milnerton, Cape Town, 7441
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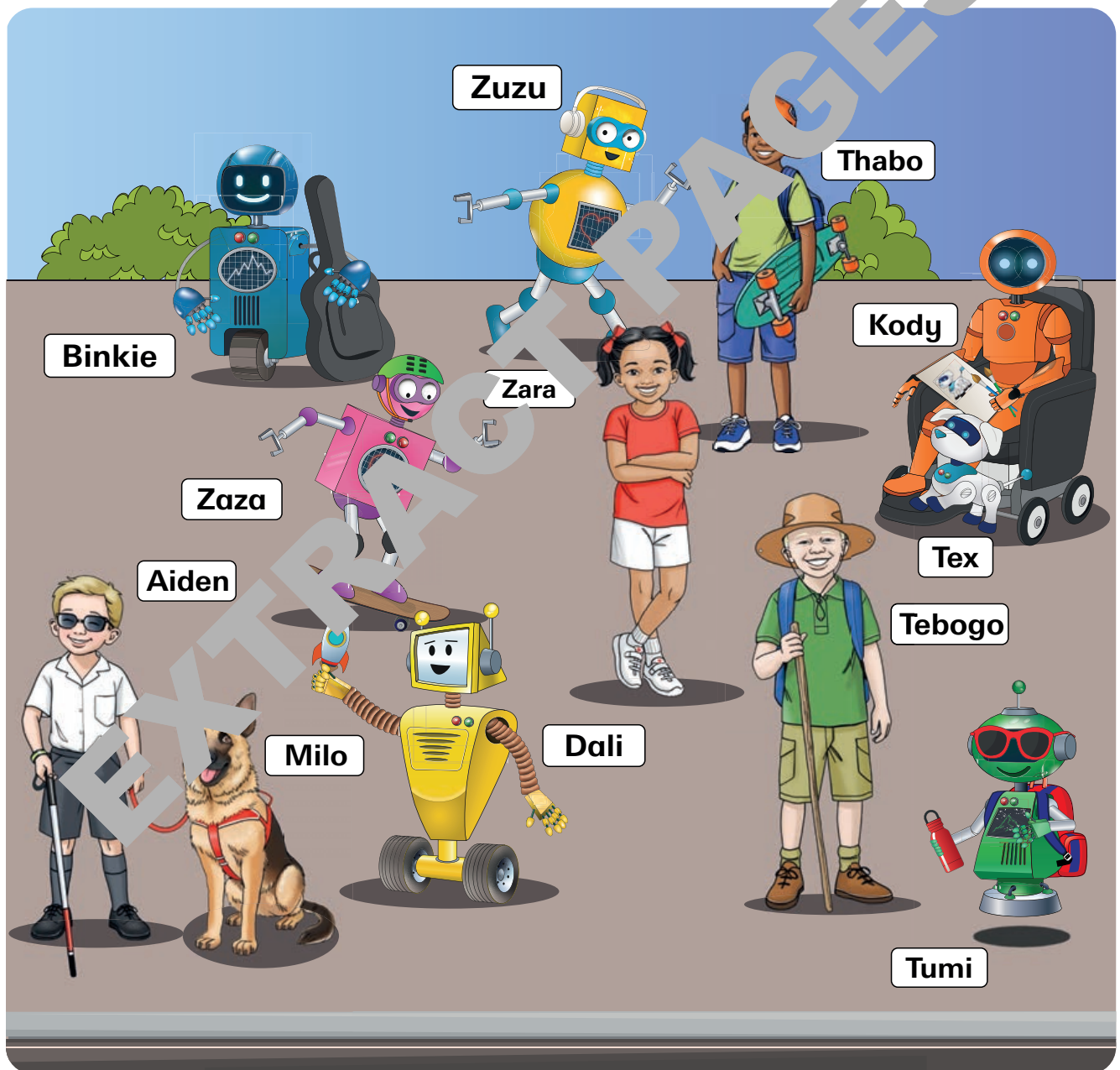
Welcome

Dear Learner,

Welcome to this exciting textbook! You will meet amazing characters; just like each character is special in their own way, you are too!

Get ready to learn, play and code with your friends.

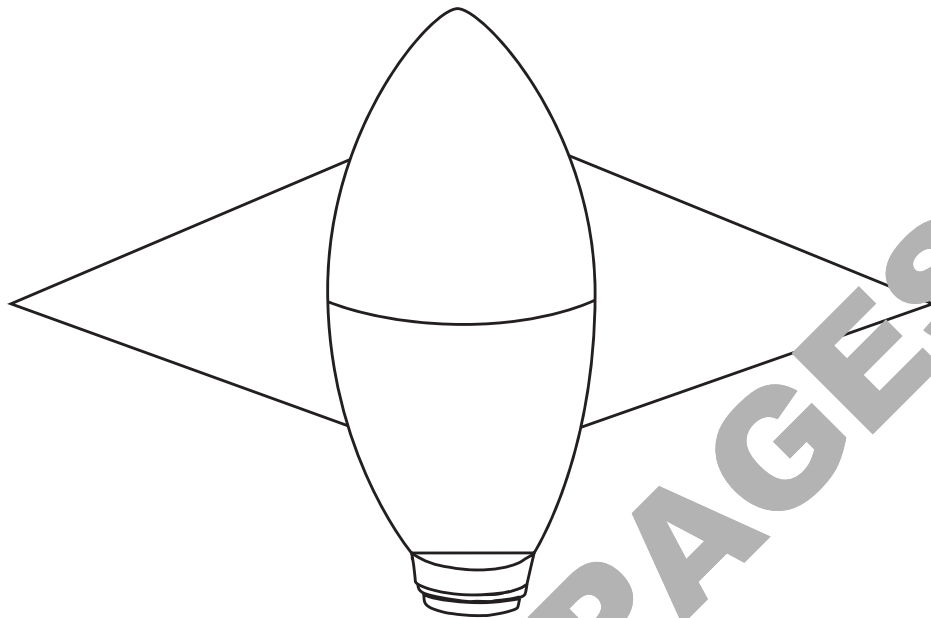
Happy learning.



How to use this book

When you see	It means:
	time to work with my friend
	time to work as a group
	time to use my hands and my brain
	time to draw and write
	time to talk about things
	time to use my brain and imagination
	time to move my body
	time to code
	time to share
	coding through play

To grasp the concept of directionality



Make a rocket:

You will need:

- 4 X sticks (this can be painted sucker sticks, straws, cardboard or coloured paper cut into strips - whatever is easiest and the most available to you).
- 1 red
- 1 orange
- 1 blue
- 1 yellow
- Glue

Making your rocket:

- Trace the rocket
- Cut out the traced rocket
- Colour your rocket
 - Up – red
 - Down – blue
 - Right – orange
 - Left - yellow
- Paste your rocket on a piece of cardboard

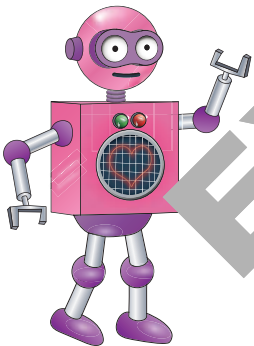
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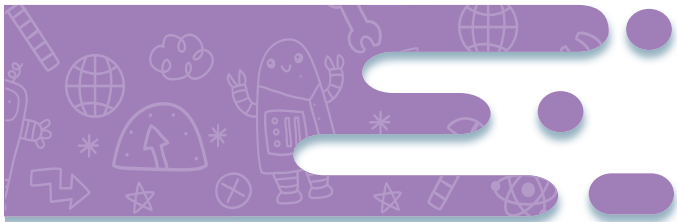


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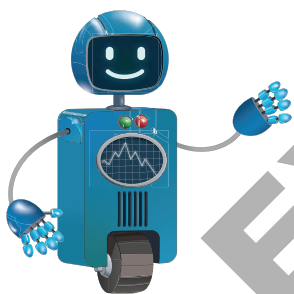


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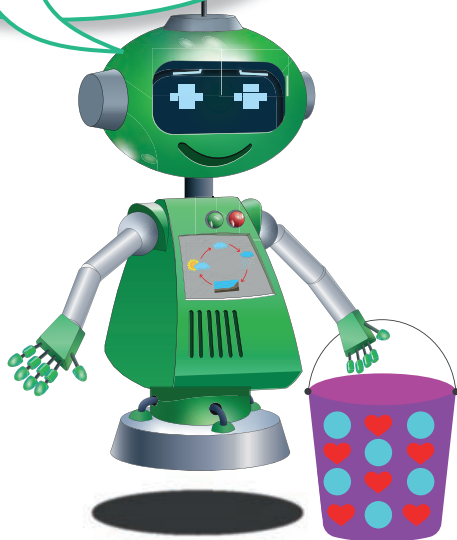
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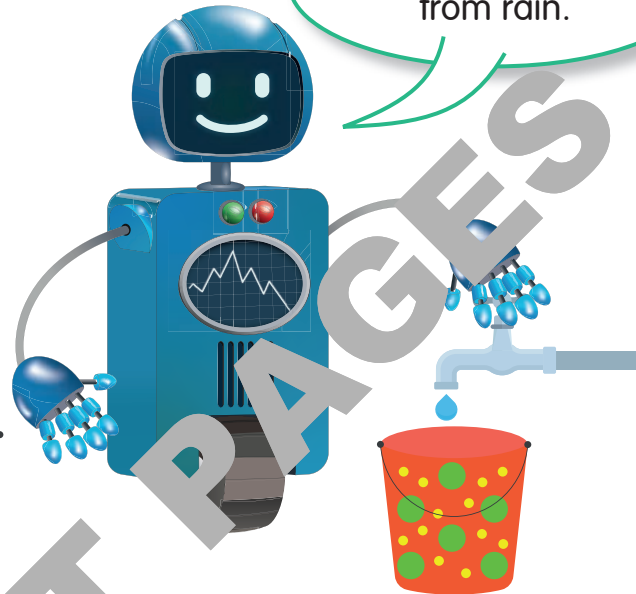
We need water to live

C1
C2
C3

Where do we get water to fill our dams?



We get our water from rain.



We must not waste water. We must save water where we can.

Let us begin

Computational thinking is like solving a puzzle. You break the problem into smaller parts. You look for patterns to see how they fit together, and then make a plan to put everything in order and solve the puzzle.

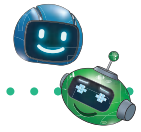
Daily routine for getting ready for school



1. Place the pictures in the correct order.
2. Look at picture **b**. Talk about the steps for brushing your teeth.
3. Look at the sequence of pictures.



- a.** Talk about what you need to make breakfast. Ignore what you do not use.



Activity 1



Look at the pictures. Discuss the questions with your friend.

1. Which pictures form the water cycle?
2. Which two pictures do not fit?
3. What is the correct order of the pictures? Explain why.

Saving water



We must turn the tap off

Precipitation



Raindrops form in the clouds. Then it rains.

Collection



Water collects in oceans, lakes and rivers

Condensation



Water vapour forms clouds.

Collecting rainwater

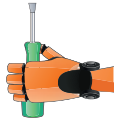


We collect rainwater to water plants.

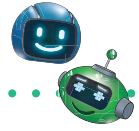
Evaporation



The sun heats the water and it evaporates into the air.



Activity 2



Robots are programmed to follow instructions.

You will need:

- a skewer or sharp pencil
- two large circles on an A4 sheet of paper
- one split pin
- a pair of scissors
- pencil crayon

Step 1: Fold both circles into four parts like a pizza.

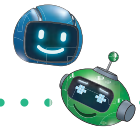


Step 2: Take one circle and cut-out one pizza slice.



Step 3: Draw the steps of how water moves around on the circle with all its parts. Make sure they are in order: evaporation, condensation, precipitation, collection





Activity 2 (continued)

Step 4: Make a hole in the middle of both circles.



Step 5: Put the circles on each other and use the split pin to hold them together. Spin and learn about the water cycle.



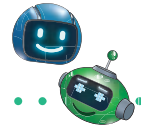
Test your water cycle wheel

Move the top circle to see each picture of the water cycle.

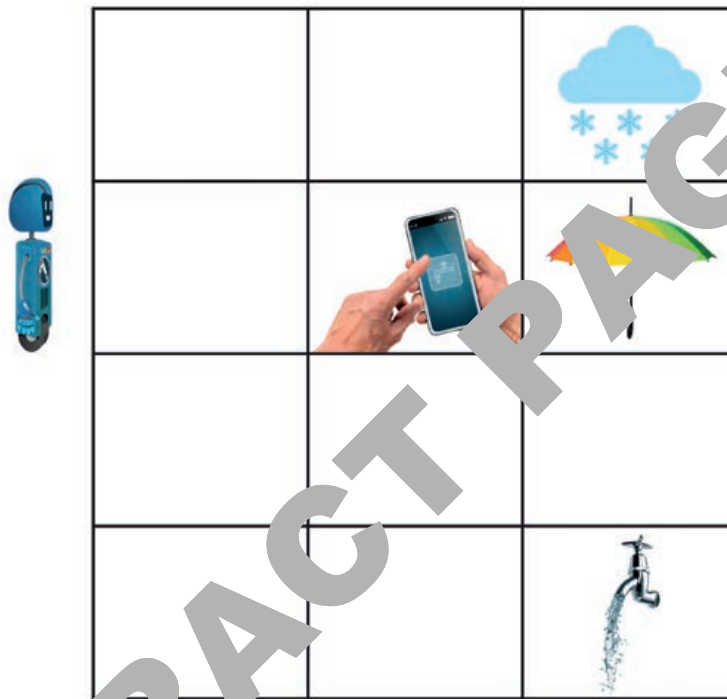
1. Does the cycle turn easily?
2. Are the pictures colourful?
3. Are the pictures in the correct order?
4. What could you improve?



Activity 3







Create a set of instructions to get Binkie to the tap.



Use these coding cards:



How do you feel about the work you did?

1 	2 	3 	4 
Trying!	Happy!	Proud!	out

EXTRACT PAGES



Let us begin

When we solve problems, we look for the important information and ignore the other information.

1. Find two foods you should ignore when you prepare a birthday party table.



Decomposition

Decomposition is breaking things down into smaller parts. For example, 5 can be broken down into 3 and 2.

Look at the doughnut.

How is the doughnut broken down?



Pattern recognition

Pattern recognition is seeing the pattern of things that repeat in the same order.



What is the sequence in the pattern?



Activity 1

1. Help Zara  find the cupcake she loves.



- a. Which cupcake would she eat?
 - b. Why did you choose that cupcake?
2. Choose your favourite cupcake.
 - a. Decompose it.
 - b. What are the different parts that make up your cupcake?

Activity 2



Talk to your friend.

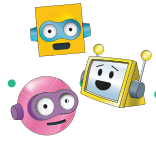
1. What was their favourite cupcake in Activity 1?
2. Draw and label your friend's cupcake.
3. Check your friend's drawing. Did they draw your cupcake correctly? Compare it to the cupcake in the textbook.

How do you feel about the work you did?

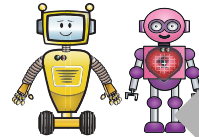
1		2		3		4	
Trying!		Happy!		Proud!		Yay!	



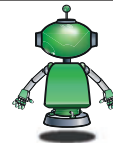
Activity 1



I. Where does each robot live?



A				
			B	
	C			
			D	



Up		Left	
Down		Right	

Activity 1 (continued)



2. Record your answers.
3. Talk about the code.

Look at the patterns below. Which row is not a pattern? Talk with your friend.

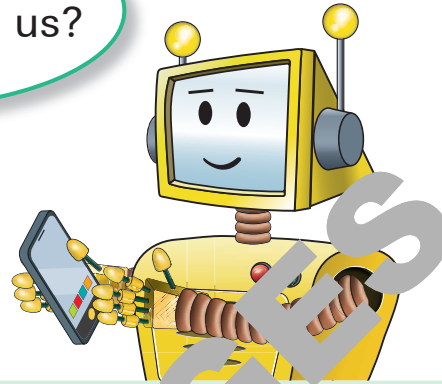


How do you feel about the work you did?

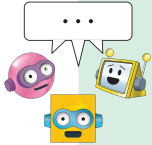
1	2	3	4
Trying!	Happy!	Proud!	Yay!



How does technology help us?



Let us begin



What is technology?

Technology is made to meet people's needs and solve their problems.

Look at the products. How do they benefit people?



A stove



A fridge



A clock

Technology – using tools and machines to solve problems for people and make things easier.

new words

What is **Information Technology**? **Information technology (IT)** is using computers and the internet. We use these devices to share information, play games, watch videos, and talk to friends and family.



Someone talking to a computer in a special language telling it what to do. This is called coding.

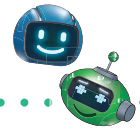
We can use tablet to make a call



We can use a computer to find an answer to a question on the internet.



We can use a computer to send or receive information like a message or a picture.



Activity 1

Match each technology with its use.

a.



iron

1.



sweety floor

b.



hammer

2.



communication

c.



robot vacuum

3.



creased clothes

d.



phone

4.



wooden product



Activity 2



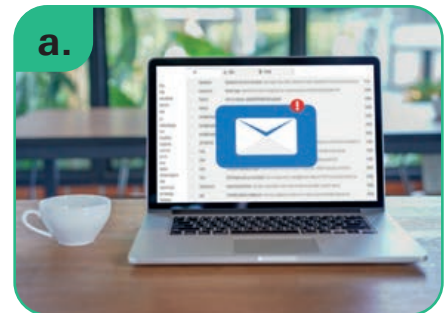
Write the code to help Binkie go to the technology products shown in pictures **a** to **c**.

b. 			
		a. 	
	c. 		



		Left	
Down		Right	

- Binkie wants to send an email inviting his friends to a braai.



Activity 2 (continued)

2. Binkie checks the weather app to see the forecast.







3. Binkie sets up his loudspeaker to listen to music.

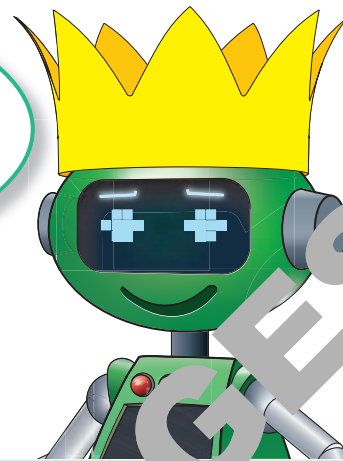


- Write the code.
- Swap your code with your friend.
- Check their code.
- Fixing any mistakes.

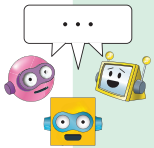
How do you feel about the work you did?

1		2		3		4	
Trying!		Happy!		Proud!		Yay!	

"You are all very special to me," the teacher says. "I am going to show you how to make a crown, because it's important to feel special every day."



Let us begin



Robots follow instructions. People who know computer language are called coders.

Coders write instructions and put these into the robot. Before the robots start working, coders make sure they do their jobs right.



robotic arm

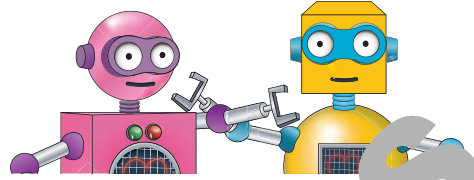


Checking the robotic arm



Activity 1

Make a crown for your friend



Find out what will make your friend feel better.

- Why is your friend sad?
- How could you cheer your friend up?
- Would a 'I am special' crown cheer them up?

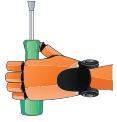
Talk about what the special crown will look like.

Draw what the special crown could look like.

Look at the instructions on how to make one type of paper crown.



Activity 1 (continued)



Instructions

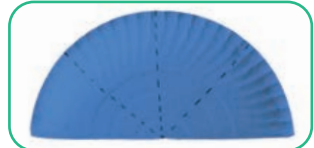
Step 1: Colour both sides of the paper plate using paint or crayon.



Step 2: Fold the paper plate in half.



Step 3: Draw three dashed lines.



Step 4: Cut on all three lines. Do not cut to the edge of the plate.



Step 5: Unfold the plate and cut on the centre fold lines.



Step 6: Fold all the edges open.



Build your special crown.





Work neatly and accurately.

Activity 2

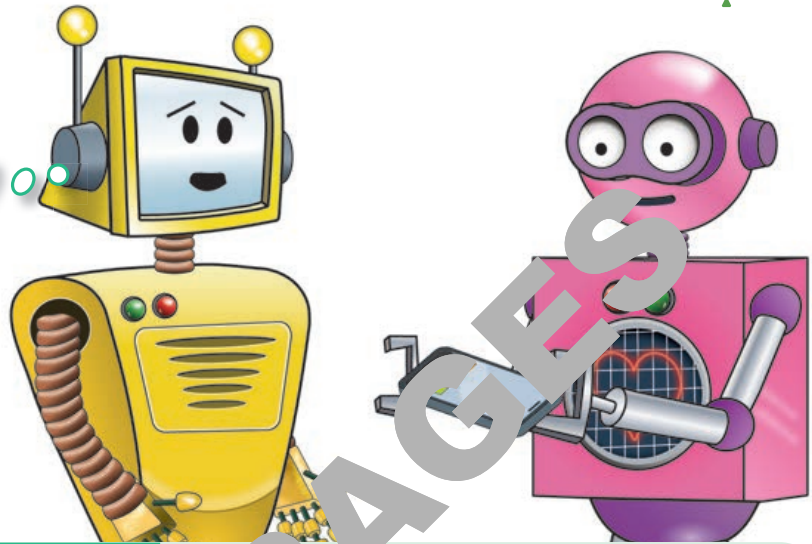


1. Does the crown fit your friend's head?
2. How well does it fit?
3. What could you improve?
4. Talk about how your friend feels.
 - a. How do they feel about getting a crown?
 - b. How do you feel about giving your crown to someone as a gift?

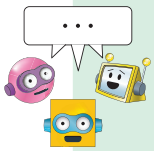
How do you feel about the work you did?

1		2		3		4	
Trying!		Happy!		Proud!		Yay!	

How can we help Zaza speak with confidence when using her phone?



Let us begin



When we interact with people online, we should treat them in the same way as we would in person. Talk about each of the behaviours shown in the pictures.



Be polite and kind, even if you disagree.



Don't interrupt. Wait for your turn to speak.



Ask for permission.



Take a break to give your eyes a rest.



Look after your phone.

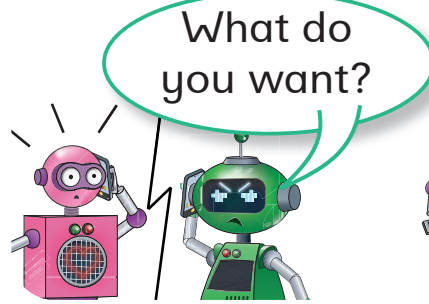


Think before you share.

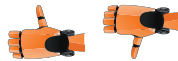


Activity 1

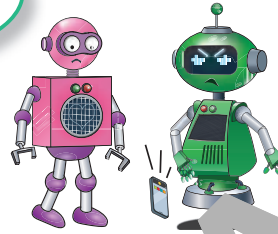
Talk about each phone comment with your friend.



Is this polite?



How should you answer?



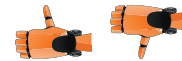
Is this polite?



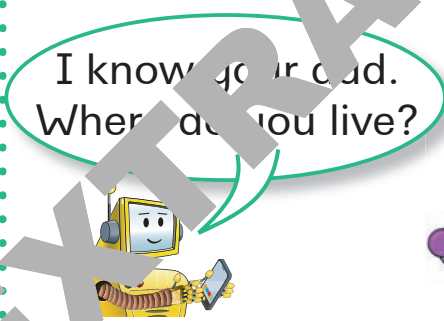
What should we do?



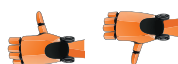
Is this polite?



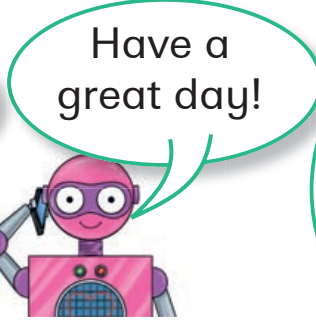
Would you change the question?



Is this a question you must answer?



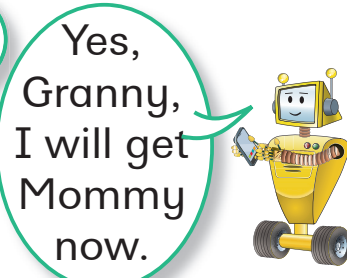
Explain why.



Is this polite?



Would you change the comment?



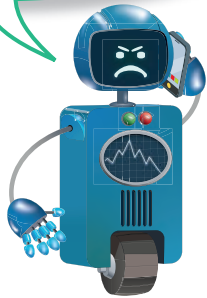
Is this polite?



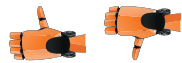
Would you change the comment?

Activity 1 (continued)

I told I will not share my password with you!

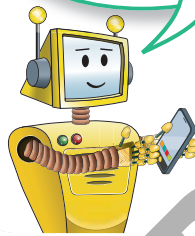


Is this polite?



What should he do?

Thank you for calling. I will give the message.

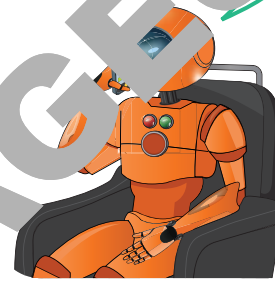


Is this polite?

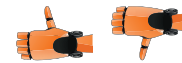


Would you change the comment?

I told you not to bother me.



Is this polite?



Would you change the comment?

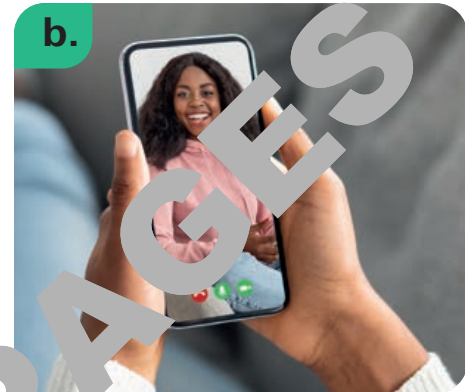
Tip

Be safe – Always ask an adult for permission before using your device, phone or tablet. Show them what you're doing and who you are talking to.

Be kind – Always be kind to others online, just like you are in real life.

Activity 2

Look at the pictures.







Taking a selfie

Making video calls

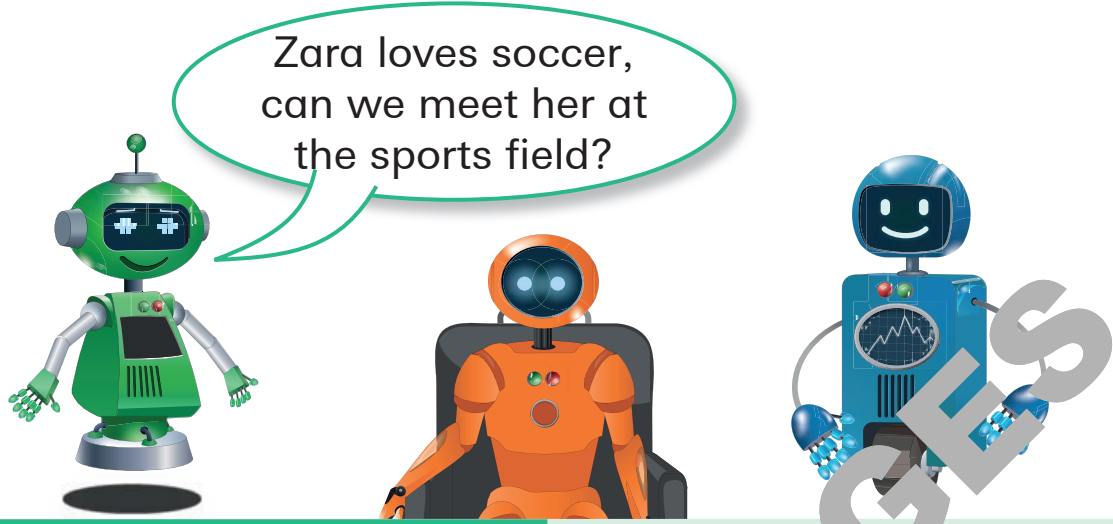
1. Do people in your family use their cell phones in this way?
2. Is it okay to do this in public?
3. If yes, what should you think about or be aware of?

How do you feel about the work you did?

1 	2 	3 	4 
Trying!	Happy!	Proud!	Yay!

Choose the route

C2
C3



Let us begin

Remember, a set of instructions helps to solve a problem.

Help the netball player find the correct court.

Which is the correct route?

Give a reason why.

Up		Left	
Down		Right	





1						
2						
3						

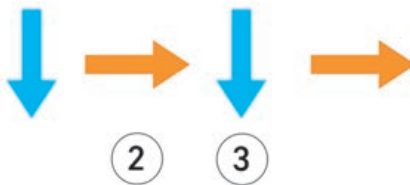
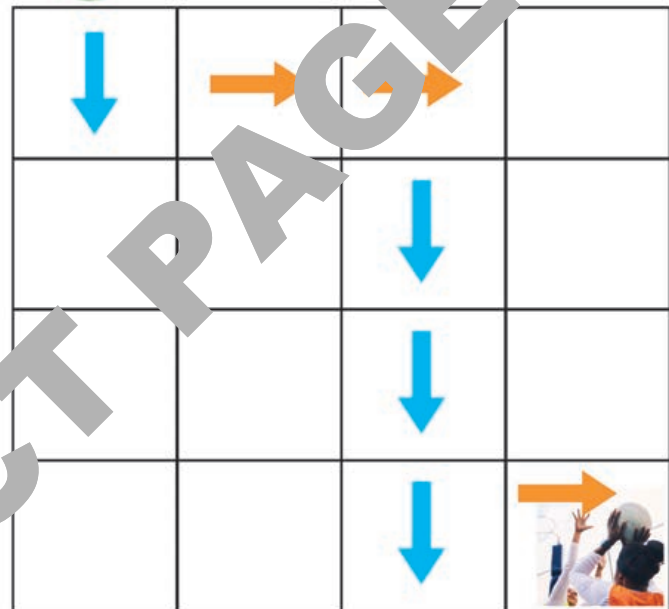


Activity 1

Let us revise how to shorten a code. See the steps in the back of the book.

Can you see repeats?

Check this shortened code. Is it correct?



Write the instructions in words.


For example:

- Move down.
- Move to the right.
- Move to the right.

Activity 1 (continued)



Mimic the robot's route to find the correct code.

↑	→	↑	→
↑	↓	↑	
↑	↓	→	



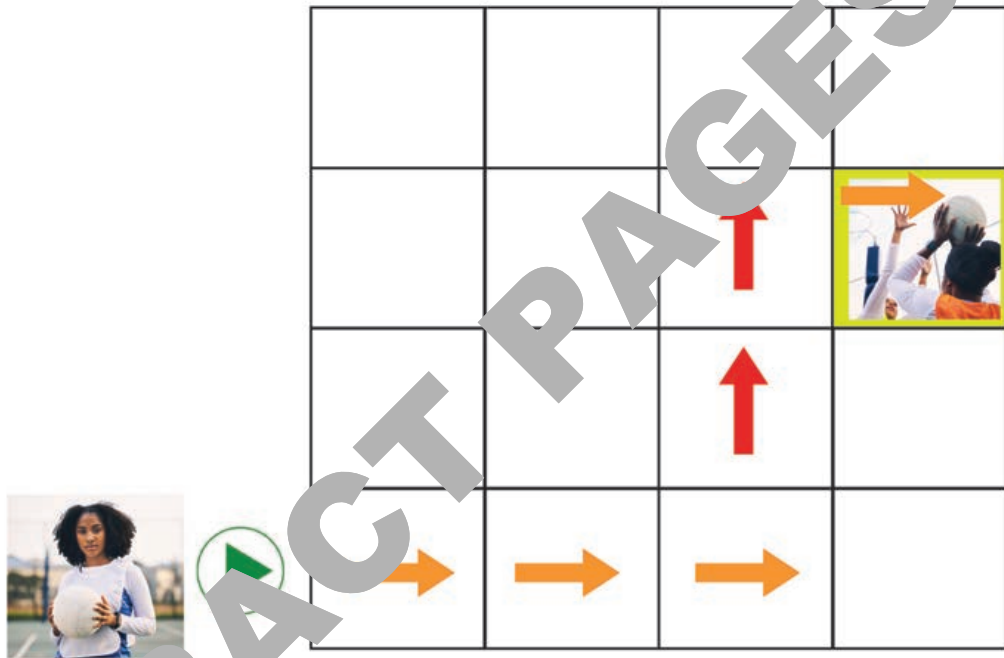
1. Select the correct code for this route.

①	↑↑↑ → ↓↓ → ↑↑ → ↓
②	↑↑↑ → ↓↓ ← ↑↑ → ↓
③	↑↑↑ → ↑↑ → ↑↑ → ↓

2. Shorten the correct code.

Activity 1 (continued)

3. Mimic the robot's route to work out the correct code.

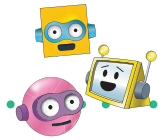


4. Write out the code for this route and shorten it.





Talk about the difference between a shorter route and a shortened code.
















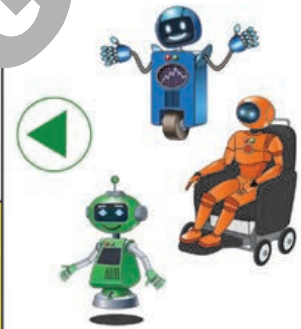
Activity 2







Binkie and Tumi are meeting Zara at the sports field.

 = 
 = 








Use these coding cards:




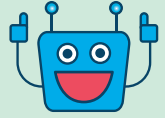
Up		Left	
Down		Right	



Activity 2 (continued)

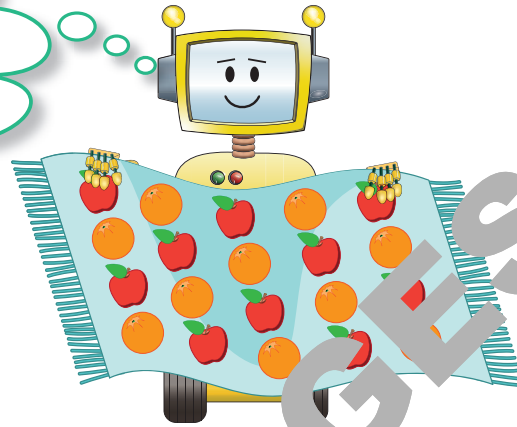
1. Look at the codes below. Which code belongs to which robot?  
 - a. 
 - b. 
 - c. 
2. Look at the robots' codes.
 - a. Which code is better?
 - b. Shorten the code of the best route you chose

How do you feel about the work you did?

1 	2 	3 	4 
Trying!	Happy!	Proud!	Yay!

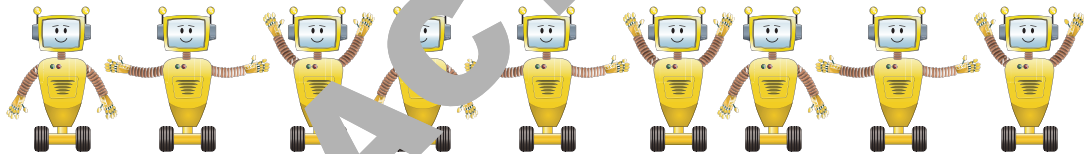
Hmm, look at these patterns.

Dali has found some very interesting patterns.



Let us begin

A pattern repeats. Look at this movement pattern.



1. How many movements are there in the sequence before it begins to repeat?
2. Do the movements three or four times.

This is a **sequence** of movements that is repeated.

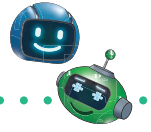
Sequence – a line of things that follow a special rule, like colours that are always placed as red, green, blue, red, green, blue.



new words

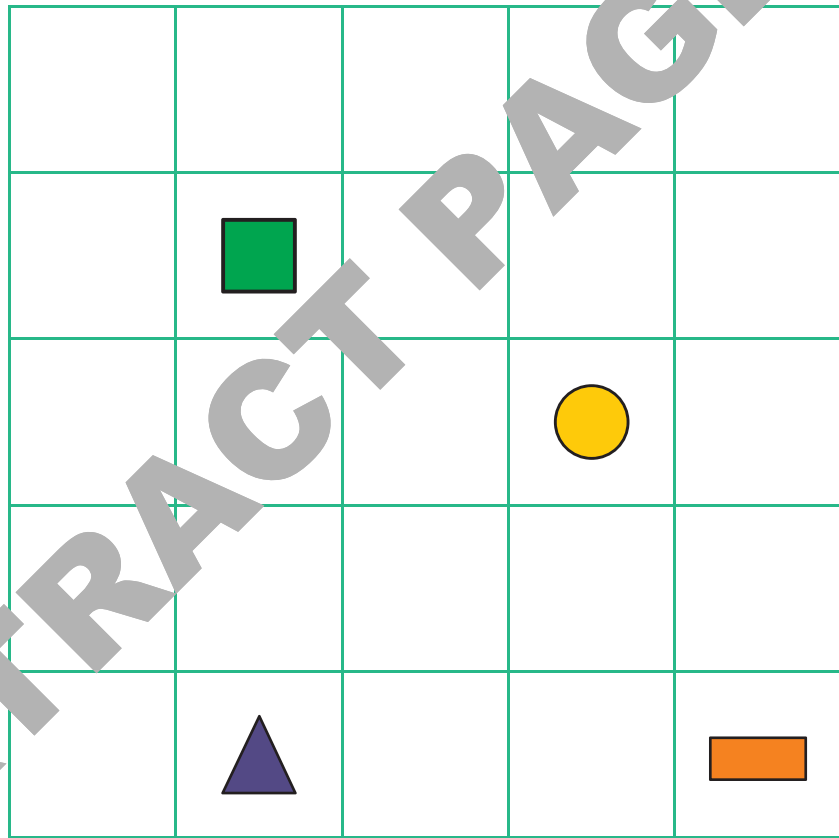






Activity 1



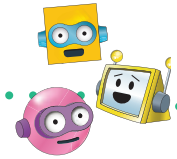
Look at the grid. There are four shapes.

1. Create a code to collect four shapes.
2. Check your code with your friend.



Up		Left	
Down		Right	

Activity 2



Work in groups of three. Look at the sequence on the left.

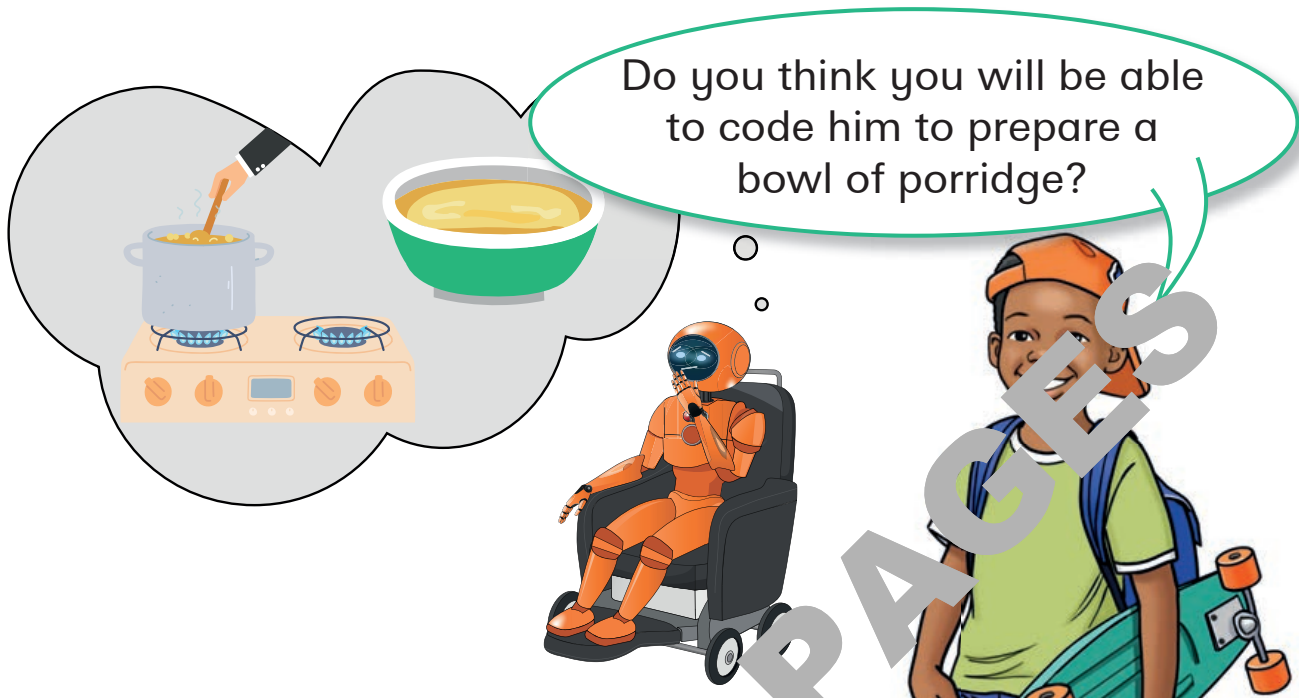
What comes next? Number the elements on the right to continue the pattern.

Example:

<p>1.</p> <p>1 2 3 4</p>	<p>3 4 1 2</p>
<p>2.</p> <p>1 2 3</p>	
<p>3.</p> <p>1 2 3 4</p>	

How do you feel about the work you did?

<p>1</p>	<p>2</p>	<p>3</p>	<p>4</p>
Trying!	Happy!	Proud!	Yay!



Kody wants to find out how the learners in class prepare a bowl of porridge.

Let us begin

Coding instructions are written in a logical order called a sequence.

Look at the pictures on the next page.
The sequence of pictures tells a story.

1. What is the story in these pictures?
2. Is the sequence correct?
3. Explain your answer.



1. Runners at the starting point on one knee



2. Runners getting ready to run



3. Runners starting to run



Activity 1



Let us explore.

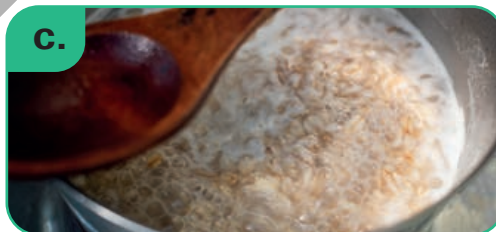
I. Is this algorithm in the correct order?



a. Serve a bowl of porridge.



b. Mix the oats and the water in the pot.



c. Cook for 5 minutes.



d. Stir the porridge very well.

Activity 1 (continued)

2. Try again.

a.



Pour the milk
over the cereal

b.



Serve a bowl of
cereal

c.



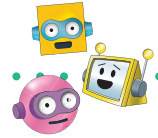
Warm the milk

d.



Pour cereal in a bowl

Activity 2



Create your own sequence of pictures.

1. Choose a dish.
2. Talk about the steps you would follow to make the dish.



Salad



Sandwich



Hot dog



Hamburger



3. Draw the steps for your dish. Use cards to draw your steps on.

Activity 2 (continued)

Check:

4. Swap your cards with another group member.
5. Put their picture cards in the correct order.
6. Talk to the group member about the order of the cards.
 - a. Is the order easy to understand?
 - b. Are all the steps easy to follow?
 - c. What could be improved on the drawings?
7. Follow steps 4 to 6 with a different group member.



How do you feel about the work you did?

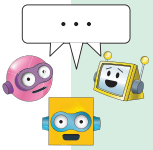
1 Trying!	2 Happy!	3 Proud!	4 Yay!

Hooray! I'm going to build a robot and so are you!

Dear Binkie,
Please build a robot for me for my birthday present.
My new robot must have the following parts: a head, a body and two arms. It must also have two eyes and an antenna.
The robot's head must be able to move up and down. The body must have a computer screen. The screen should show a message.
Thank you so much – I know I will love my present!
Thabo



Let us begin

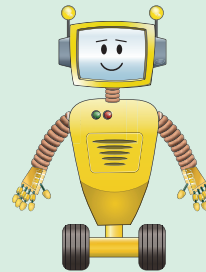


Let us explore more ideas about what a robot is.

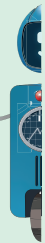
A robot is a machine that moves on its own or is controlled as it moves.

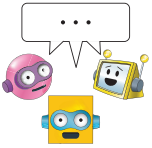
Its legs and arms have moving parts or joints.

It might also move on wheels.



Dear Binkie,
Please build a robot for me for my birthday present.
My new robot must have the following parts: a head, a body and two arms. It must also have two eyes and an antenna.
The robot's head must be able to move up and down. The body must have a computer screen. The screen should show a message.
Thank you so much – I know I will love my present!
Thabo





There are many types of robots that can do many different things.

Look at these examples.



Robotic arm

This robot is a moving arm. It picks up things and builds things.



Robot dog

This robot can walk and run. It has sensors to find things.

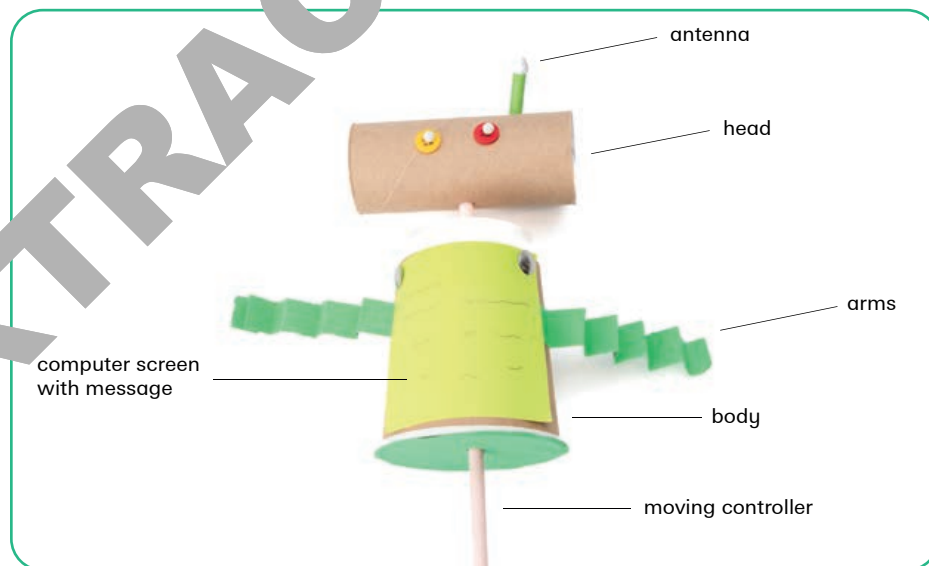
1. How are their bodies different?
2. What type of movements can these robots make?
3. What makes these robots work?
4. Where is the robot's brain?

Activity 1

How do we design a robot for Thabo?

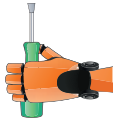
We must follow the following steps:

- Let us read Thabo's letter again to see what he wants.
- Think of what you will use to create your robot. You must find things in your classroom or house.
- Draw and label your robot. This is an idea of what the finished robot will look like. Include the head, arms, body, controller and a computer screen.



Build your robot. Work carefully. Make sure you add all the parts.

Activity 1 (continued)



Make a robot for Thabo.

You will need:

- body: paper cup
- head: toilet roll tube
- moving controller: straw
- arms: paper strips
- antenna: straw
- a pair of scissors
- an A4 sheet of paper
- glue



Activity 1 (continued)

Instructions

Make your robot.

Step 1: Trace around the edge of the cup on a piece of cardboard.



Step 2: Cut out the circle.



Step 3: Make a hole in the bottom of the cup.



Step 4: Fold the circle into four parts.



Step 5: Make a hole in the middle of the circle.



Step 6: Glue the circle to the top of the cup.

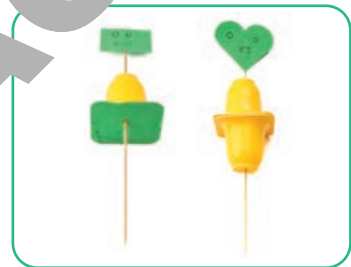


Activity 1 (continued)

Step 7: Push the straw through the two holes and attach your head.



Step 8: You can do the same with one or two yoghurt cups.

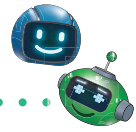


Step 9: How does it move?



Is the robot ready for Thabo? Let us check.

Body	
Arms	
Computer screen with message	
Eyes	
Antenna	



Activity 2

Oh dear, Thabo's robot is not done yet.

Read Thabo's instructions again about the robot he wants.

What did you forget?




- arms
- computer screen with message
- antenna



1. Fold the two strips of paper as a zigzag and glue to the body.
2. Draw a computer screen with a message.
3. Glue the antenna onto the robot's head.

Test: Work with a friend and test your robots together.

Activity 2 (continued)





 Very well	 Well	 Could be better
How smoothly does the head move up and down?		
How well is the head joined to the controller?		
How well do the arms wiggle or move when the robot is shaken?		
How neatly and creatively is the robot decorated?		
How clearly and neatly is the message on the “screen”?		



Think about your robot.

- What would you add to your robot?
- What do you like most about your robot?

How do you feel about the work you did?

1 	2 	3 	4 
Singing!	Happy!	Proud!	Yay!