شكراً لتحميلك هذا الملف من موقع المناهج الإماراتية

حل كتاب النشاط Answers Book Activity

التواصل الاجتماعي بحسب الصف الخامس

روابط مواد الصف الخامس على تلغرام

التربية الاسلامية	اللغة العربية	اللغة الانجليزية	الرياضيات

المزيد من الملفات بحسب الصف الخامس والمادة تصميم في الفصل الثاني

1	حل كتاب النشاط Answers Book Activity
2	كيفية عمل مشروع تشك بوينت 3
3	تشيك بوينت PROJECT ROBOT FOLLOWER LINE 3
4	أسئلة تشيك بوينت A Part (SA) Project - 3 Checkpoint
5	دليل المعلم للفصل الثاني

Grade 5

Robotics

Unit 1: Computer Systems and Embedded Systems

Teacher Answers

E-safety

How can you protect yourself on the internet?

Activity 1 { 

Part A:

It's important to make sure your password is strong.

A strong password has:

- At least 6 characters
- Letters
- Numbers
- At least 1 capital letter
- Symbols - @, _, #, $, %, -, / etc

Take a look at the passwords below.

Which ones are strong and which ones are weak?

Passwords	Strong	Weak
Cats%run8912	/	
Pretty20		/
Flowers		/
pink-Rabit75	/	
spiderman		/

Part B:

Create your own strong password:

_____ **(Strong password using list above)**

Devices and components in embedded systems

Activity 2 **{**

Microcontrollers

Electronic devices/systems		Contains microcontroller?
 Yes		Yes
 No		
 Yes		
 No		No
 Yes		
 Yes		

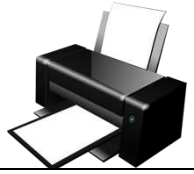
}

Activity 3 {

Input and output devices

Mariam and Ahmed are recapping what they learnt in the previous term about computer systems.

Help them to complete the activity below by identifying which components are input and output.

Component	Input	Output
Mouse 	/	
Speakers 		/
Keyboard 	/	
Printer 		/
Drawing tablet 	/	
Apple pencil	/	

}

Memory

Activity 4  **{**

Mariam and Ahmed are learning about primary memory.

Help them to complete the activity below by choosing whether the statements below are true or false.

Statement	True/false
RAM stands for 'Read-Access-Memory'	False
ROM is quicker than RAM	False
Primary storage is also known as the 'main memory'	True
ROM is used to store the start-up instructions for the computer	True
RAM is lost when the computer is switched off.	True
ROM is known as non-volatile memory ROM is not lost when the computer is switched off.	True

}

Activity 5 {

Mariam and Ahmed are refreshing their memory on Input-Process-Output.

Help them to complete the activity below by identifying the input-process-output for an ATM machine.

Options such as withdrawing or depositing cash will appear.

Insert card and enter pin number.

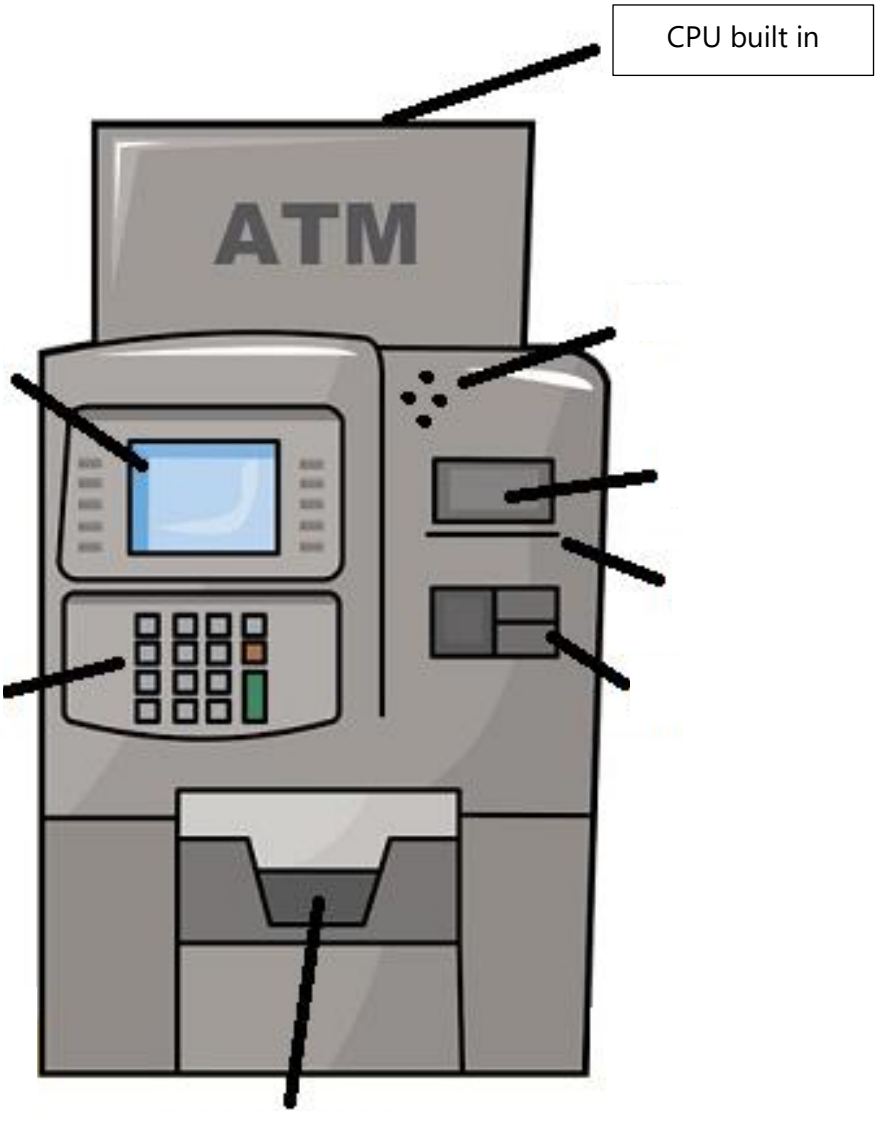
Money will come out or balance will be displayed.

Activity 6 {

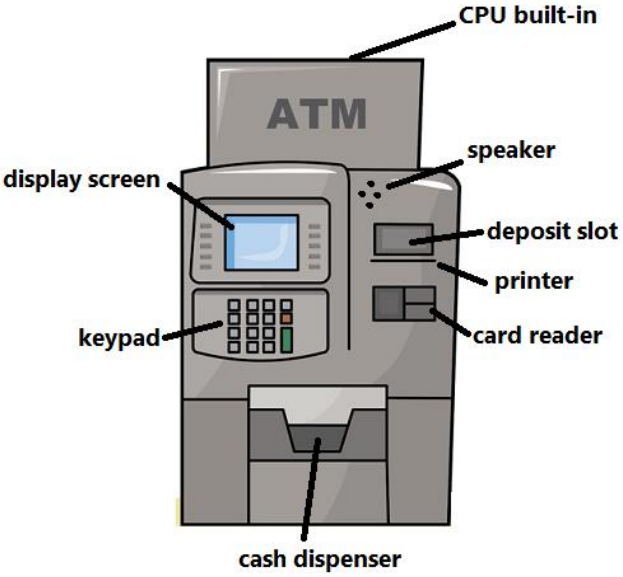
Mariam and Ahmed are trying to identify the different embedded systems within an ATM.

Help them to complete the activity below by matching the embedded system with the correct name.

~~CPU built in~~	keypad	speaker	cash dispenser
printer	speaker	deposit slot	display screen



Teacher answers.



}

Activity 7  {

Mariam and Ahmed want to separate the embedded systems in an ATM machine into input-process-output.

Help them to complete the activity below.

card reader	cash dispenser	central processing unit (CPU)	deposit slot	display screen	keypad	printer	speaker

Inputs	Processing	Outputs
deposit slot **card reader** **keypad**	**central processing unit (CPU)**	**speaker** **printer** **display screen** **cash dispenser**

}

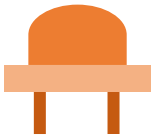
Robotics and embedded systems

Engino is an example of a robot. It can be connected to input and output devices to carry out a range of functions.

Below is an example of Input-Process-Output for Engino.

1 **Input**

Motion sensors detects an object causing a block.



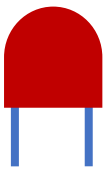
2 **Process**

The Engino processes the input and decides what to do next.

Engino

3 **Output**

The processor sends a signal to the buzzer and buzzer goes off.



Activity 8 {

Mariam and Ahmed are learning about the input-process-output for a robotic system.

Help them to complete the activity below by putting the steps in the correct order.

Input	**Process**	**Output**

Process

The Engino processes the input and decides what to do next.

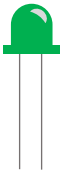
Engino

Input

Temperature sensors detects the temperature of the room.

Output

The processor sends a signal to the LED to switch on.

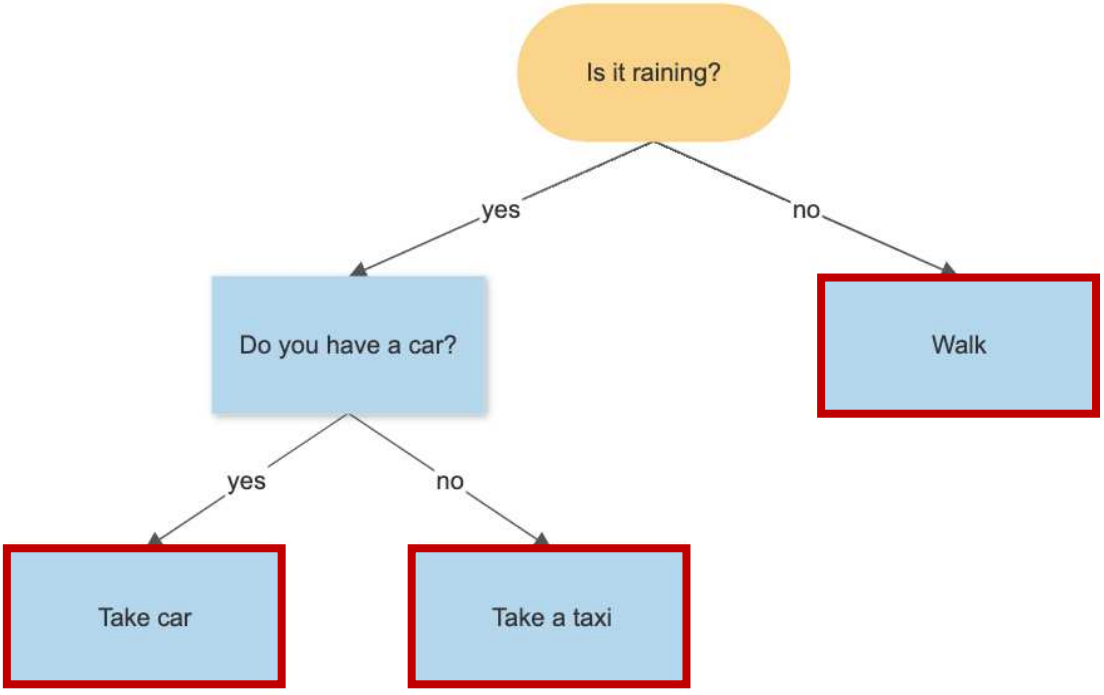


}

Decision trees

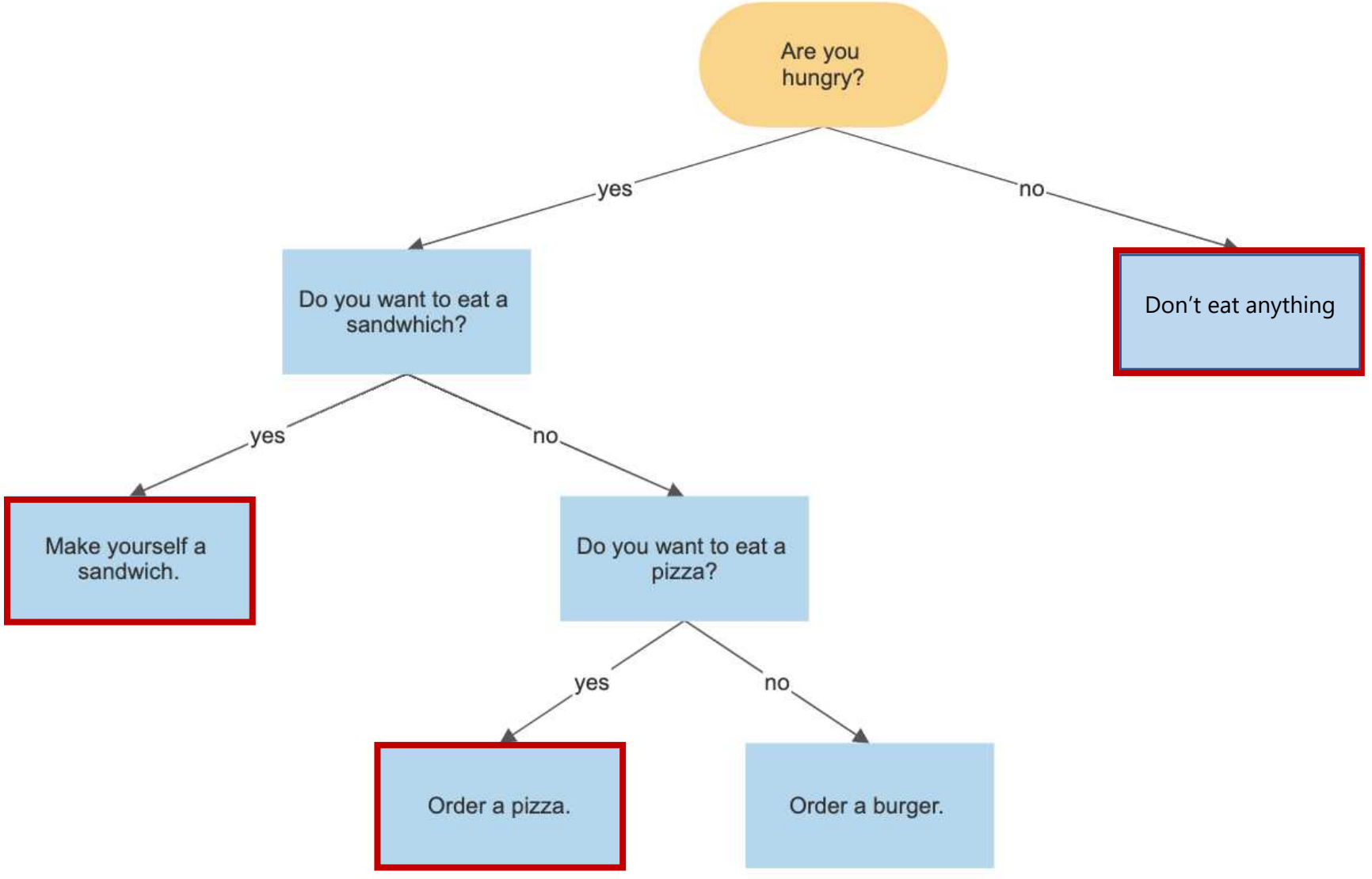
Activity 9 {

Teacher answers:



Activity 10 {

Teacher answers:

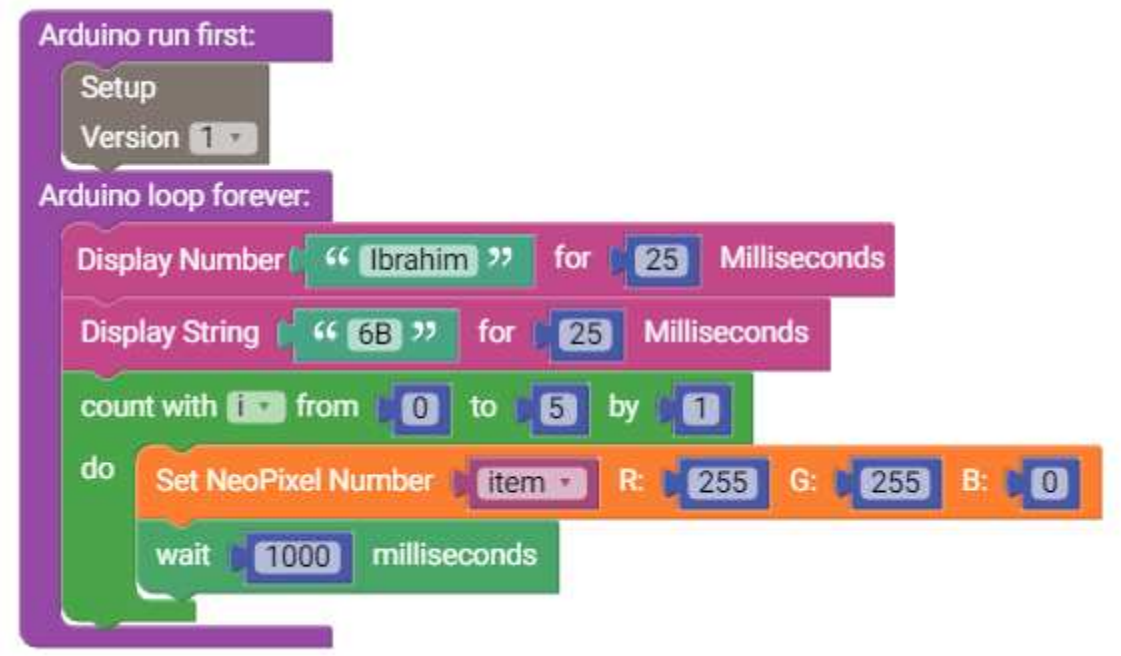


Activity 11 {

Ahmed and Mariam are learning about modifying code by identifying coding errors. Remember, there are two types of error in coding:

- Syntax errors where an incorrect command is used.
- Logic errors where the conditions or parameters are incorrect.

1. Identify two errors in Ibrahim's name badge program, then complete the table below.



Number	Error type	Description
1	**Syntax**	**Output text using number block (Ibrahim)**
2	**Logic**	**NeoPixel block references item instead of loop count (i)**

2. Use graphical programming software to modify the program to correct or remove the errors.

Student reflection

Students' personal reflection.

	**Activity 12**

Write about what you have learned and liked in this unit.

Three things I have learned:

_____

_____

_____

Two things I have liked:

1. _____

_____

Knowledge and skills reflection

Please tick the box to show what you understand:			
Understand the function of a range of devices and components in computer systems.			
Understand how a range of devices and components interact in computer systems.			
Understand how microcontrollers can be used to improve systems.			
Understand the relationship between hardware and software in an embedded system.			
Teacher's comments:			

End of unit quiz

Activity 13  **{**

Complete the end of unit quiz by answering the questions.

Which of the following does NOT keep you safe on the internet?

a. using privacy settings

b. using a password that is your name or birthday

c. Installing antivirus and anti-spyware

IPO stands for…

a. Information-process-output

b. Input-practice-outturn

c. Input-process-output

Secondary storage is also known as the 'main memory'

a. True

b. False

What is an example of an embedded system?

ATM, mobile phone, games console, GPS_____

A decision tree is a graph of possible decisions used to create a plan.

a. True

b. False

Grade 5

Robotics

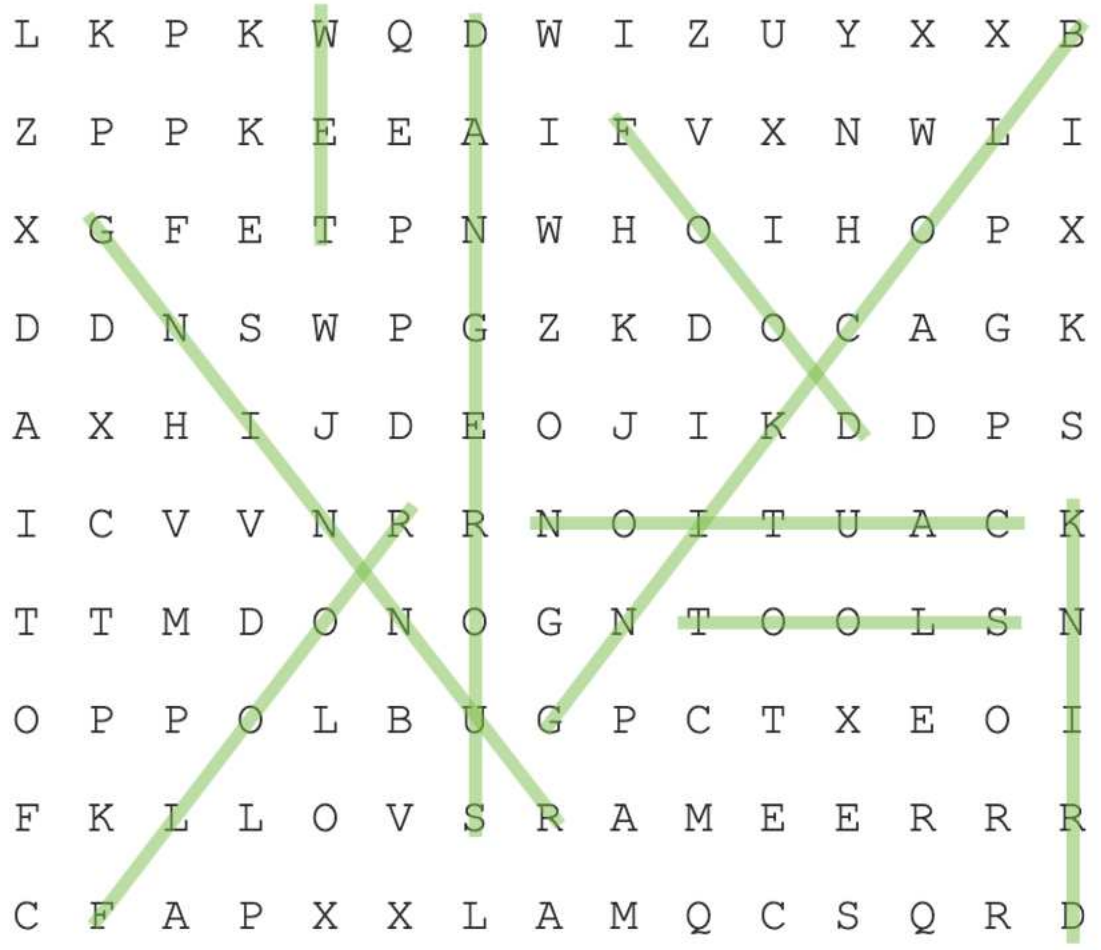
Unit 2: Introduction to Robotics

Teacher Answers

E-safety

Recognise hazards in the class workspace

Teacher answers:



Robotics

History of Robotics

Activity 2 { 

Choose whether the statements below are true or false.

Statement	True/False
Jacques de Vaucanson created the Flying Pigeon.	False
The Flying Pigeon was able to fly 200 metres.	True
The Flute Player was designed in 1948.	False
The first ever robot was built by Grey Walters.	False
The Unimate was built by George Devol.	True
The Unimate searched for food using light sensors.	False

}

The UAE and robotics

Activity 3 { 

What is a robot?

Draw a picture of your favourite robot. Give it a name.

Then write a short description about the robots' special features.

My robot is called: _____

My robot is special because:

_____

_____

_____

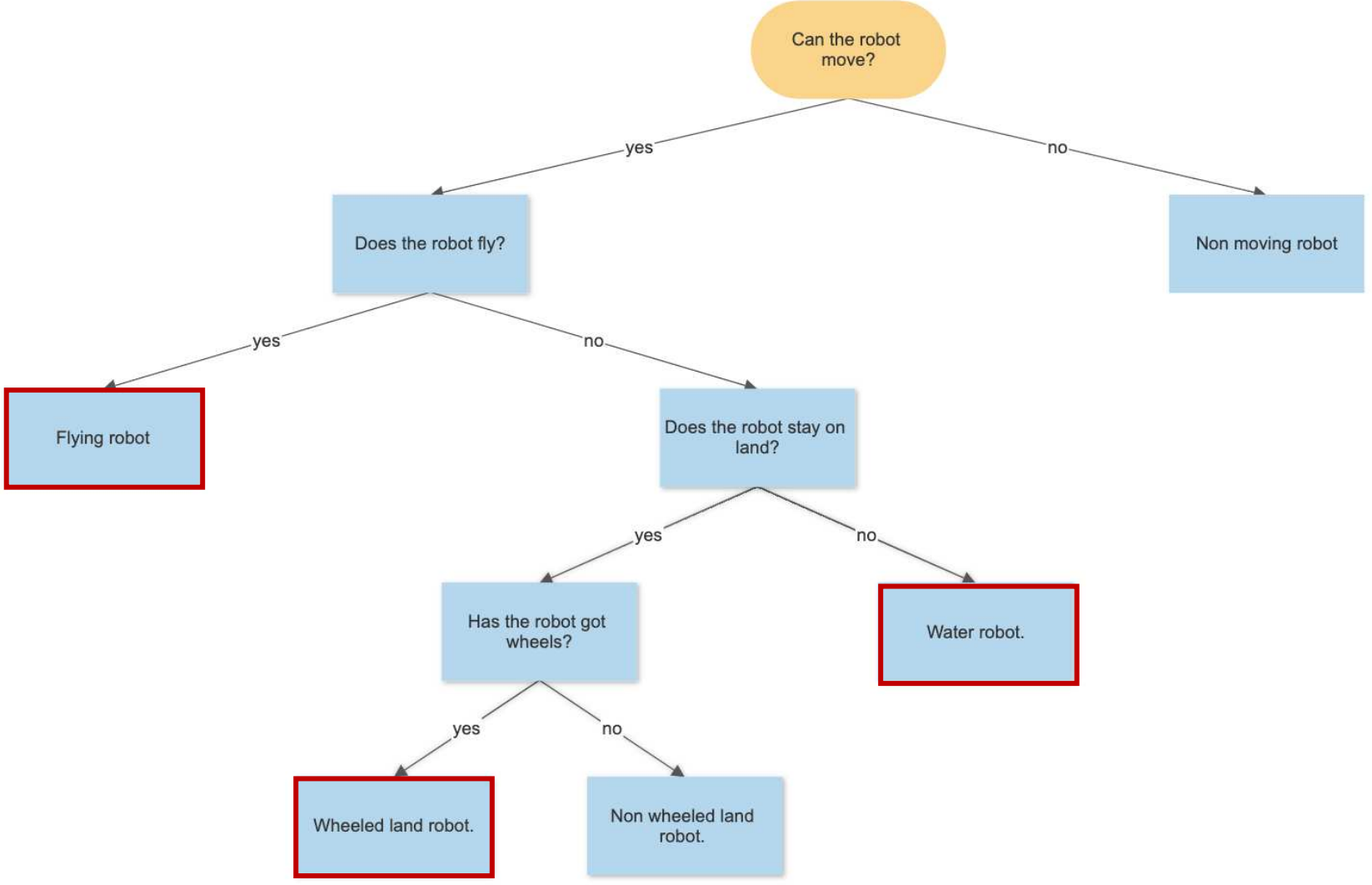
_____

No teacher answers provided for open ended questions.

Activity 4 (

Types of robots

Teacher answers:



Activity 5 (

Types of robots

Use the following words to fill in the blanks.

1. cannot	2. water	3. robots	4. wheels	5. three

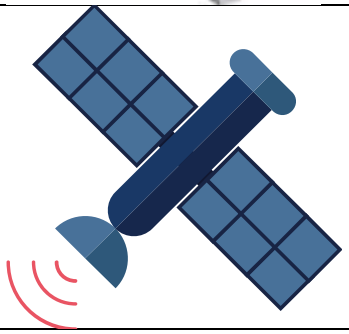
There are many different types of robots. Each robot is used in different way. Some can move, and others cannot. Robots that can move can be broken down into three categories - those that are used for flying, those that stay on the ground and those that are used in water. Robots that stay on the ground can have wheels or legs.

}

Robots and their uses

Activity 6 {

Match the type of robot with the correct image.

1 		Manufacturing Robot (2)
2 		Space Robot (4)
3 		Medical Robot (1)
4 		House Robot (3)

}

Robots and their components

Activity 7 (

Robots – input and output

Mariam and Ahmed are learning about Robots.

They learnt that a robot needs an input to produce an output.

Below is an example of a house cleaning robot.

Complete the activity below by selecting the input, process, output for this robot.

Input	Process	Output

Robot decides whether it is dirt or not.

Robot cleans up dirt.

Robot scans area for dirt.

Teacher answers:

Robot decides whether it is dirt or not - Process

Robot cleans dirt - Output

Robot scans area for dirt – Input

Activity 8 (

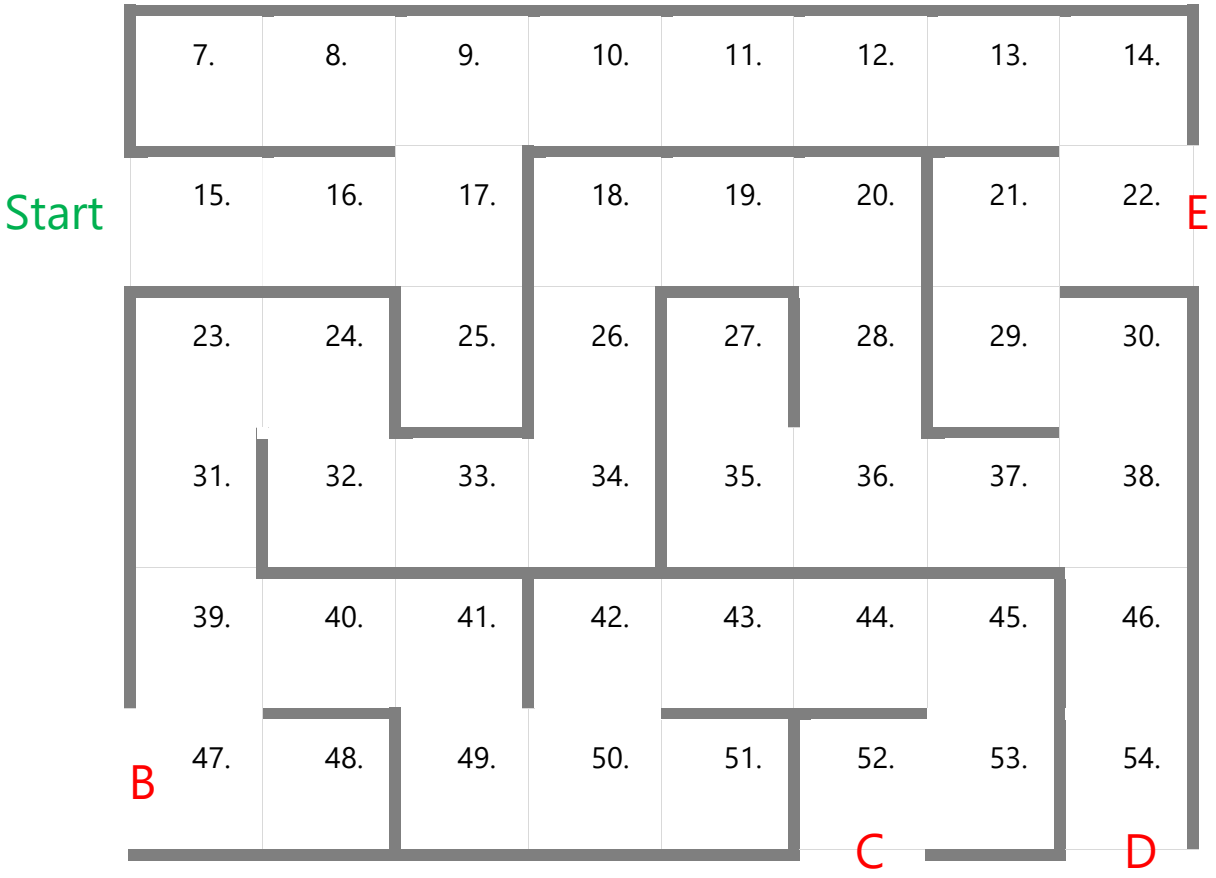
Robots – input and output

Mariam and Ahmed are learning about robot instructions.

Mariam has created some instructions for Ahmed to solve a puzzle.

Help Ahmed to solve the puzzle. Begin at 'start'.

Go 3 steps forward.
Turn left.
Go 1 step forward.
Turn right
Go 5 steps forward.
Turn right.
Go 1 step forward.
Turn left.
Go 1 step forward.



Which exit should you take? _____

Teacher answers:

Exit E

}

Activity 9 (

Robots – input and output

Ahmed now wants to create instructions for Mariam.

Help Ahmed to write the instruction for exit D.

Teacher answers:

Go 3 steps forward.

Turn left.

Go 1 step forward.

Turn right

Go 5 steps forward.

Turn right.

Take 1 step forward.

Turn right.

Take 1 step forward.

Turn left.

Take 1 step forward.

Turn left.

Take 1 step forward

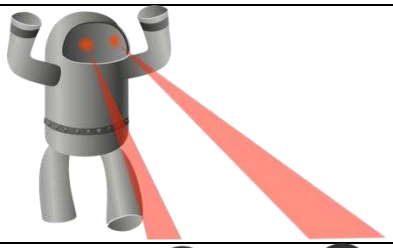
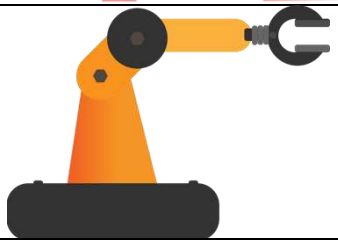
Turn right.

Take 4 steps forward and exit at D.

Activity 10 (

Automation industry

Teacher answers:

Industry	Image	What does this industry do?
Automotive		Used for building cars
Welding		**Used for joining metal together**
Food services		**Used for packaging food**
Law enforcement		**Used to help police, mostly in dangerous situation**
Electronics manufacturing		**Used to handle small parts**

Medical		**Used to help during surgery**

Activity 11 (

Sensors used in automated control systems

Mariam and Ahmed are learning about the different types of robots.

Help them to complete the activity below by filling in the gaps in the passage using the words.

human	robot vacuum	ATM	drone	semi-autonomous	small

There are three different types of robots. They are:

Autonomous

_____

Remote controlled

Autonomous robots control themselves without human input. A _____ is an example of this type of robot. Semi-autonomous robots need a very _____ amount of human input. An _____ is an example of this type of robot. Remote controlled robots are controlled by a _____. A _____ is an example of this type of robot.

Teacher answers:

There are three different types of robots. They are:

Autonomous

Semi-autonomous

Remote controlled

Autonomous robots control themselves without human input. A **robot vacuum** is an example of this type of robot. Semi-autonomous robots need a very **small** amount of human input. An **ATM** is an example of this type of robot. Remote controlled robots are controlled by a human. A **drone** is an example of this type of robot.

}

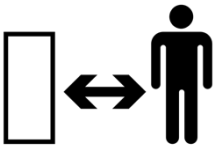
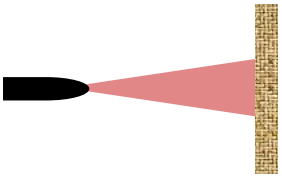
Automated control

Activity 12 (

Sensors used in automated control systems

Mariam and Ahmed are learning about sensors. Help them to complete the activity below by matching the sensor image with the correct name.

Sensor	Image
Light sensor	
Movement sensor	
Touch sensor	

Proximity sensor	
Temperature sensor	
Infrared sensor	

Activity 13 (

Sensors used in automated control systems

Mariam and Ahmed are looking at sensors used in automated control systems.

Mariam has asked Ahmed to identify the sensors in a smart home.

A smart home is where devices can be automatically controlled.

Help Ahmed to complete the activity.

Sensor		What it is used for
Light sensor 1		Lowers or increases the temperature of the room **4**
Proximity sensor 2		Used to detect noise such as babies and pets **5**
Motion sensor 3		Switches off the garden lights when the sun comes out **1**
Temperature sensor 4		Used in a burglar alarm to detect movement **3**

Sound sensor 5		Opens the garage door when the car is near **2**

}

Student reflection

Students' personal reflection.

	**Activity 14**

Write about what you have learned and liked in this unit.

Three things I have learned:

_____

_____

_____

Two things I have liked:

1. _____

_____

Knowledge and skills reflection

Please tick the box to show what you understand:			
Explained what a robot is.			
Describes robots with reference to their uses and forms.			
Differentiate input and output devices.			
Explain how robots know what to do.			
Described what automated control is.			
Described sensors used in automation control systems.			
Teacher's comments:			

End of unit quiz

Activity 15  **{**

Complete the end of unit quiz by answering the questions.

Food or drink **can** be brought into a lab.

a. True

b. False

Which of the following is NOT an example of a robot

a. Bike

b. 3D printer

c. Driverless car

An autonomous robot is one that doesn't need human help.

a. True

b. False

What is the name of the first industrial robot?

Unimate_____

A light sensor measures the temperature of the room

a. True

b. False

}

Grade 5

Robotics

Unit 3: Electricity and electronics

Teacher Answers

E-safety

E-safety – Reducing impact of computer waste

Activity 1 { 

Mariam and Ahmed are learning about computer waste. They want to help reduce the impact of computer waste on the environment.

Help them to complete the activity below by filling in the blanks.

Use the words provided to fill in the blanks.

recycle	40	pollution	donate	online	year

E-waste is very dangerous for the environment because it causes a lot of _____. Around ____million tons of e-waste is produced every _____. We can sell or _____ our electronic devices so that someone else can use them. Also, we can _____ our devices so that the expensive electronic parts can be reused. It is also a good idea to store our data _____. This means that we won't need to buy a storage device.

Teacher answers:

E-waste is very dangerous for the environment because it causes a lot of **pollution**. Around **40** million tons of e-waste is produced every **year**. We can sell or **donate** our electronic devices so that someone else can use them. Also, we can **recycle** our devices so that the expensive electronic parts can be reused. It is also a good idea to store our data **online**. This means that we won't need to buy a storage device.

}

Electricity

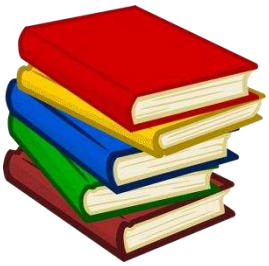
How is electricity made?

Activity 2 **{**

Mariam and Ahmed are learning about electricity.

Help them to complete by identifying which objects around them use electricity.

Object		Does it use electricity?	
		Yes	No
Computer		/	
Tap			/
Dart board			/

Fan		/	
Books			/

}

How does electricity travel?

Activity 3  **{**

Teacher answers:

Statement	True	False
We can see atoms all around us.		/
Atoms are made up of protons and electrons.	/	
Electrons are positive + and protons are negative - .		/
Electricity is made of electrons.	/	
Electic current is measured in Amps.	/	

Voltage, current and power

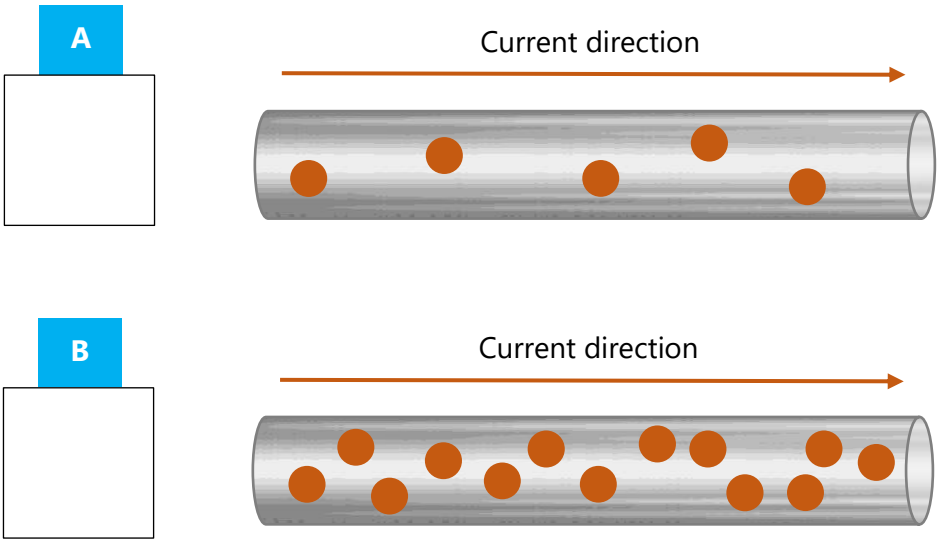
Current

Activity 4 {

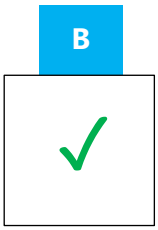
Ahmed wants to see what Mariam has learnt about current.

He has created two images for her.

Help Mariam decide which image has the bigger current. ✓



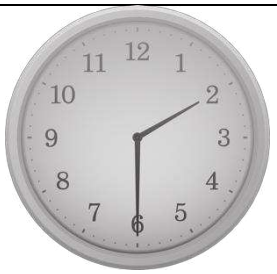
Teacher answers:



Batteries

Activity 5 {

Teacher answers:

Device		Battery name
Wall clock 2 batteries 1.5V and 2.4A		AA
Calculator 1 battery 3V and 0.25A		Coin cell
Flashlight 1 battery 1.5V and 8A		C
Scale 2 batteries 1.5V and 1.2A		AAA

Activity 6  {

Students will all do their own individual research.

Device name	Battery brand	Battery size	Voltage

Power

Activity 7  **{**

Ahmed and Mariam are calculating the Power of their batteries.

They have already calculated the Power for some of their batteries.

Help them to calculate the Power for the C battery.

_____

_____

_____

_____

Power = _____

Teacher answers:

Power = Voltage x Current

Power = 1.5 x 8

Power = 12W

}

Electrical energy

Activity 8 **{**

Ahmed and Mariam are calculating the Electrical energy of their fans.

Ahmed uses the fan in his bedroom for 4 hours a day.

It uses a C battery.

Help Ahmed to calculate the Power and Electrical energy.

_____

_____

_____

_____

Power = _____

_____

_____

_____

_____

Electrical Energy = _____

Teacher answers:

Step 1: Power

Power = Voltage x Current

Power = 1.5 x 8

Power = 12W

Step 2: Electrical energy

Electrical energy = Power x Time

Electrical energy = 12 x 4

Electrical energy = 48kWh

}

Electric circuits

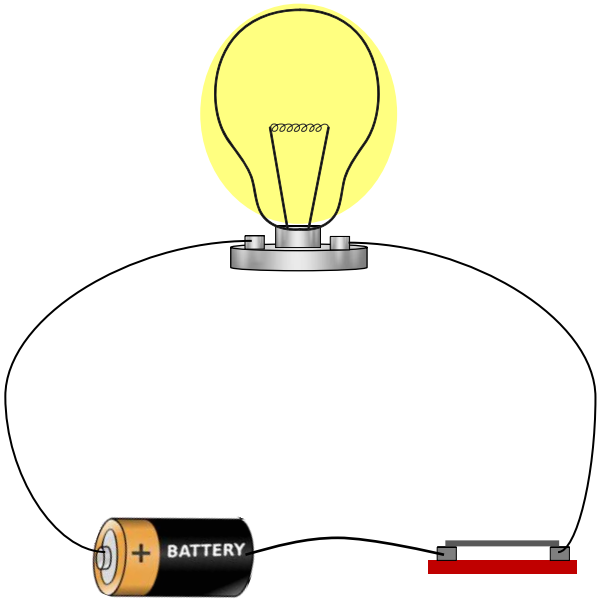
Series circuit

Activity 9 **{**

Ahmed and Mariam are learning about schematic symbols.

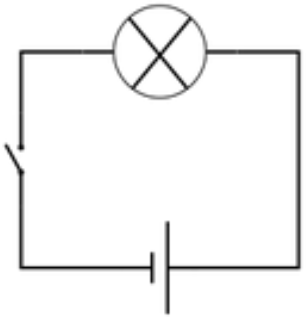
Mariam loves drawing.

Help Mariam to draw the circuit below using schematic symbols.



Schematic circuit

Teacher answers:



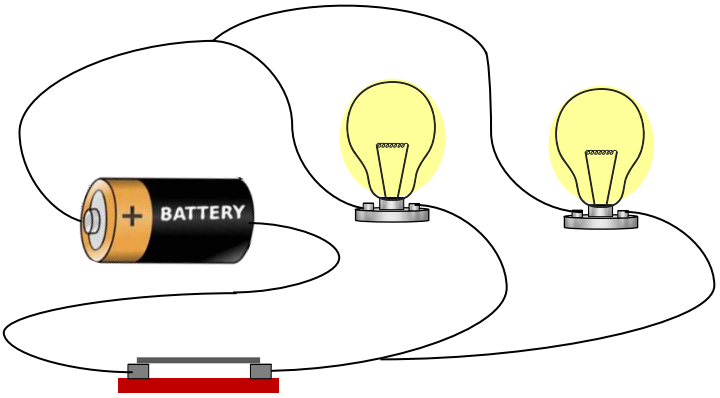
}

Parallel circuit

Activity 10 {

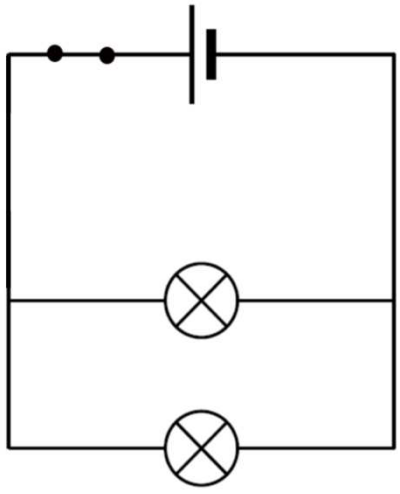
Ahmed also wants to try and draw a schematic circuit with Mariam.

Help Ahmed to draw the circuit below using schematic symbols.



Schematic circuit

Teacher answers:



}

Activity 11  {

Ahmed and Mariam are enjoying learning about circuits.

Help Ahmed and Mariam to complete the activity below.

Match the statement with the correct name.

Teacher answers:

Statement		Circuit type
Current divides when it reaches each branch. (Parallel)		Series circuit
Current flows on the same path. (Series)		
If one device in a breaks, it will not affect the rest of the devices from working. (Parallel)		
There is only one pathway. (Series)		
Adding branches does not affect the current available for each branch. (Parallel)		
The amount of current for each device decreases as more devices are added. (Series)		Parallel circuit
There can be many pathways. (Parallel)		
If one device breaks, the whole circuit will not work. (Series)		
Current moves through one device and then through the next. (Series)		

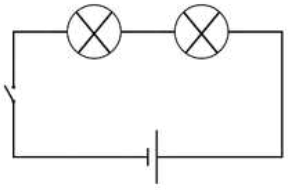
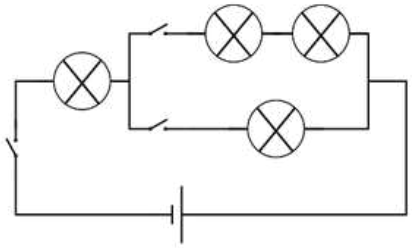
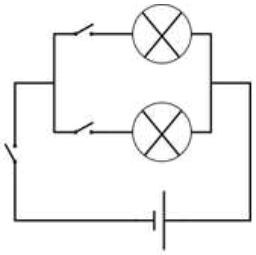
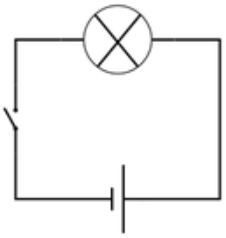
The current is split into separate paths. **(**Parallel)		

Activity 12 {

Ahmed and Mariam are enjoying learning about circuits.

Help Ahmed to complete the activity that Mariam has created for him. ✓

Teacher answers:

Circuit image	Series circuit	Parallel circuit
	/	
		/
		/
	/	

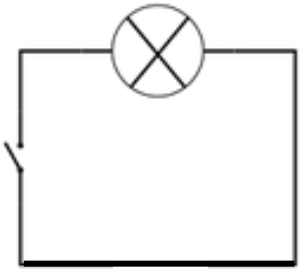
Activity 13 {

Ahmed and Mariam are enjoying learning about circuits.

Help them to create their circuit on an online simulator.

Scan the QR code to use online simulation software. You will use online simulation software to simulate a simple circuit.

Create the following circuit in the online simulator.



Does it work?	
Yes	No

If no, why do you think that is?

Circuit does not contain battery.

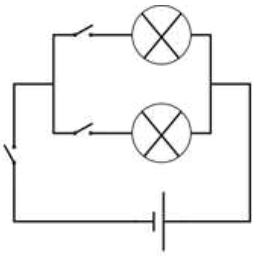
_____

_____

_____

_____

Create the following circuit in the online simulator.



Does it work?	
Yes	No

If no, why do you think that is?

It works. _____
_____
_____
_____

}

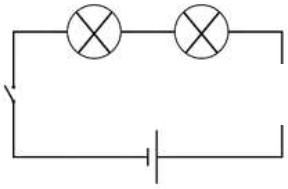
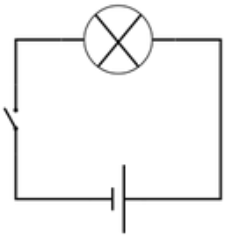
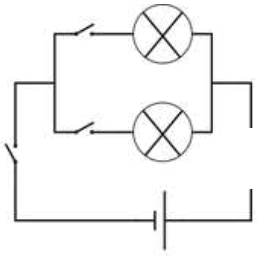
Open circuit

Activity 14 **{**

Ahmed and Mariam are learning about open and short circuits.

Help them to choose which circuits will work and which will not.

Teacher answers:

Circuit image	Will the circuit work?	
	Yes	No
		/
	/	
		/

}

Short circuit

Activity 15  **{**

Ahmed wants to see what Mariam has learnt about open and short circuits.

Help Mariam to complete the activity below.

Teacher answers:

Statement	True	False
If there is a break anywhere in a circuit, it will not work.	/	
For an electric current to flow through a circuit, it needs to have an open path.		/
A short circuit takes place when two or more wires that are not supposed to touch each other, touch.	/	
High current flowing through a short circuit can start a fire	/	
Circuit breakers and fuses are used to detect short circuits	/	

}

Activity 16 {

Ahmed and Mariam want to put together everything they have learnt.

They want to build the circuit for a car with two head lights and two break lights.

Help them to build the circuit and test it using the online simulator.

Requirements:

To power the circuit, each light needs:

1.5V

1.2A

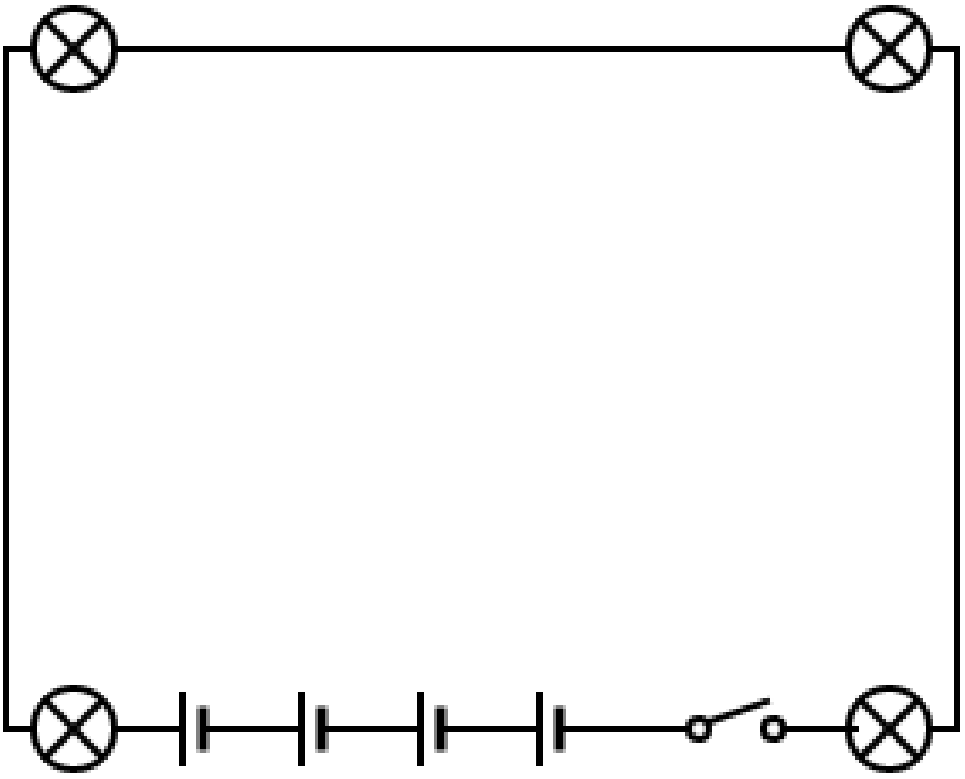
How many batteries are needed?

_____

Teacher answers**: 4 x AAA battery**

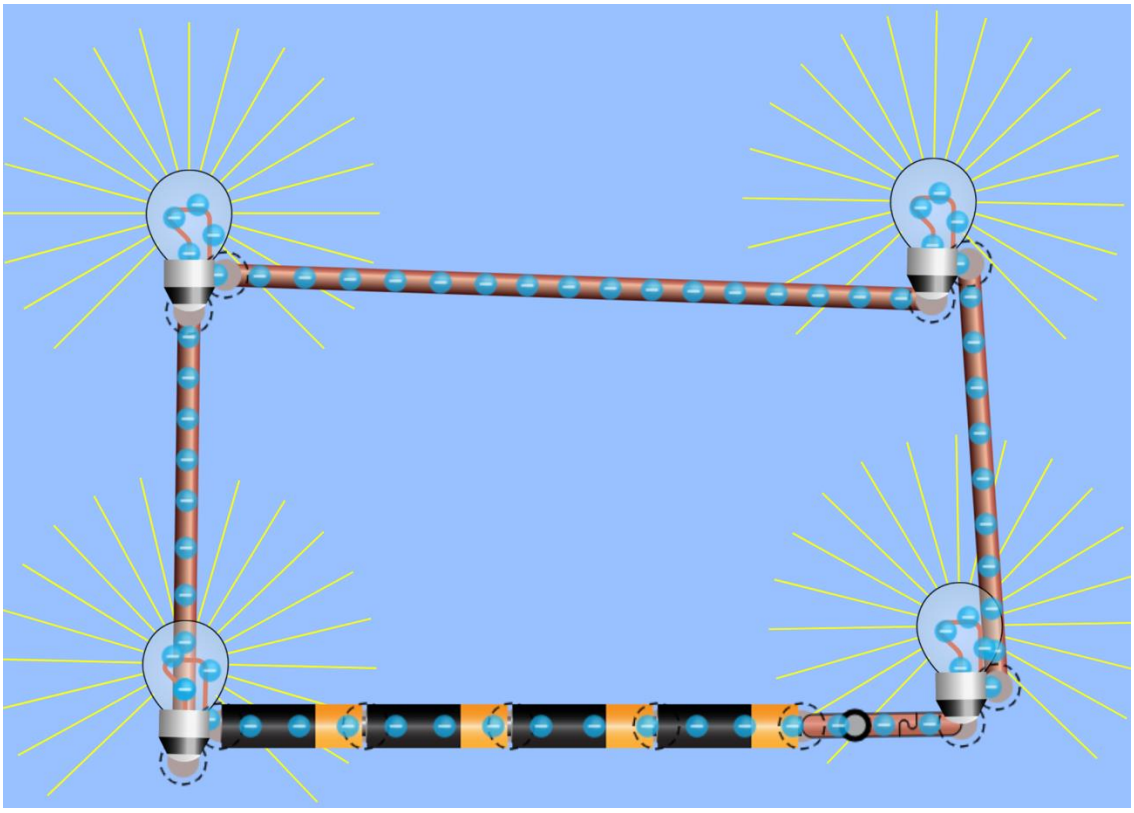
Begin by creating a schematic drawing of the circuit.

Teacher answers:



Next, use the online simulator to create and test the circuit.

Teacher answers:



Student reflection

Students' personal reflection.

	**Activity 17**

Write about what you have learned and liked in this unit.

Three things I have learned:

_____

_____

_____

Two things I have liked:

1. _____

_____

Knowledge and skills reflection

Please tick the box to show what you understand:			
Examined the flow of electrical energy through a simple circuit.			
Described the concepts of voltage potential.			
Explained how to calculate electrical energy use in a simple circuit.			
Identified different types of electrical circuits.			
Drew electrical circuit schematic diagrams using standard symbols.			
Constructed different arrangements of a circuit.			
Teacher's comments:			

End of unit quiz

Activity 18 {

Complete the end of unit quiz by answering the questions.

2. We can reduce computer waste by looking after our electronics.

    a. True

    b. False

Protons are positive  and electrons are negative. 

    a. True

    b. False

What is the name for an electric force?

    a. Current

    b. Voltage

    c. Power

The current capacity of a 'Coin cell' is…

    a. 2.4A

    b. 8A

    c. 0.25A

What is power measured in?

    a. Amps

    b. Watts

    c. Volts

Grade 5

Robotics

Unit 4: Robotics Systems and Robotics Project

Teacher Answers

E-Safety

Activity 1 { 

Ahmed and Mariam are always trying to help the environment.

Complete the table below by choosing the more environmentally friendly option for Ahmed and Mariam to choose.

Do some research to help.

The first one has been done for you.

Walking	✓	Driving	
Hand washing dishes		Using the dishwasher	✓
Putting batteries in the bin		Recycling batteries	✓
Turning lights off when not using	✓	Leaving lights on when not using	
Taking long showers		Taking short showers	✓

}

The design process

Activity 2 [

Ahmed and Mariam are learning about the design process.

Help them to complete the activity below by filling in the blanks.

Use the words provided to fill in the blanks.

design	analyse	similar	development	test	stages

Teacher answers

The **design** process is a method for breaking down large project into stages. The design process is used by designers, engineers, architects, and scientists whenever they face a problem such as a design task. The **stages** in the design process are:

- Design problem or brief
- **Analyse** the problem
- Research and planning
- Design possible and final solutions
- Produce the final product
- **Test** and evaluate the product

There are many **similar** processes used for design and project development. Some other methods are:

- Design thinking process
- Systems **development** lifecycle
- Agile development

}

Robots

Activity 3 [

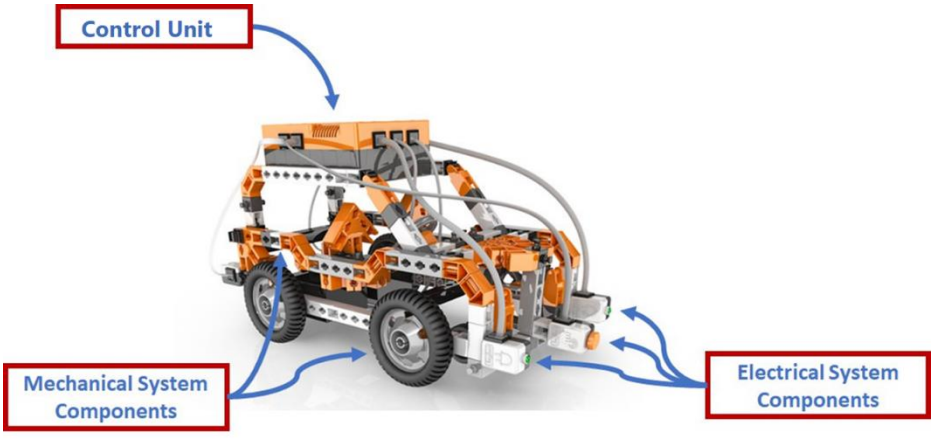
Ahmed and Mariam are learning about constructing robots.

Help them to identify the three main types of robot components.

Use the words provided to fill in the blanks.

control unit	electrical system components	mechanical system components

Teacher Answers



}

Programming robots

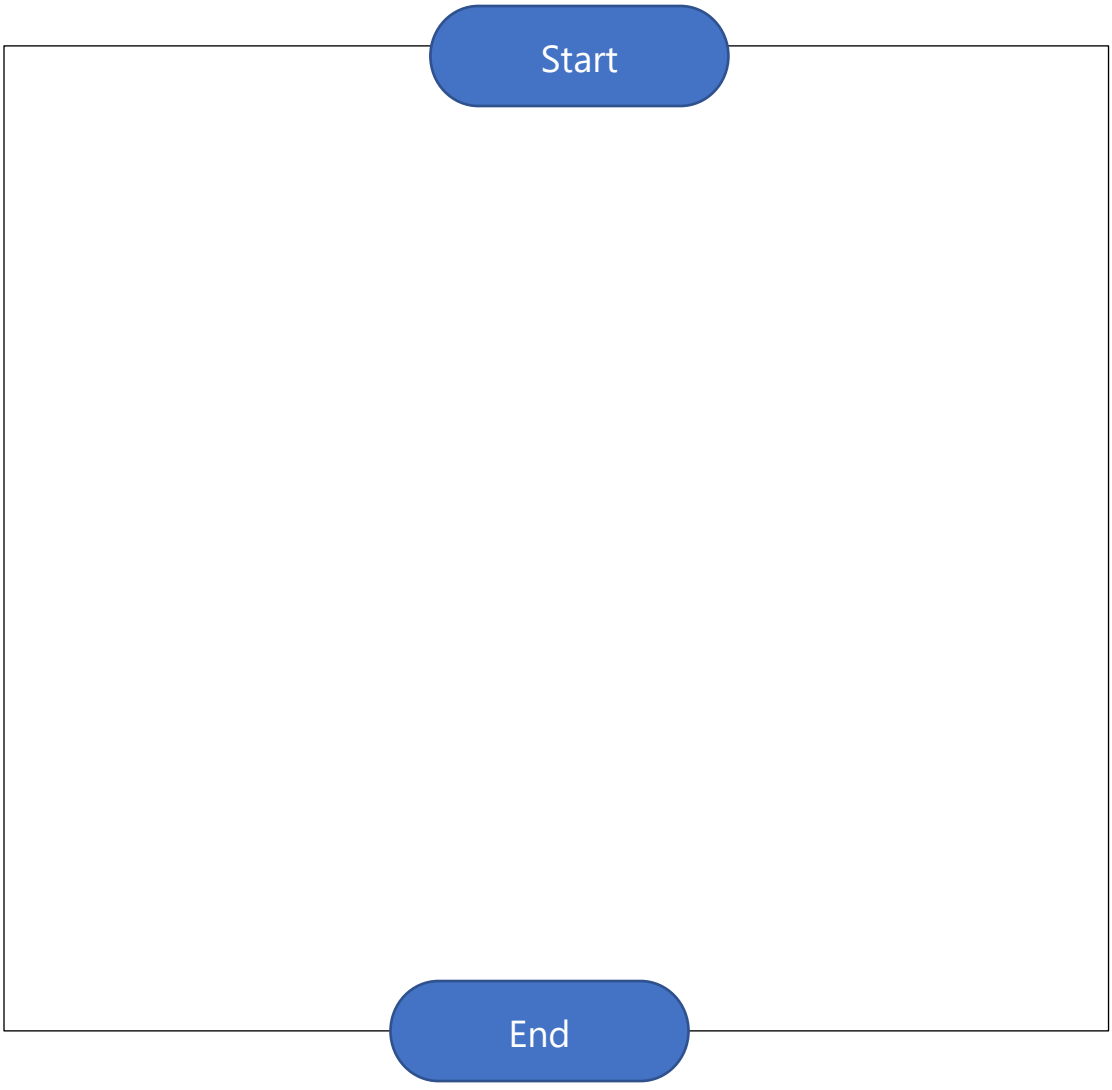
Activity 4

Ahmed and Mariam are reviewing algorithms.

Create a flowchart algorithm to solve one everyday problem.

Some examples of everyday problems are:

- buying groceries
- making a meal
- washing your clothes



Each student will create their own individual drawings.

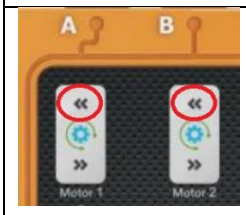
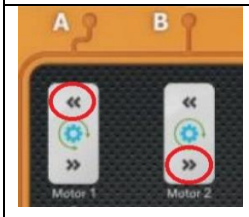
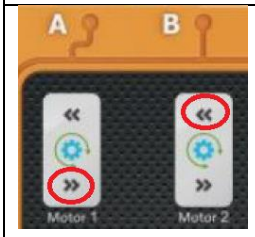
Programming constructs

Manual programming

Activity 5

Refer to the technical guide for robot building instructions.

Open ended programming question. One possible answer. Answer assumes the robot motors are connected to ports A and B.

Button	Description	Duration
	**Press the program button to start recording a manual program**	**-**
	**Pressing and hold these buttons for 2 seconds to move the robot forwards.**	**2 seconds**
	**Pressing and hold these buttons for 2 second to move the robot right.**	**2 seconds**
	**Pressing and hold these buttons for 2 seconds to move the robot left.**	**2 second**
	**Press the program button to finish recording a manual program.**	**-**
	**Press the play button to make the robot perform the manual program that has been recorded.**	**-**

Graphical programming

Activity 6

Refer to the technical guide for robot building instructions.

Open ended programming question. One possible answer:

Activity 7 {

Ahmed and Mariam are learning about the programming robots.

Help them to complete the activity below by filling in the blanks.

Use the words provided to fill in the blanks.

algorithm	selection	manual	graphical	flowcharts	instructions

Teacher Answers

Robots only do what a person has built them to do. This means they have a set of **instructions** that they follow. An **algorithm** is a set of instructions. Programmers use algorithms to plan programs before programming them. You can create algorithms are step-by-step instructions and **flowcharts**.

There are three basic building blocks (constructs) to use when designing algorithms and creating programs:

- sequence
- ***selection***
- iteration

Robots can be programmed using ***manual*** programming, graphical programming and text-based programming. To manually program a robot, you can use the buttons on a robots control unit. Using ***graphical*** programming software, blocks can be dragged, dropped, and connected to program a program a robot.

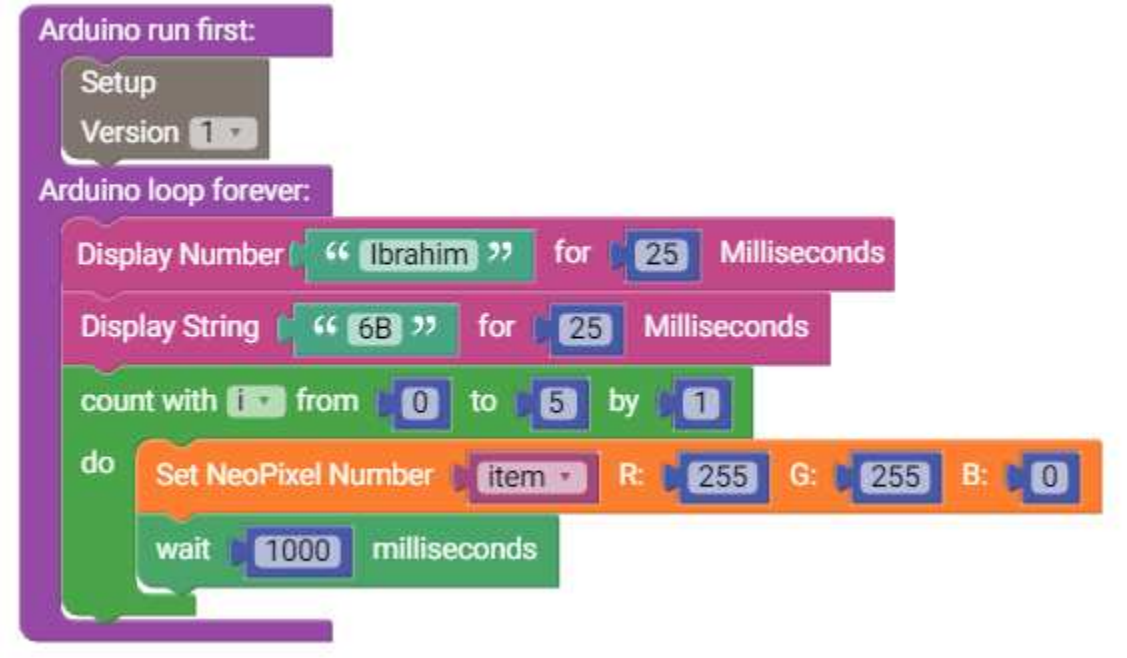
}

Activity 8 {

Ahmed and Mariam are learning about modifying code by identifying coding errors. Remember, there are two types of error in coding:

- Syntax errors where an incorrect command is used.
- Logic errors where the conditions or parameters are incorrect.

1. Identify two errors in Ibrahim's name badge program, then complete the table below.



Number	Error type	Description
1	**Syntax**	**Output text using number block (Ibrahim)**
2	**Logic**	**NeoPixel block references item instead of loop count (i)**

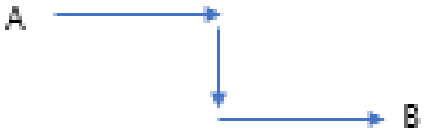
2. Use graphical programming software to modify the program to correct or remove the errors.

Activity 9 {

Solving simple problems with robots

1. Design brief: A to B robot

This problem requires getting a robot to move from location A to location B. The route between A and B will not change. The route has no obstacles or lines marking the route.



This problem could be solved using manual programming and a sequence of instructions.

2. Analysis

Answer the questions to analyse the problem. Write your answers below.

What does the robot need to do?

What components will the robot need?

What type of programming and constructs will you use?

No teacher answers provided for open ended questions.

Activity 10 {

Remember, Ahmed and Mariam are learning about solving problems with robots using the design process.

3. Design Solutions

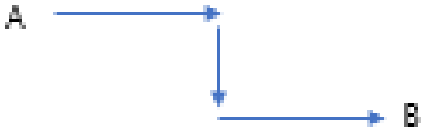
Students will all do their own personalised drawings.

a) Draw a design of the robot for the A to B problem.

Remember to include all the required components.

b) Create an algorithm for the A to B robot program using step-by-step instructions.

Remember, the route between A and B will not change. The route has no obstacles or lines marking the route.



The first instruction has been done for you.

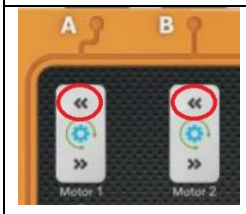
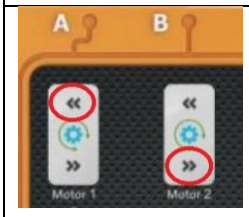
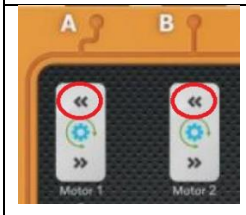
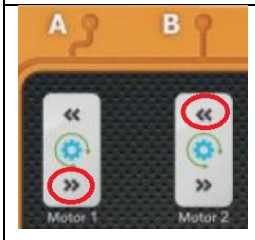
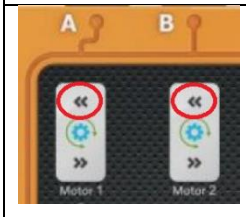
Number	Instruction	Duration
1	**Move the robot forward**	**3 seconds**
2	**Move the robot right**	**1 second**
3	**Move the robot forward**	**1 seconds**
4	**Move the robot left**	**1 second**
5	**Move the robot forward**	**3 seconds**
6	**Stop the robot**	**-**

Activity 11

Teacher answers

Refer to the technical guide for robot building instructions.

Answer assumes the robot motors are connected to ports A and B.

Button	Description	Duration
	**Press the program button to start recording a manual program**	**-**
	**Pressing and hold these buttons for 3 seconds to move the robot forwards.**	**3 seconds**
	**Pressing and hold these buttons for 1 second to move the robot right.**	**1 second**
	**Pressing and hold these buttons for 1 second to move the robot forwards.**	**1 seconds**
	**Pressing and hold these buttons for 1 second to move the robot left.**	**1 second**
	**Pressing and hold these buttons for 3 seconds to move the robot forwards.**	**3 seconds**
	**Press the program button to finish recording a manual program.**	**-**

	**Press the play button to make the robot perform the manual program that has been recorded.**	

Activity 112

No teacher answers provided for open ended questions.

Remember, Ahmed and Mariam are learning about solving problems with robots using the design process.

5. Test and evaluate the product

a) Test your A to B robot. Does it meet the design brief?

If your robot does not meet the brief, you can change the algorithm or variables to produce the required output or improve performance.

Test	Result	
Does the robot use manual programming?	☐ No	☐ Yes
Does the robot move from location A to location B?	☐ No	☐ Yes

b) Evaluate the A to B robot. Does it meet the brief and produce the required output?

Write your answer below.

Activity 13

Ahmed and Mariam are learning about solving problems with robots using the design process. Demonstrate how to solve a problem using the design process:

1. Design brief: Maze solver

This problem requires getting a robot from the entrance to a goal in a maze. The route from entrance to the goal can be changed. The walls in the maze are obstacles that the robot must avoid. The program will:

- set the ports for sensors and motors.
- input data from the sensors.
- move the robot right for 3 seconds when an obstacle is detected on the left.
- move the robot left for 3 seconds when an obstacle is detected on the right.

Here is an example of a maze the robot should be able to solve:

			Goal
Entrance			

This problem could be solved using graphical programming with a selection and repetition.

No teacher answers provided for open ended questions.

2. Analysis

Answer the questions to analyse the problem. Write your answers below.

What does the robot need to do?

What components will the robot need?

What type of programming and constructs will you use?

Activity 14

Remember, Ahmed and Mariam are learning about solving problems with robots using the design process.

3. Develop Solutions

Students will all do their own personalised drawings.

a) Draw a design of the robot for the maze solver problem.

Remember to include all the required components.

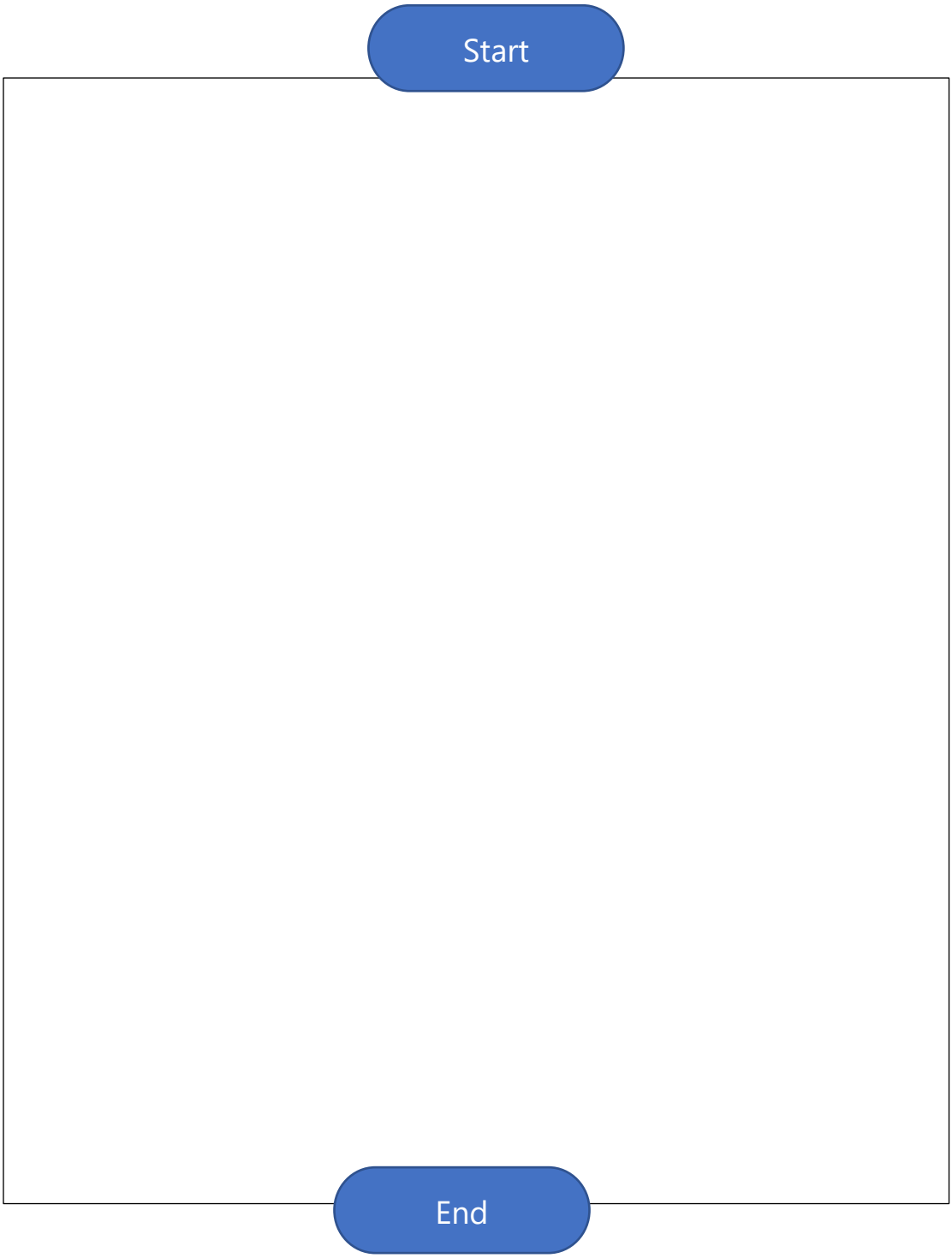
b) Draw a design of the maze for the robot to solve.

Remember, the route from entrance to the goal can be changed.

c) Create a flowchart algorithm for the maze solver robot program.

The program will:

- set the ports for sensors and motors.
- input data from the sensors.
- move the robot right when an obstacle is detected on the left.
- move the robot left when an obstacle is detected on the right.



No teacher answers provided for open ended questions.

Activity 15

Remember, Ahmed and Mariam are learning about solving problems with robots using the design process.

4. Produce the final product

a) Before you program the maze solver robot, you need to build a robot with the required components. Use your design to help build the robot.

Use the QR code below for technical guidance on this activity:

Refer to the technical guide for robot building instructions.

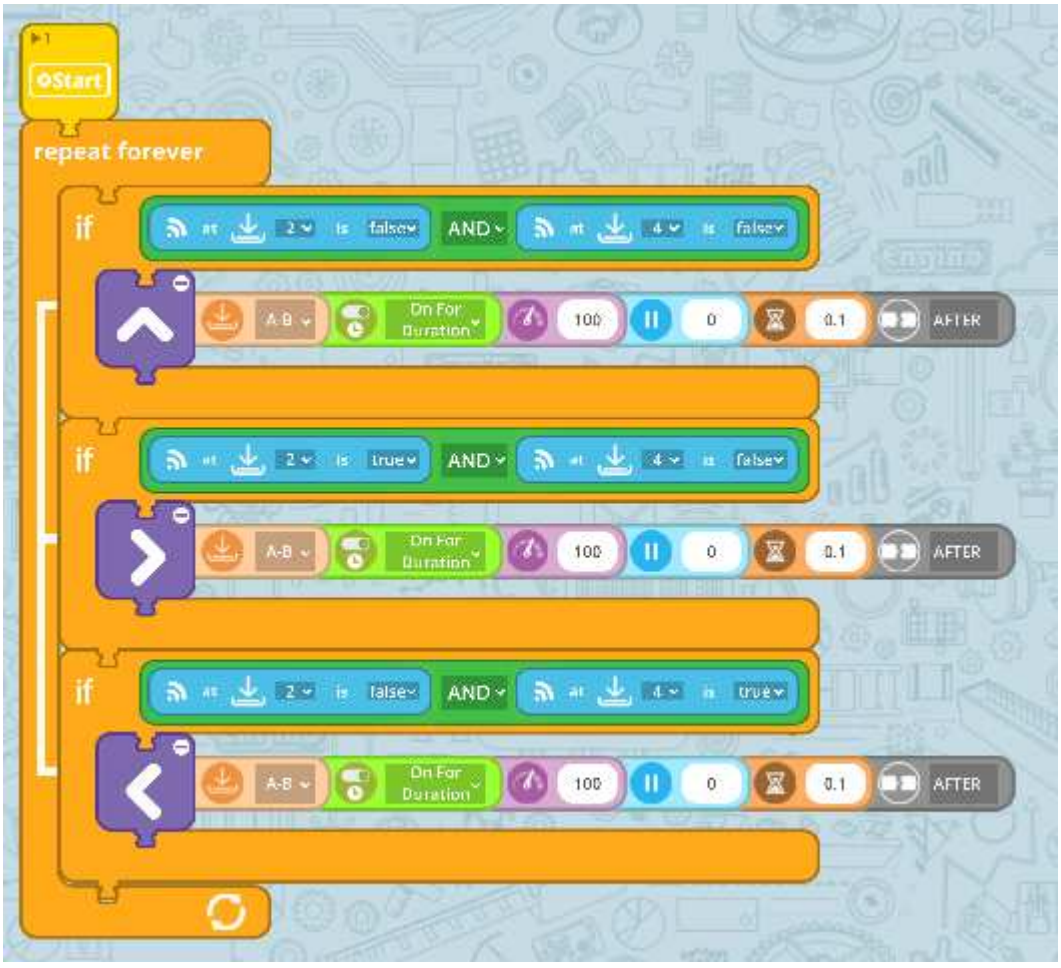
b) Create the maze solver robot program using graphical programming with selection and repetition. Start by watching the video to learn more about how robots can avoid obstacles:

Use your flowchart algorithm to help you create the program.

Here is an example showing part of the maze solver robot program:

Use the QR code below for technical guidance on this activity:

Teacher answers



}

Activity 16

No teacher answers provided for open ended questions.

Remember, Ahmed and Mariam are learning about solving problems with robots using the design process.

5. Test and evaluate the product

a) Test your maze solver robot. Does it meet the design brief?

If your robot does not meet the brief, you can change the algorithm or variables to produce the required output or improve performance.

Test	**Result**	
Does the program set the ports for sensors and motors?	☐ No	☐ Yes
Does the program input data from the sensors?	☐ No	☐ Yes
Does the robot move right for 3 seconds when an obstacle is detected on the left?	☐ No	☐ Yes
Does the robot move left for 3 seconds when an obstacle is detected on the right?	☐ No	☐ Yes
Does the robot solve the maze?	☐ No	☐ Yes

b) Evaluate the maze solver robot. Does it meet the brief and produce the required output?

Write your answer below.

c) The variables in your maze solver program are used to set the duration of movement.

Change the variables in the program to produce the required output

1. Change the movement time to 2 seconds in the program.

Does it meet the brief and produce the required output?

Write your answer below.

2. Change the movement time to 0.1 seconds in the program.

Does it meet the brief and produce the required output?

Write your answer below.

The advantages and disadvantages of robots

Activity 17  **{**

Teacher answers:

Sentence	True/False
Robots can get tired, humans cannot.	**False**
A computer does not need training to learn something new.	**False**
Robots are programmed to do a task, so they don't have to think.	**True**
Robots will replace a lot of jobs.	**True**
You do not need to be an expert to fix a robot.	**False**

}

Activity 18 (

Teacher answers:

	Advantage	Disadvantage
They help us to clean our homes	/	
They cannot be used if the battery isn't charged		/
We don't need to help them to clean	/	
They can get damaged because their parts can be broken easily		/
They will not work properly if the sensors are blocked		/

}

The future of robots

No teacher answers provided for open ended questions.

Activity 19  **{**

Ahmed and Mariam are learning about robots that have replaced human jobs.

They want to see pictures of them.

First, find pictures of these robots using the internet. Then, draw an example of each these robots:

Assembly line robot	Taxi robot
Phone operator robot	Self-scan robot

Impact of robots on future jobs

Activity 20  **{**

Mariam and Ahmed are learning about jobs that robots can also do.

Complete the activity below by filling in the gaps in the passage.

online	**taught**	**detailed**	**replaced**	**operations**	**facial**

There are many jobs that will get replaced by robots in the future. These jobs are ones that a robot can be **taught** how to do. Robots and **drones** will be doing deliveries in the future. They will be quicker than humans. Robotics surgeons can perform major **operations** on people. They are more **detailed** than humans. Some security technologies that have made robots very useful include **facial** recognition software high tech robotic guards. Shop assistants will also be replaced by robots. This is because many people can buy and return through **online** shopping.

}

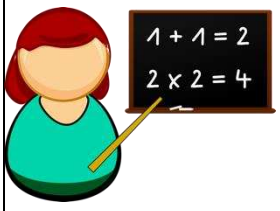
Jobs that robots cannot do

Activity 21 {

Mariam and Ahmed are learning about jobs that robots can also do.

Choose which jobs you think can be done by a robot and why.

You can do research to help you.

Job		Robot?		Why?
		Yes	No	
Soldier		/		**Many robots used currently being used for search, rescue, and attack.**
Scientist			/	**Machines cannot carry out research. They cannot find solutions to certain problems.**
Teacher			/	**Robots cannot inspire students. They aren't creative.**
Dentist			/	**Research has shown that only 13 percent of a dental hygienist activities can be automated.**
Bus driver		/		**With the technology of driverless cars, bus drivers and taxi drivers will be replaced.**

}

Artificial intelligence

Activity 22 {

Mariam and Ahmed are learning about artificial intelligence.

Complete the statements below by selecting ✓ or ✗.

Statement	✓	✗
AI outperforms humans in everything		/
Humans can process large amounts of information quicker than AI systems		/
Ai systems will always be consistent and stay the same	/	
Smelling and taste are a unique feature of AI systems		/
AI systems cannot show empathy like a human can	/	
Humans are more adaptable at dealing with new situations than Ai systems	/	

}

Activity 23 {

Mariam and Ahmed are learning more about artificial intelligence.

Help them to complete the activity by completing the AI for oceans course.

AI for oceans course: https://code.org/oceans	Code: ytjs

}

Robotics project

Systems development lifecycle

Activity 24

Read the project brief, then talk about the project. Work in pairs.

Explain what you need to do to for the project.

Write your answer below.

No teacher answers provided for open ended questions.

Activity 25

Answer the questions below.

Your answers will show that you understand the line follower robot project.

1. You will finish each stage of the development cycle to complete the project.

1. A. True B. False

True

2. In this project, you will program a robot to avoid obstacles?

2. A: True B: False

False

3. In this project, you will program a robot to follow a line?

3. A: True B: False

True

4. Which components will you use to move the robot?

4. A. remote B. IR sensors

5. C. motors D. distance sensors

motors

5. Which components will help the robot follow the line?

6. A. remote B. IR sensors

7. C. ambient light sensors D. distance sensors

IR sensors

2. Planning

Project planning

Activity 26

Development cycle stages
Programming
Testing
Self-reflection
Project brief
Planning

Look at the project stages below. Then, put the stages into the correct order.

This will help you to plan when to complete each stage in the project.

Project brief

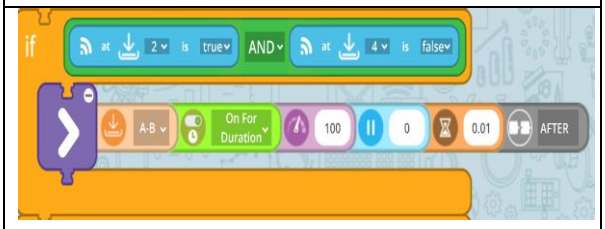
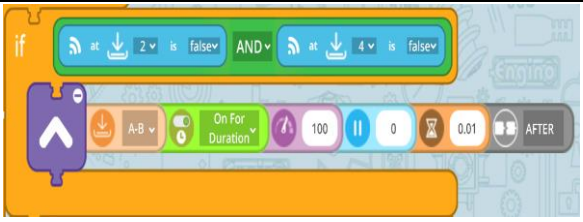
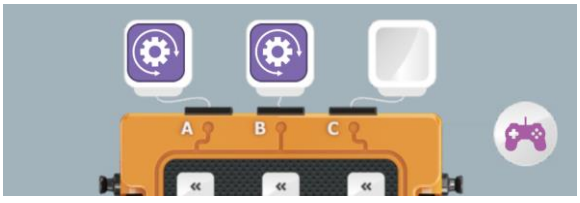
Number	Stage
1.	Project brief
2.	**Planning**
3.	**Programming**
4.	**Testing**
5.	**Self-reflection**

Activity 27

Technology Engineering

Before you create an algorithm for the program you should review the programming blocks that you can use with the robot.

Match the requirements to the programming blocks needed to meet them.

Description		Programming blocks
Set the ports for the two motors.		
Set the ports for the two IR sensors.		
Move the robot forwards when no line is detected.		
Move the robot left when a line is detected on the left.		
Move the robot right when a line is detected on the right.		

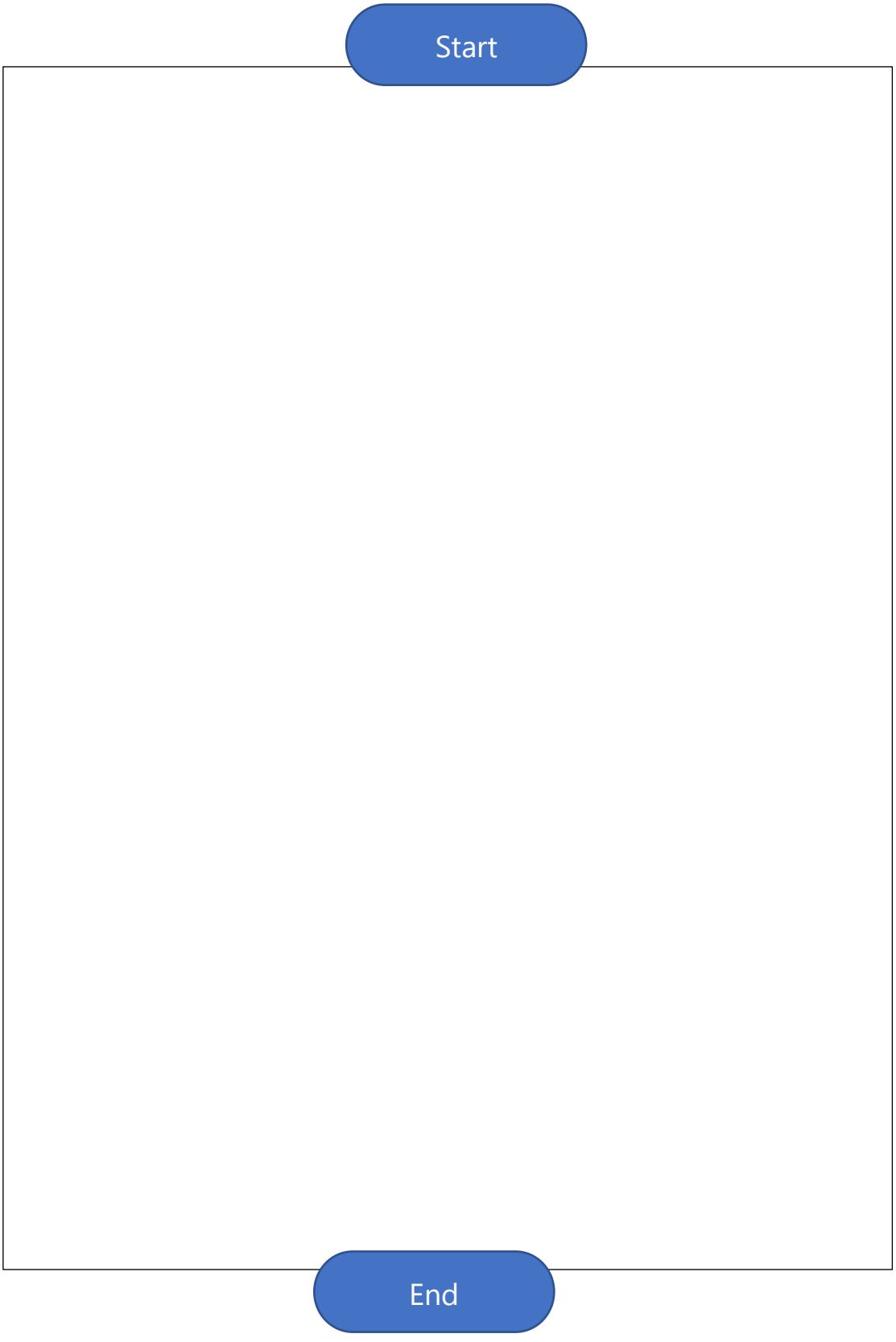
Activity 28 {

Use what you know about the line follower program and your flowchart skills.

Create a flowchart algorithm for the line follower program.

Their program will:

- **Set the ports for:**
  - **two IR sensors**
  - **two motors**
- Input data from the IR sensors.
- Move the robot forwards when no line is detected.
- Move the robot left when a line is detected on the left.
- Move the robot right when a line is detected on the right.
- Move the robot forwards when a line is detected on the left and right.



No teacher answers provided for open ended questions.

Activity 29

Before you create the line follower program you must build a robot with the required components.

The robot you build should include:

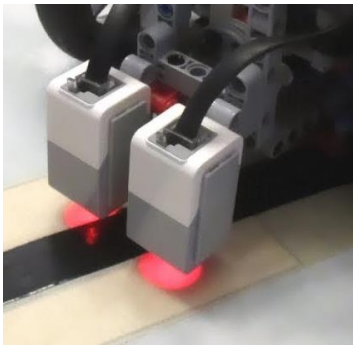
two IR sensors

two motors

a control unit

Remember, your line follower robot will be used to guide visitors around the UAE pavilion at Expo 2020. Here is an example of a robot with two motors and a control unit:

Here is an example of two IR sensors on a robot that can be used to detect lines:



Refer to the technical guide for robot building instructions.

Activity 30

Create the line follower program then, upload it to the robot.

The program will:

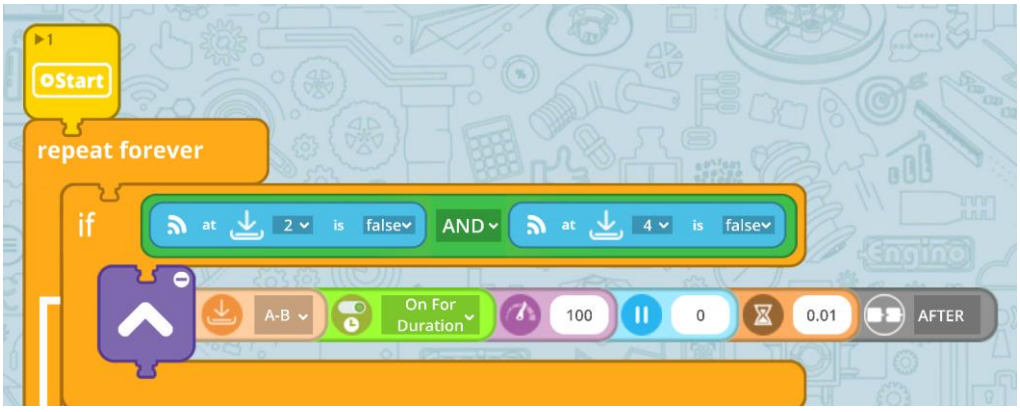
Set the ports for:

two IR sensors

two motors

- Input data from the IR sensors.
- Move the robot forwards when no line is detected.
- Move the robot left when a line is detected on the left.
- Move the robot right when a line is detected on the right.
- Move the robot forwards when a line is detected on the left and right.

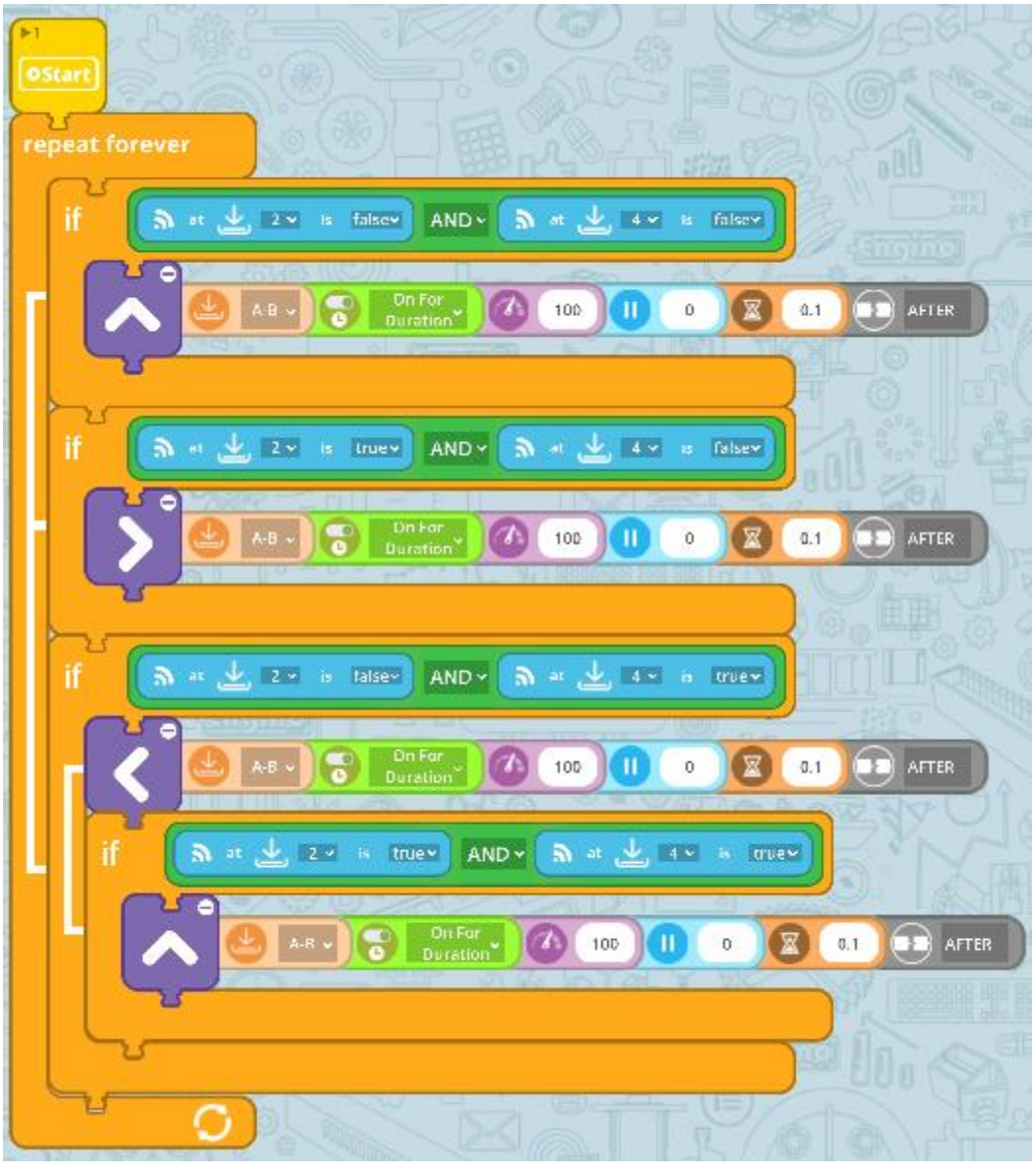
Here is an example showing part of the project program:



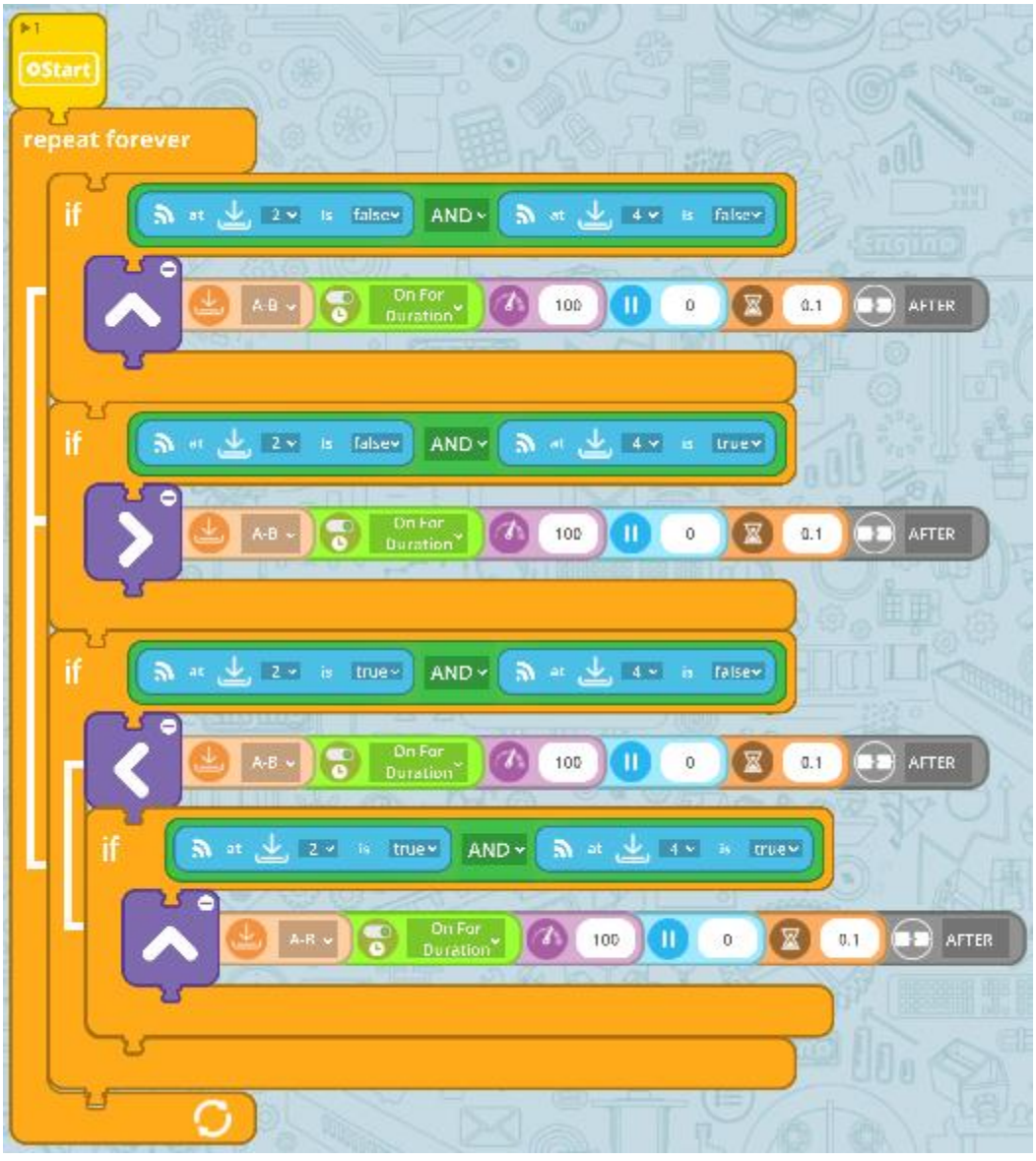
Teacher Answers

Solution 1

The line follower program can be solved in two ways depending on the calibration of the IR sensor to read True for black or white:



Solution 2


OStart
repeat forever
if
at 2 is false AND at 4 is false
A-B On For Duration 100 0 0.1 AFTER
if
at 2 is false AND at 4 is true
A-B On For Duration 100 0 0.1 AFTER
if
at 2 is true AND at 4 is false
A-B On For Duration 100 0 0.1 AFTER
if
at 2 is true AND at 4 is true
A-B On For Duration 100 0 0.1 AFTER

}

4. Testing

Activity 31

Test your line follower robot. Does it meet the basic requirements?

If your robot does not meet the basic requirements, go back and try to fix it. Then, write your results.

Test	**Result**	
Does the robot include: two IR sensors two motors a control unit	☐ No	☐ Yes
Does the program set the ports for two IR sensors?	☐ No	☐ Yes
Does the program set the ports for two motors?	☐ No	☐ Yes
Does the program input data from the IR sensors?	☐ No	☐ Yes
Does the program the robot forwards when no line is detected?	☐ No	☐ Yes

Did you answer No to any questions? If so, can you change your program to improve your test score?

Explain any changes that you made to your program.

Write your answer below.

5. Self-reflection

Activity 32

Think about how you did. Read the statements below.

Tick the boxes that show how you did [√].

Statements	I needed help	I improved during the project	I am an expert!
I understood the project brief and answered the questions.	☐	☐	☐
I planned the order to finish each stage in the project.	☐	☐	☐
I identified programming blocks needed to meet the requirements.	☐	☐	☐
I created a flowchart for the program.	☐	☐	☐
I built a robot including the required components.	☐	☐	☐
I used graphical programming software to create the program and upload it to the robot.	☐	☐	☐
I did my own testing and changed the robot or program (if needed).	☐	☐	☐

Explain any other areas that you think you could do better in.

_____

_____

_____

Activity 33

Use the checklist to make sure you have completed all of the required tasks for the project

Tick the box that shows what they did [√].

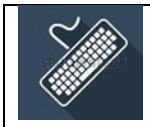
Project stage/Task	Completed?	
	Yes	No
1. Project brief		
I understood the project brief and answered the questions.	☐	☐
2. Planning		
I planned the order to finish each stage in the project.	☐	☐
I identified programming blocks needed to meet the requirements.	☐	☐
I created a flowchart for the program.	☐	☐
3. Programming		
I built a robot including the required components.	☐	☐
I used graphical programming software to create the program and upload it to the robot.	☐	☐
4. Testing		
I did my own testing and changed the robot or program (if needed).	☐	☐
5. Self-reflection		
I thought about how well I did in each project task.	☐	☐

Teacher feedback box

Your teacher will give you feedback on the work that you have done.

What went well	Even better if

Use the box below to set future targets for the student.



Activity 34

Mariam wants to tell her friends all about the line follower robot project.

They have decided to do a presentation for them to explain the line follower project.

The presentation will:

- **introduce the project.**
- **explain the program and components used.**
- **explain how you could improve the program and your performance.**

Use the checklist to review your presentation.

Design requirements	Achieved?	
Uses at least two slide layouts.	☐ Yes	☐ No
Uses images and text.	☐ Yes	☐ No
Uses font styles.	☐ Yes	☐ No
Uses slide design.	☐ Yes	☐ No

Student reflection

Activity 35

Write about what you have learned and liked in this unit.

Three things I have learned:

1. _____

_____

_____

Two things I have liked:

2. _____

_____

Knowledge and skills reflection

Please tick the box to show your understanding of:			
I identified the requirements for the final project.			
I demonstrated an understanding of the final project and requirements.			
I tested the project against the requirements.			
I thought about my project performance and identified areas for development.			
Teacher's comments:			

End of unit quiz

Activity 36

What have you learned? Do the quiz.

1. Which is the first stage of a project?

3. A. Project brief B. Planning

4. C. Testing D. Self-reflection

Project brief

2. Which stage of the project did you create a flowchart algorithm?

5. A. Programming B. Planning

6. C. Self-reflection D. Testing

Planning

3. The line follower robot included a control unit, motors and IR sensors?

7. A. True B. False

True

4. What type of programming did you use to create the line follower program?

8. A. graphical programming B. text-based programming

graphical programming

5. Which stage of the project did you check how well you did?

9. A. Project brief B. Planning

10. C. Programming D. Self-reflection

Self-reflection

}