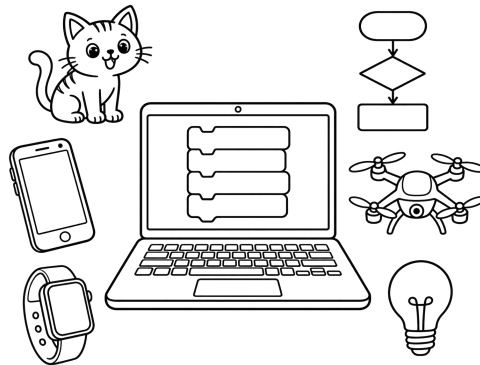


ICT

INFORMATION AND COMMUNICATION TECHNOLOGY

GRADE 8



UNIT 4

Programming

Student Workbook



"The King of ICT"

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STUDENT DETAILS

Name:

School:

Institution:

Contact:

BEFORE WE START

What This Unit Is About

Read this page with your teacher

AT THE END OF THIS UNIT YOU WILL BE ABLE TO

- ☐ Analyse a problem and find its input, process and output.
- ☐ Name the three control structures: sequence, selection and repetition.
- ☐ Draw and read flowcharts with the correct symbols.
- ☐ Solve day-to-day problems with sequence and selection.
- ☐ Use the IF THEN and IF THEN ELSE blocks in Scratch.
- ☐ Use comparison blocks (<, =, >) and logical blocks (and, or, not).
- ☐ Name mobile and smart devices and the apps we use on them.

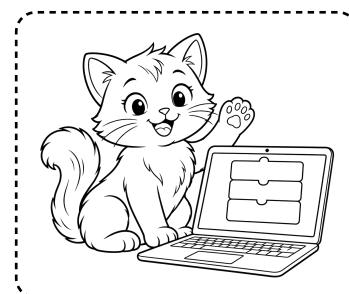
THREE RULES FOR THE COMPUTER ROOM

- **Always** save your Scratch project, and give it a clear name.
- **Never** download or install an app without asking your teacher or parents.
- **Never** eat or drink near the computer.

HOW TO USE THIS BOOK

Each chapter has three parts. First you **read** the chapter with your teacher. Then you **do** the practical task on a real computer (or on paper). Last you **write** the exercises in this book.

Colour the small pictures when you finish your work early.



Colour me!

THE WORDS YOU WILL LEARN

Problem analysis	Input	Process	Output
Data	Information	Algorithm	Flowchart
Control structure	Sequence	Selection	Repetition
Condition	Decision	Scratch	Variable
IF THEN	IF THEN ELSE	Comparison block	Logical block
MOD	Smart device	App	Drone camera

"Every program starts with a problem. Every solution starts with a plan."

- THE KING OF ICT



CHAPTER 1

Problem Analysis

? A PROBLEM AT THE BOOKSHOP

"Uncle Sunil made a mistake in the bill again!"

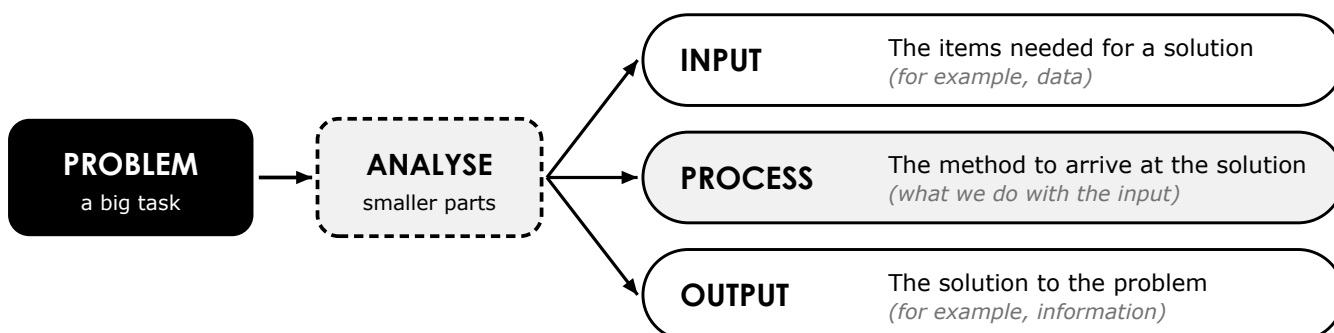
"Can a computer program make the bill for him?"

Yes! But first we must analyse the problem: what goes in, what the computer does and what comes out.



4.1 What is problem analysis?

Analysing a problem means dividing the problem into **smaller parts** and examining each part. This makes the problem easier to solve. Before we develop a computer program, we analyse the problem and find its **input**, **process** and **output**.



4.2 Analysing a bill

Look at this bill from a stationery shop. To find the price of each item, we need the **number of items** and the **unit price** (the price of one item).

Bill - ABC Bookshop

Item	Number of items	Unit price (Rs.)	Price (Rs.)
200-page book	1	150.00	150.00
80-page book	4	55.00	220.00
Carbon pen	3	15.00	45.00
Total			415.00

PROCESS

INPUT

OUTPUT

i THE ANALYSIS

Input: The item, the number of items and the unit price (the price of one item).

Process: Price = number of items × unit price.
Total bill = all the prices added together.

Output: The price of each item and the total bill (the amount to be paid).



4.3 Two more examples

In every problem, we can find the input, the process and the output.

	Example 1: Year of birth	Example 2: Cost of five pens
Problem	Find the year of birth from a National Identity Card (NIC) number, like 987654321V .	Find the cost of buying five pens.
Input	The NIC number	The price of a pen
Process	Select the first two digits (98)	Total = price of a pen $\times$ 5
Output	The year of birth (1998)	The total amount

> DO IT - PRACTICAL 1 (WORKBOOK ACTIVITY 4.1)

Analyse a real bill with a friend. You need a bill and a pencil.

1	Take a bill from a shop at home, or ask your teacher for one.
2	Find the items, the number of items and the unit prices. These are the inputs . Circle them.
3	Check each price: number of items $\times$ unit price. This is the process .
4	Add all the prices. Is the total on the bill correct?
5	The prices and the total are the outputs . Underline them. Then write your analysis below.

Input: _____

Process: _____

Output: _____

A Analyse the problem

9 marks

Write the input, process and output of each problem. The first one is done for you.

Problem	Input	Process	Output
Find the cost of five pens	The price of a pen	Total = price of a pen $\times$ 5	The total amount
Find the total marks of three subjects			
Find the area of a rectangle			
Find the balance when you pay for a book with a Rs. 500 note			



B Fill in the blanks

6 marks

Use the words in the box.

WORD BANK

smaller analyse input process output unit price

- Analysing a problem means dividing it into parts.
- We must a problem before we develop a computer program.
- The items (data) we need to find the solution are the
- The method we use to arrive at the solution is the
- The solution to the problem (information) is the
- The price of one item is called the

C Input, process or output?

8 marks

Tick the correct column for each item.

Problem	Item	Input	Process	Output
Total marks	The total marks	☐	☐	☐
Five pens	The price of one pen	☐	☐	☐
Year of birth	Select the first two digits	☐	☐	☐
Year of birth	The year of birth	☐	☐	☐
Total marks	Add the three marks	☐	☐	☐
Year of birth	The NIC number	☐	☐	☐
Five pens	Price of a pen $\times$ 5	☐	☐	☐
Total marks	The marks of the three subjects	☐	☐	☐

D Answer these

4 marks

Write full sentences.

- What is problem analysis? (2 marks)

- Why must we analyse a problem before we develop a computer program? (2 marks)



E True or false

6 marks

Write T or F in the box.

1. ☐ We should analyse a problem before we develop a computer program.
2. ☐ The output is the method we use to solve a problem.
3. ☐ In a bill, the unit price is an input.
4. ☐ Analysing a problem makes it harder to solve.
5. ☐ Price = number of items × unit price is a process.
6. ☐ When we find the year of birth from an NIC number, the year of birth is the input.

F Complete the bill

6 marks

Fill in the prices and the total of this canteen bill. Then answer the questions.

Item	Number of items	Unit price (Rs.)	Price (Rs.)
Fish bun	2	60.00	
Vadai	4	25.00	
Milk packet	3	50.00	
		Total	

1. Which columns are the input?

2. What is the output of this bill?

CHAPTER 2

Control Structures and Flowcharts

? LIBRARY OR PLAYGROUND?

"It is raining. Where do we go for sports?"

"If it rains, the library. If not, the playground!"

We make **decisions** like this every day. A computer program can make decisions too.

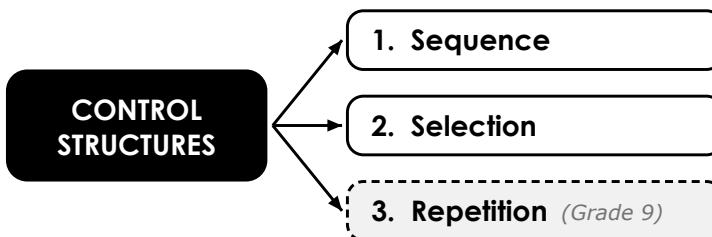


Colour me!

4.4 Control structures and algorithms

A **control structure** is a block in a program that decides the **direction of flow**: which step comes next. There are three types. You met them in Grade 7.

In this unit we use **sequence** and **selection**. You will learn repetition in Grade 9.



The steps to solve a problem, in the correct order, are called an **algorithm**. Generally, we write the algorithm first. Then we change it into a **program**. We can draw an algorithm as a **flowchart**, with the symbols in 4.5.

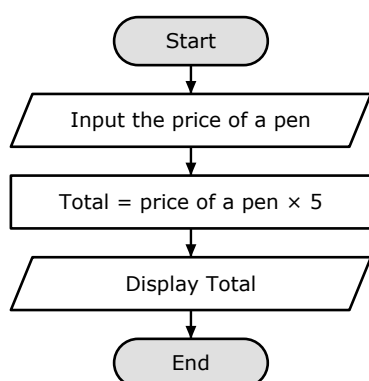


4.5 Flowchart symbols

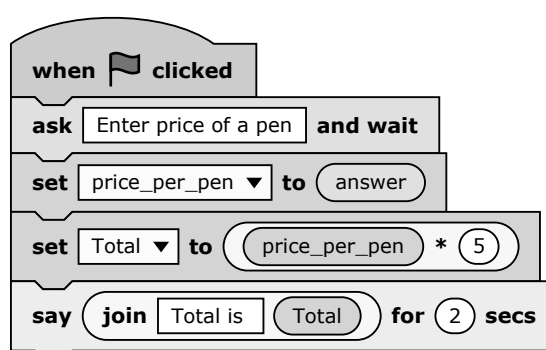
Symbol	Name	What it shows
	Start / End	Shows where the flowchart starts and where it ends.
	Input / Output	Data that goes in (input), or a result that comes out (output).
	Process	A calculation or a task, like Total = price × 5.
	Decision	A question (a condition) with two exits: Yes and No.
	Arrow	Shows the direction of the flow: which step comes next.

4.6 Sequence

In a **sequence**, the steps are carried out **one after the other**, from the beginning to the end, in the correct order. Here is the flowchart and the Scratch program for "**Find the cost of five pens**".



Flowchart 1: the cost of five pens



Scratch program 1

The variable **price_per_pen** keeps the price of one pen.
The variable **Total** keeps the amount to be paid.

> DO IT - PRACTICAL 2 (WORKBOOK ACTIVITY 4.2)

Make the five pens program in Scratch. **Ask your teacher first.**

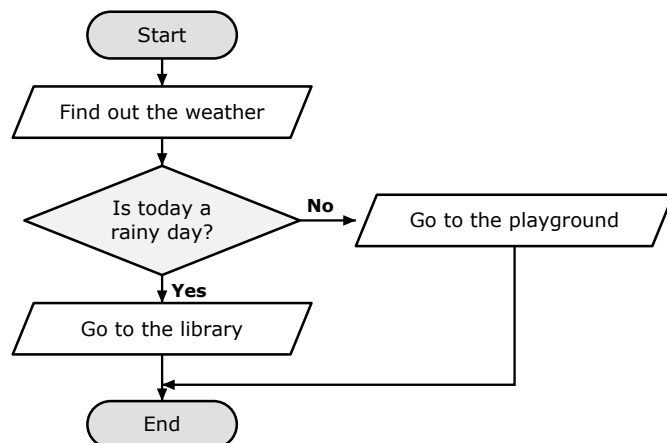
1	Open Scratch. Make two variables: price_per_pen and Total .
2	Drag when green flag clicked (Events) to the scripts area.
3	Add ask ... and wait (Sensing). Type Enter price of a pen .
4	Add set price_per_pen to (Variables). Drop answer into it.
5	Add set Total to . Put price_per_pen * 5 (Operators) in it.
6	Add say ... for 2 secs (Looks) with join: Total is and Total .
7	Click the green flag. Type 20 . The cat says Total is 100 . Save it.



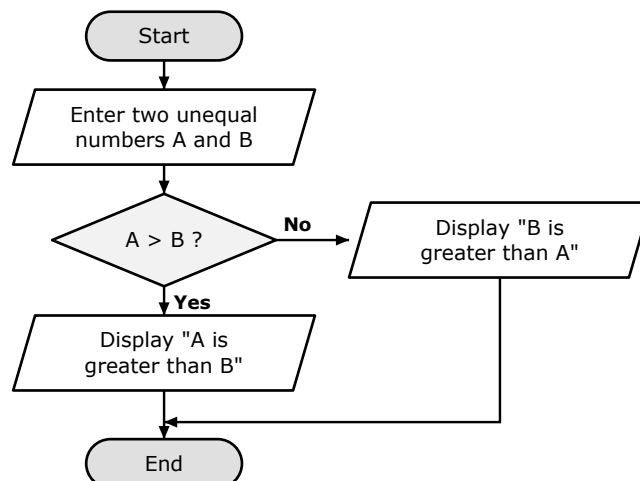
4.7 Selection

Selection decides which step (or steps) are carried out. It depends on whether a **condition** is satisfied or not. In a flowchart, the **decision** symbol shows the condition. If the condition is true, we follow **Yes**. If it is false, we follow **No**.

Flowchart 2: if it rains, the students go to the library. If not, they go to the playground. **Flowchart 5:** two unequal numbers A and B are compared. The symbol $>$ means **greater than**: $7 > 3$ is true, but $2 > 9$ is false.



Flowchart 2: library or playground?



Flowchart 5: which number is greater?

> DO IT - PRACTICAL 3 (WORKBOOK ACTIVITY 4.3)

Draw a flowchart for this problem: **Input the mark of a test. If the mark is greater than 49, display "Pass". If not, display "Try again".**

1	Draw the Start symbol at the top. Then draw an input symbol: Input the mark.
2	Draw a decision symbol with the condition: Is the mark > 49 ?
3	Yes: draw an output symbol: Display "Pass". No: draw an output symbol: Display "Try again".
4	Join both arrows, then draw End . Label the arrows Yes and No .
5	Check it with a friend: follow the arrows with the mark 75, then with the mark 30.

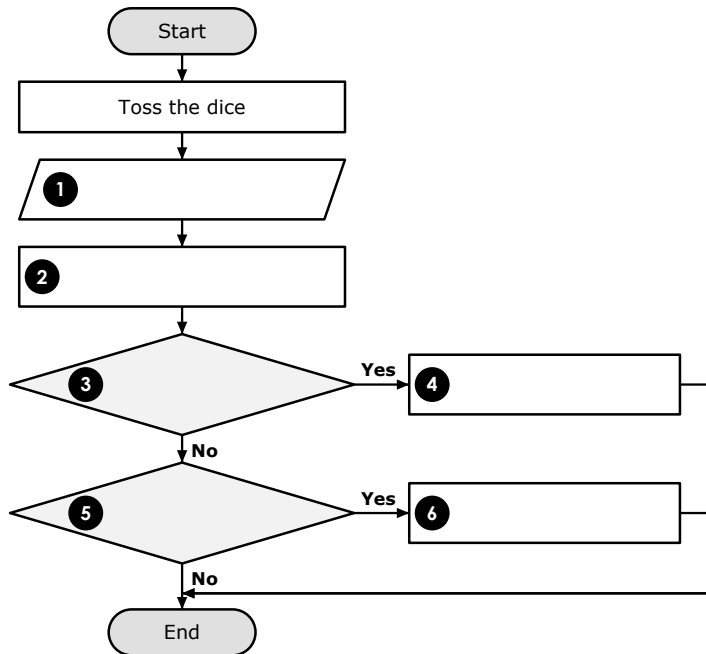
Draw your flowchart here.

A Complete the flowchart

6 marks

Flowchart 3 shows one turn of Snakes and Ladders. Fill in the empty symbols.

The rules: 1. Toss the dice and get the value (the number on the top face). 2. Move the counter forward by the value of the dice. 3. If the counter reaches the bottom of a ladder, move it up to the top of the ladder. 4. If the counter reaches the head of a snake, move it down to the tail of the snake.



USE THESE

- Move the counter to the top of the ladder
- Move the counter forward by the value
- Did you reach a snake's head?
- Get the value
- Move the counter to the tail of the snake
- Did you reach the bottom of a ladder?

B Sequence or selection?

6 marks

Tick the control structure of each algorithm.

Algorithm	Sequence	Selection
Input the price of a pen. Multiply it by 5. Display the total.	☐	☐
If it rains, go to the library. If not, go to the playground.	☐	☐
If the answer is correct, award 10 marks.	☐	☐
Wake up, brush your teeth, wash your face, wear your uniform.	☐	☐
Select the first two digits of the NIC number. Display the year of birth.	☐	☐
If the remainder is 0, say "Even number". Else, say "Odd number".	☐	☐

C Put the steps in order

6 marks

Flowchart 4: a quiz gives 10 marks for a correct answer. Number the steps 1 to 6.

- ☐ Award 10 marks (only when the answer is correct).
- ☐ Start.
- ☐ Obtain the answer.
- ☐ End.
- ☐ Ask the question.
- ☐ Check: is the answer correct?



D Name the symbol

8 marks

Write the name of each flowchart symbol under it. Use the words in the box.

WORD BANK

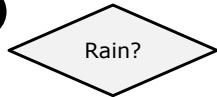
Start / End

Input / Output

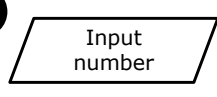
Process

Decision

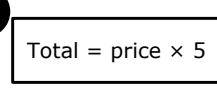
1



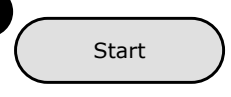
2



3



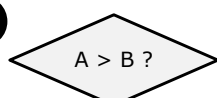
4



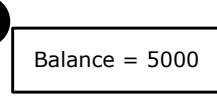
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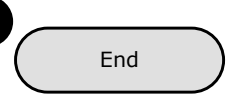
6



7



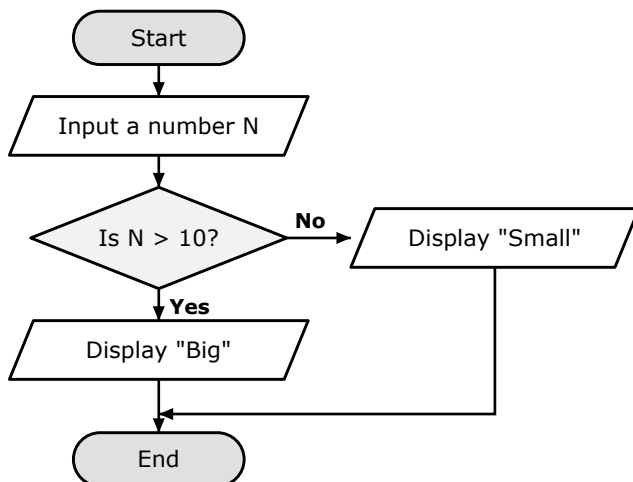
8



E Follow the flowchart

4 marks

Follow the arrows for each number. Write what the flowchart displays.



Input N	Display
25	
4	
10	
11	

F Answer these

5 marks

Write full sentences.

1. Write the three types of control structures. (3 marks)

2. Write one difference between sequence and selection. (2 marks)



CHAPTER 3

Selection in Scratch

? CAN THE CAT DECIDE?

"Is my number odd or even? Can the cat tell me?"

"Can a Scratch program make decisions?"

Yes! Scratch has **selection blocks**. The program checks a **condition**, then it decides what to do.



4.8 Scratch and the IF blocks

Scratch is an open source **visual programming language**. It makes programming easier to learn. We can make games, music, animations and interactive stories with it. Scratch has two **selection** blocks:

IF ... THEN block	IF ... THEN ... ELSE block
slot for the condition if then runs only when the condition is true	slot for the condition if then else 1. runs when the condition is true 2. runs when the condition is false
The blocks inside run only if the condition is satisfied (true).	The first part runs when the condition is true. The second part runs when it is not satisfied (false).

4.9 Comparison blocks

Sometimes a program must **compare** two values before it decides. These **Operators** blocks compare two values. They give the answer **true** or **false**.

Block	It checks whether the value on the left is ...	Example	Output
	smaller than the value on the right.		true
			false
	equal to the value on the right.		true
			false
	greater than the value on the right.		true
			false



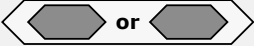
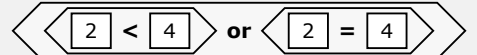
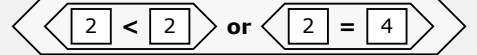
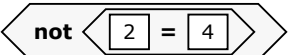
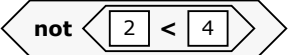
> DO IT - PRACTICAL 4 (WORKBOOK ACTIVITY 4.4)

1	Open Scratch. Click Operators . Drag the < block to the scripts area. Type 1 and 2 .
2	Click the block. Scratch shows the answer, true or false , in a small bubble.
3	Change it to 2 < 1 and click it again. Then try the = and > blocks.
4	Make three blocks of your own. Write them and their answers below.

My block	Answer (true or false)

4.10 Logical blocks

Logical blocks join comparison blocks together. There are three: **and**, **or** and **not**.

Block	The output is true when ...	Example	Output
	both sides are true.		true
			false
	one side, or both sides, are true.		true
			false
	the block inside it is false.		true
			false

> DO IT - PRACTICAL 5 (WORKBOOK ACTIVITY 4.5)

1	From Operators , drag the and block to the scripts area.
2	Put a < block in its left slot and an = block in its right slot.
3	Make 2 < 4 and 2 = 2 . Click it. Then change it to 2 < 4 and 2 = 4 and click again.
4	Do the same with the or block and the not block. Use the examples in the table.
5	Do your answers match the table? Tick:

☐ Yes, all of them.

☐ No. I asked my teacher.

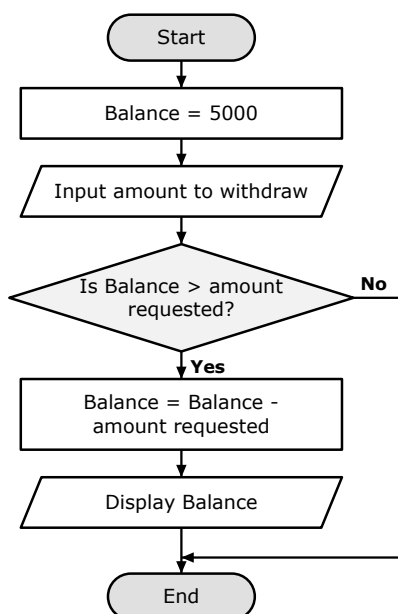
"IF you practise, THEN you improve. ELSE, start again tomorrow!"

- THE KING OF ICT

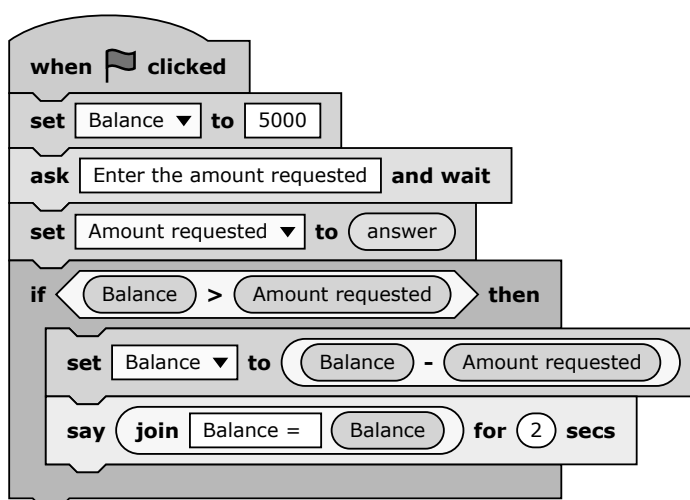


4.11 Program 1: the account balance

An account has **Rs. 5000**. Money is given only if the balance is **greater than** the amount requested. Then the amount is taken away from the balance.



Flowchart 6: account balance



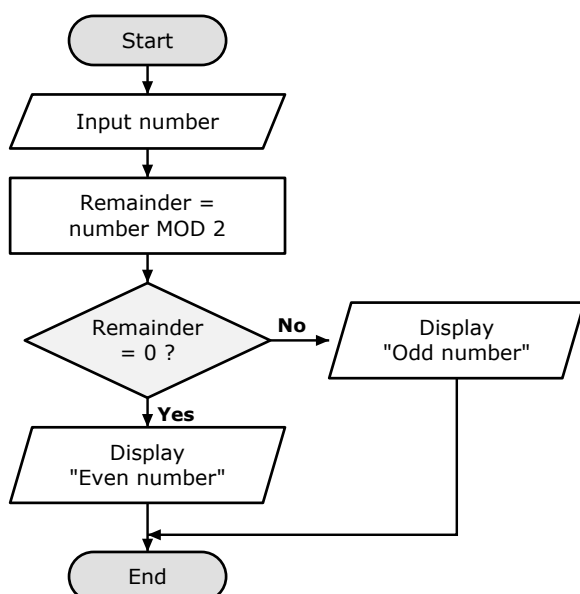
Scratch program 2

4.12 Program 2: odd or even? (MOD)

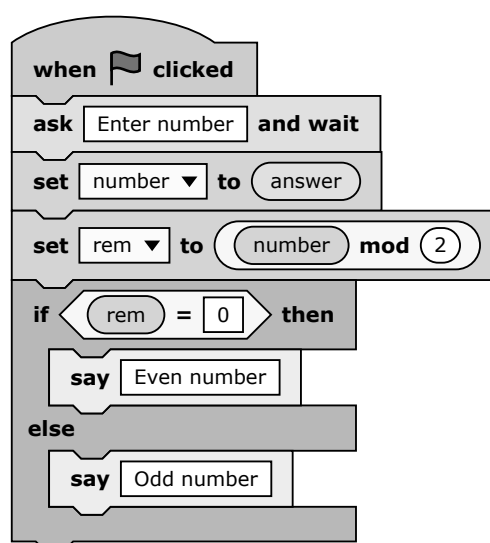
MOD gives the **remainder** when one number is divided by another. $13 \text{ MOD } 5 = 3$, because $13 \div 5 = 2$, remainder 3.

If a number MOD 2 is **0**, the number is **even**. If it is **1**, the number is **odd**.

$$\begin{array}{r}
 2 \quad 13 \text{ MOD } 5 = 3 \\
 5 \overline{) 13} \quad 13 \div 5 = 2, \text{ remainder } 3 \\
 \underline{10} \\
 3 \leftarrow \text{remainder}
 \end{array}$$



Flowchart 7: odd or even?

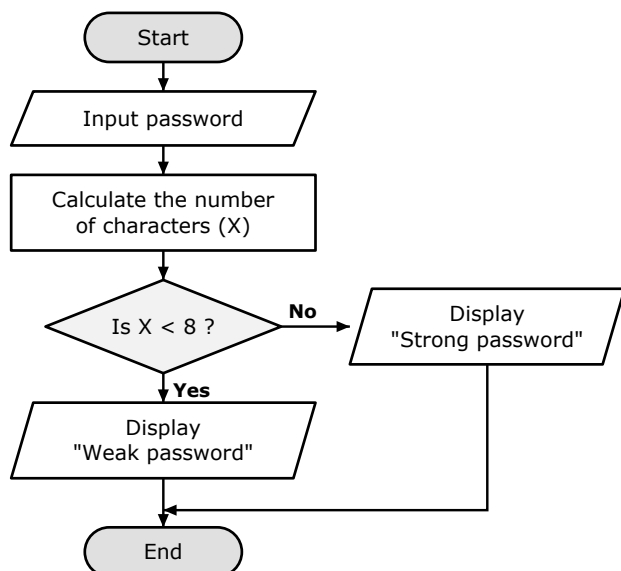


Scratch program 3

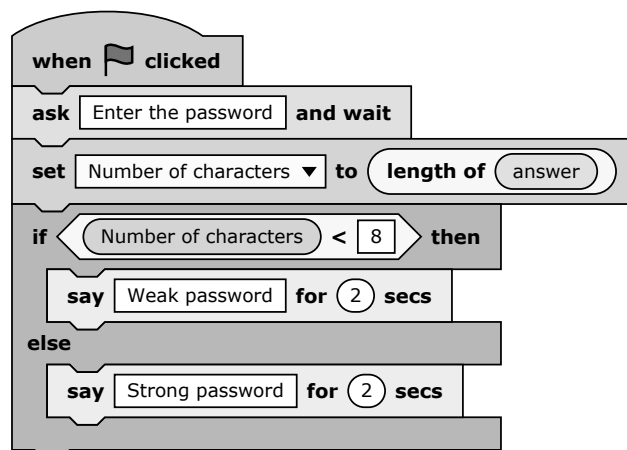


4.13 Program 3: weak or strong password?

The number of characters in a password shows its strength. A password with **fewer than 8** characters is **weak**. A password with **8 or more** characters is **strong**. The **length of** block counts the characters.



Flowchart 8: weak or strong?



Scratch program 4

> DO IT - PRACTICALS 6, 7 AND 8 (WORKBOOK ACTIVITIES 4.6, 4.7, 4.8)

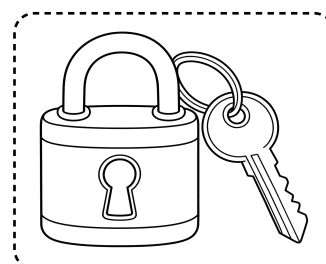
Build the three programs above in Scratch. **Ask your teacher first.**

1	Practical 6: make the variables Balance and Amount requested . Build Scratch program 2. Run it with 2000 , then with 6000 .
2	Practical 7: make number and rem . Build Scratch program 3 (mod is in Operators, if ... then ... else is in Control). Run it with 13 , 20 and 0 .
3	Practical 8: make Number of characters . Build Scratch program 4 (length of is in Operators). Run it with cat12 and colombo2024 .
4	Save each project with a clear name. Write what the cat says in the table.

Practical 6 (balance)	Practical 7 (odd or even)	Practical 8 (password)
2000:	13:	cat12:
6000:	20:	colombo2024:
	0:	

"Every programmer makes mistakes. Good programmers find them and fix them."

- THE KING OF ICT



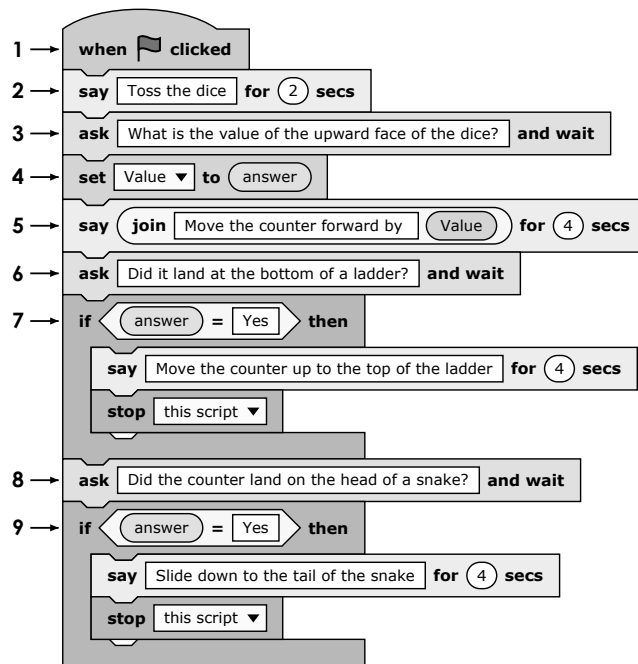
Colour me!



> DO IT - PRACTICAL 9 (WORKBOOK ACTIVITY 4.9) - SNAKES AND LADDERS

This program helps you to play Snakes and Ladders. It follows the flowchart of one turn.

1	Make a variable called Value . Build the program below, block by block.
2	The stop this script block is in Control . Save the project as Snakes and Ladders .
3	Play Snakes and Ladders with a friend on a real board. Click the green flag before each turn.
4	Answer the cat with Yes or No . Does the program follow the rules of the game?



A MOD - odd or even?

8 marks

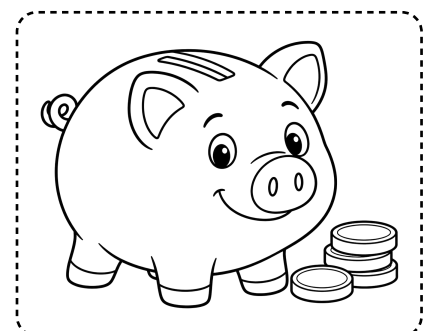
Work out the remainders. Then fill in the table.

10 MOD 3 = ... 17 MOD 5 = ... 8 MOD 2 = ... 15 MOD 4 = ...

Number	Number MOD 2	Odd or even?
7		
12		

"The computer only does what you tell it. So learn to tell it well."

- THE KING OF ICT



Colour me!



B What does each block do?

6 marks

These blocks are in the Snakes and Ladders program. Write the correct letter in the box.

A - The block		B - What it does
1. when green flag clicked		A. Shows a message in a speech bubble for 2 seconds.
2. ask [] and wait		B. Stops the script.
3. set [Value] to (answer)		C. Starts the program when the green flag is clicked.
4. say [] for 2 secs		D. Runs the blocks inside it only if the condition is true.
5. if < > then		E. Asks a question and waits for the answer.
6. stop [this script]		F. Keeps the answer in the variable called Value.

C What will the cat say?

4 marks

Look at Scratch program 2 in 4.11 (the balance is 5000). Write what the cat says.

The amount requested	What does the cat say?
2000	
4500	
5000	
7000	

D Complete the script

5 marks

Fewer than 8 characters: weak. 8 or more: strong. Fill in the numbered gaps.

WORD BANK

length of answer < > 8 mod Weak password

when  clicked

ask Enter the password and wait

set Number of characters to 1 2

if Number of characters 3 4 then

say 5 for 2 secs

else

say Strong password for 2 secs

1.
2.
3.
4.
5.



E True or false?

8 marks

What will each block give? Write true or false.

No	Block	Answer
1	$5 > 3$	
2	$4 = 7$	
3	$7 > 7$	
4	$6 = 6$	

No	Block	Answer
5	$3 < 5$ and $2 = 2$	
6	$3 < 5$ and $4 > 6$	
7	$1 > 2$ or $5 = 5$	
8	not $6 > 1$	

F Answer these

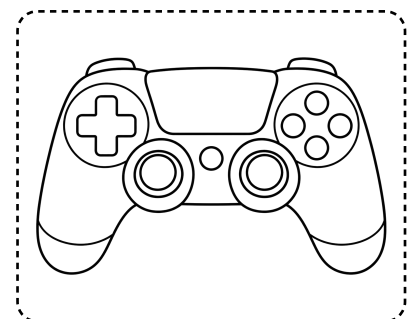
4 marks

Write full sentences.

- What is the difference between the IF THEN block and the IF THEN ELSE block? (2 marks)
- Write two things that we can make with Scratch. (2 marks)

"Big programs are built from small blocks. Big dreams are built from small steps."

- THE KING OF ICT



Colour me!

CHAPTER 4

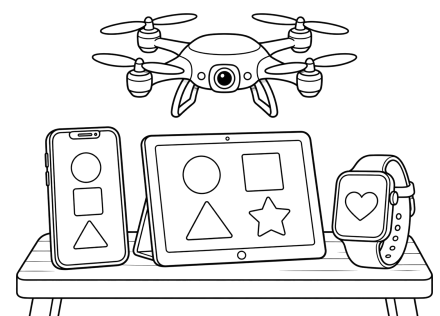
Mobile and Smart Devices

? A DEVICE FOR EVERY JOB

"My uncle takes photos of our paddy fields from the sky!"

"He uses a drone camera. It is a smart device."

Each mobile and smart device is made for a special job. It does the job **accurately** and **efficiently**.



4.14 Smart devices

Each device is made for a **specific function**. **Tablets** and **laptops** are **general purpose** machines. So we check that a device suits the job.

Device	Examples of use
Laptop computer	A mobile computer for general computer applications.
Tablet computer	Surfing the Internet, taking photos, etc.
Smart phone	Phone calls, SMS and MMS messages, photos, audio and video clips, the Internet, e-mail.
Smart TV	Managing and recording TV programmes, e-mail and the Internet.
Smart camera	Taking photos and video clips, and sending them to other smart devices.
Smart watch	Shows the time, sends SMS, sets alarms, accesses the Internet, etc.
Smart sunglasses	Also called mobile spectacles. Watching scenery in 3D, listening to audio, taking photos and video clips.
Drone camera	A remotely controlled mini helicopter. It takes photos or videos from the sky.

4.15 Apps

Many **apps** (application software) are on the Internet. Some are **free**, others must be **bought**. We download and **install** an app, then use it.

App	What it does
Compass	Finds the direction (the orientation).
Route map	Finds routes with GPS, the distance between two places and the traffic.
Sky map	Point the device at a star or a planet to see its name and other details.
QR code reader	Gets information by scanning a QR code.
Language translator	Translates text from one language to another.
Chess game	The computer plays chess against you.
Dictionary	Finds the English word for a Sinhala word.
Voice recorder	Records sound and plays it back.

Before we can use an app:

1. Download
free or bought

2. Install
on the device

3. Use
the app

> DO IT - PRACTICAL 10 (WORKBOOK ACTIVITY 4.10)

Do this at home or at school, with a parent or your teacher.

1	Ask an adult to show you a smart phone or a tablet.
2	Look at the apps on the screen.
3	Ask what each app does. Is it free, or was it bought?
4	Write four of them in the table below.
5	Never download or install an app without asking an adult first.

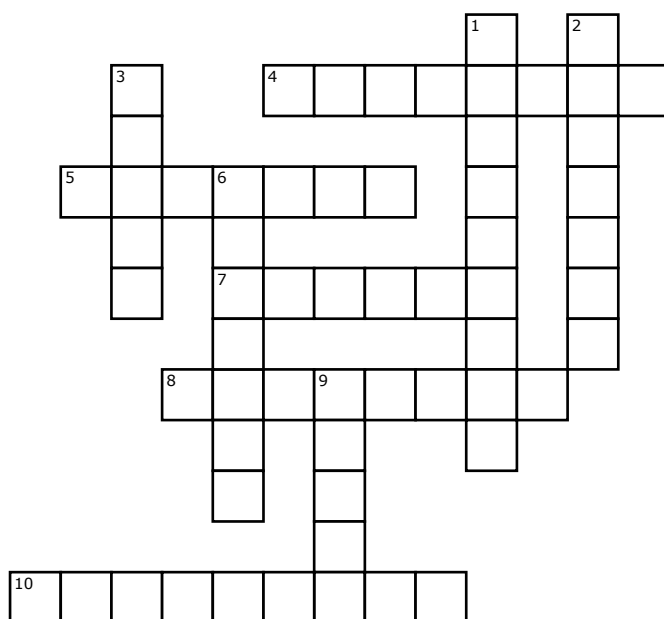
App	What it does	Free or bought?



A Crossword

10 marks

All the words are from this unit.



ACROSS

- 4. Steps carried out one after the other, in order. (8)
- 5. An app that finds the direction. (7)
- 7. The solution of a problem, for example information. (6)
- 8. The diamond symbol in a flowchart. (8)
- 10. The steps to solve a problem, in the correct order. (9)

DOWN

- 1. A control structure that checks a condition. (9)
- 2. A visual programming language with blocks. (7)
- 3. This camera is a remotely controlled mini helicopter. (5)
- 6. The method used to arrive at the solution. (7)
- 9. The data we need to find a solution. (5)

B True or false

6 marks

Write T or F in the box.

1. ☐ Tablets and laptops are general purpose machines.
2. ☐ We must buy every app before we can use it.
3. ☐ We install an app on the device before we use it.
4. ☐ A smart watch can send SMS messages and set alarms.
5. ☐ A sky map app translates text into another language.
6. ☐ Each smart device is made for a specific function.

C Match the app

8 marks

Write the correct letter in the box.

A - The app		B - What it does
1. Compass		A. Translates text from one language to another.
2. Route map		B. Records sound and plays it back.
3. Sky map		C. Finds the direction (orientation).
4. QR code reader		D. Gets information by scanning a QR code.
5. Language translator		E. Finds the English word for a Sinhala word.
6. Chess game		F. Finds routes with GPS, distances and the traffic.
7. Dictionary		G. Plays chess against you.
8. Voice recorder		H. Shows the name and details of a star or a planet.



D Which device would you use?

6 marks

Write the best mobile or smart device.

You want to ...	Device
Take photos of your school from the sky	
Record a TV programme to watch later	
See the time and read an SMS on your wrist	
Watch scenery in 3D form	
Take photos and send them to other smart devices	
Make a phone call and send an MMS message	

E Choose the correct answer

10 marks

Underline your answer.

- The items we need to solve a problem are called the
(a) output (b) process (c) input (d) program
- Generally, we write the algorithm first. Then we change it into a
(a) flowchart (b) program (c) device (d) bill
- Which flowchart symbol shows a decision?
(a) rectangle (b) diamond (c) parallelogram (d) oval
- Steps carried out one after the other, in order, are called
(a) selection (b) repetition (c) decision (d) sequence
- Which block runs one part when the condition is true, and another part when it is false?
(a) IF THEN ELSE (b) IF THEN (c) say (d) ask and wait
- The block $(3 > 7)$ gives
(a) true (b) 3 (c) false (d) 7
- Which logical block gives true only when both sides are true?
(a) and (b) or (c) not (d) join
- A remotely controlled mini helicopter with a camera is a
(a) smart TV (b) tablet (c) smart watch (d) drone camera
- Which app finds the direction?
(a) sky map (b) compass (c) chess game (d) voice recorder
- Which are general purpose machines?
(a) tablets and laptops (b) smart watches and drones
(c) smart cameras (d) smart TVs

"Smart devices are useful. Smart users are powerful."

- THE KING OF ICT



REVISION

Unit 4 in One Page

Read this the night before the test

Topic	The key facts
Problem analysis	Divide the problem into smaller parts. Find the input, process and output before you develop a program.
Input, process, output	Input: the items (data) we need. Process: the method. Output: the solution (information).
Algorithm	The steps to solve a problem, in order. First the algorithm, then the program.
Control structures	Sequence · Selection · Repetition (you will learn repetition in Grade 9).
Sequence	The steps are carried out one after the other, from the beginning to the end.
Selection	A condition is checked. True: follow Yes. False: follow No.
Flowchart symbols	Oval: Start / End. Parallelogram: Input / Output. Rectangle: Process. Diamond: Decision.
Scratch	An open source visual programming language. Games, music, animations and stories.
IF blocks	IF THEN: runs only when the condition is true. IF THEN ELSE: one part for true, one for false.
Comparison blocks	< smaller than · = equal to · > greater than. The answer is true or false.
Logical blocks	and: both sides true. or: one or both true. not: true becomes false, false becomes true.
MOD	Gives the remainder: $13 \text{ MOD } 5 = 3$. Number $\text{MOD } 2 = 0$: even. Number $\text{MOD } 2 = 1$: odd.
Smart devices	Laptop, tablet, smart phone, smart TV, smart camera, smart watch, smart sunglasses, drone camera.
Apps	Some are free, some are bought. Download, install, then use. Never without permission.

★ TICK WHEN YOU CAN DO IT

- ☐ I can find the input, process and output of a problem.
- ☐ I can name the three control structures.
- ☐ I can draw a flowchart with the correct symbols.
- ☐ I can make a Scratch program with a sequence of blocks.
- ☐ I can use the IF THEN and IF THEN ELSE blocks in Scratch.
- ☐ I can use comparison blocks, logical blocks and MOD.
- ☐ I can name smart devices and apps, and say what they do.



WORD POWER

Unit 4 Word List

Thirty words you must know

Word	What it means
Problem analysis	Dividing a problem into smaller parts to find the input, process and output.
Input	The items (data) that we need to find the solution.
Process	The method that we use to arrive at the solution.
Output	The solution to the problem (information).
Data	Facts that go into a program, like numbers and names.
Information	The useful result that comes out of a program.
Unit price	The price of one item.
Algorithm	The steps to solve a problem, in the correct order.
Flowchart	A drawing of an algorithm, with symbols joined by arrows.
Control structure	A block in a program that decides which step comes next.
Sequence	Steps carried out one after the other, in order.
Selection	Choosing which steps to carry out by checking a condition.
Repetition	The third control structure. You will learn it in Grade 9.
Condition	A question whose answer is true (Yes) or false (No).
Decision symbol	The diamond in a flowchart. It has a Yes exit and a No exit.
Scratch	An open source visual programming language.
Variable	A named place that keeps a value, like Total or Balance.
IF THEN	Runs the blocks inside it only when the condition is true.
IF THEN ELSE	Runs one part when the condition is true, the other part when it is false.
Comparison block	The <, = and > blocks. They give true or false.
Logical block	The and, or and not blocks. They join comparison blocks.
MOD	Gives the remainder of a division: $13 \text{ MOD } 5 = 3$.
Remainder	What is left over after a division: $13 \div 5 = 2$, remainder 3.
Open source	Software that anyone may use, change and share, like Scratch.
Smart device	A mobile device made for a special job, like a smart watch.
App	Application software for a mobile or smart device.
Install	To put a downloaded app on a device, so that we can use it.
GPS	A system that finds where we are on the Earth. A route map app uses it.
QR code	A square code of black and white squares. A QR code reader app scans it.
Drone camera	A remotely controlled mini helicopter that takes photos and videos.

"Learn the words today. Speak the language of programmers tomorrow."

- THE KING OF ICT



END OF UNIT

Unit 4 Test

Time: 45 minutes

Total: 40 marks

Name _____

Class _____

Marks

1 Choose the correct answer

8 marks

Underline your answer.

- Analysing a problem means dividing it into
(a) smaller parts (b) programs (c) flowcharts (d) devices
- In the problem "find the cost of five pens", the input is
(a) the total amount (b) the price of a pen
(c) price $\times$ 5 (d) the answer
- Which flowchart symbol shows an input or an output?
(a) diamond (b) rectangle (c) parallelogram (d) oval
- Which control structure makes a decision?
(a) sequence (b) selection (c) process (d) output
- Which Scratch block runs its blocks only if the condition is true?
(a) IF THEN (b) say (c) set (d) ask and wait
- What does the block $(2 = 2)$ give?
(a) false (b) 4 (c) 0 (d) true
- What is $9 \text{ MOD } 2$?
(a) 0 (b) 1 (c) 4 (d) 18
- Which app records sound and plays it back?
(a) compass (b) route map (c) voice recorder (d) QR code reader

2 Fill in the blanks

8 marks

One word in each blank.

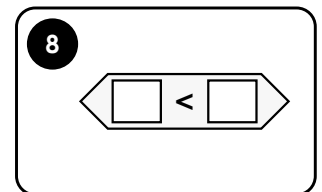
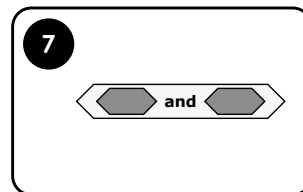
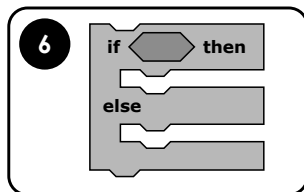
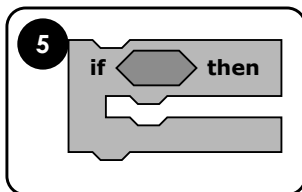
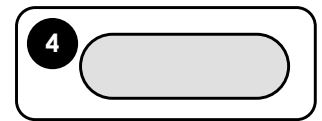
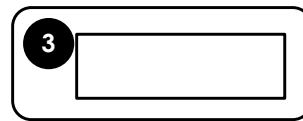
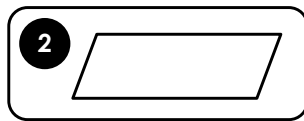
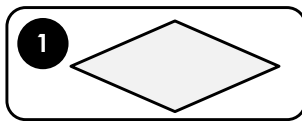
- The method used to arrive at the solution is called the
- The solution that a program gives is the
- In a, the steps are carried out one after the other, in order.
- The symbol in a flowchart has two exits: Yes and No.
- Scratch is a visual language.
- The block gives true only if both sides are true.
- $13 \text{ MOD } 5 = \dots$
- Some apps are free. Others must be



3 Name the picture

8 marks

Write the name of each symbol or block under it.



4 Answer these

16 marks

Write in the space given.

1. Analyse this problem: "Find the cost of 4 books when the price of one book is given."
Write the input, the process and the output. (3 marks)

2. Write the three types of control structures. (3 marks)

3. Write the difference between the IF THEN block and the IF THEN ELSE block. (2 marks)

4. Draw a flowchart: Input two unequal numbers A and B. If $A > B$, display A. If not, display B. (5 marks)

5. Write THREE smart devices. Write one use of each. (3 marks)
