United Arab Emirates
Ministry of Education

الإمـارات العـربيـة المتحدة
وزارة التـربيـــة والتعليـــم

قطاع العمليات المدرسية
مجلس خليفة التعليمي 5 / نطاق 3
مدرسة أذن للتعليم الأساسي للبنات - ح1

Be ready for

Design and Technology (Grade 4)

End of Term One Examination

الاستعداد

لاختبار نهاية الفصل الأول الخاص بمادة

التصميم و التكنولوجيا - الصف الرابع

- سيكون الاختبار يوم الأربعاء الموافق: 2017/11/15 ومدته: 35 دقيقة من الساعة 9:00 حتى الساعة 9:35 صباحاً
- تم ارفاق مختصر للكمية التي يشملها الاختبار و نموذج يوضح نوع الاسئلة التي سيتم طرحها في الاختبار (يرجى الانتباه أن نموذج الاختبار لصفوف رابع و خامس و سادس معاً وقد وضع للتعريف بنوع الأسئلة)
- يرجى الاطلاع على الكتاب و عدم الاعتماد على المختصر فقط

الاختبار ليس كابوساً مزعجاً بل خطوة نحو تحقيق النجاح

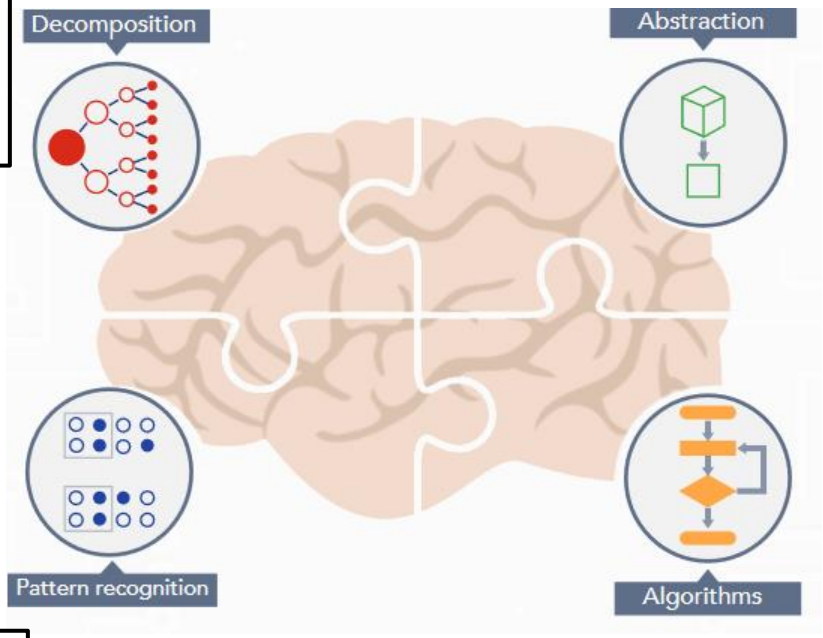
إعداد وتصميم: مريم المزروعي – معلمة التصميم و التكنولوجيا

Unit 1 Computational Thinking

- **What is computational thinking?**
    - Looking at a complex problem.
    - Understanding what the problem is.
    - Developing possible solutions in a way that a computer, a human, or both, can understand.
- Computational thinking is about the ideas not objects that inform our technology. These ideas lead to the creation of new technology.
- Computational thinking is available to all people.
- It does not matter whether we use technology or not.
- It doesn't even matter whether their solutions need technology or not.
- **The four areas of computational thinking:**

1) Breaking the problem down into chunks we can work with

2) Focusing on the important information and ignore details that aren't important



3) We looking for similar things within problems

4) Developing a solution to the problems. Make step-by-step rules to solve the problem

- Programming tells a computer what task to do and how to do it.
- The planning part of solving a problem is like computational thinking.
- Following the directions is like programming.

Activity 1

Which of these definitions did you learn a word for today?

- bringing two pieces together: **Recognition**
- breaking a problem down into smaller pieces: **Decomposition**
- using all of the information we are given: **Algorithm**

Activity 2 - Quiz

- What should you try to do when you're faced with a complex problem?

Understanding the problem and start applying the four areas of computational thinking (Decomposition, Abstraction, Pattern recognition, Algorithms)

- If a problem is too hard, how can we make it easier to solve?

Breaking down the problem into small parts (Decomposition)

- If you find similarities in lots of solutions to different problems, what does that probably tell you?

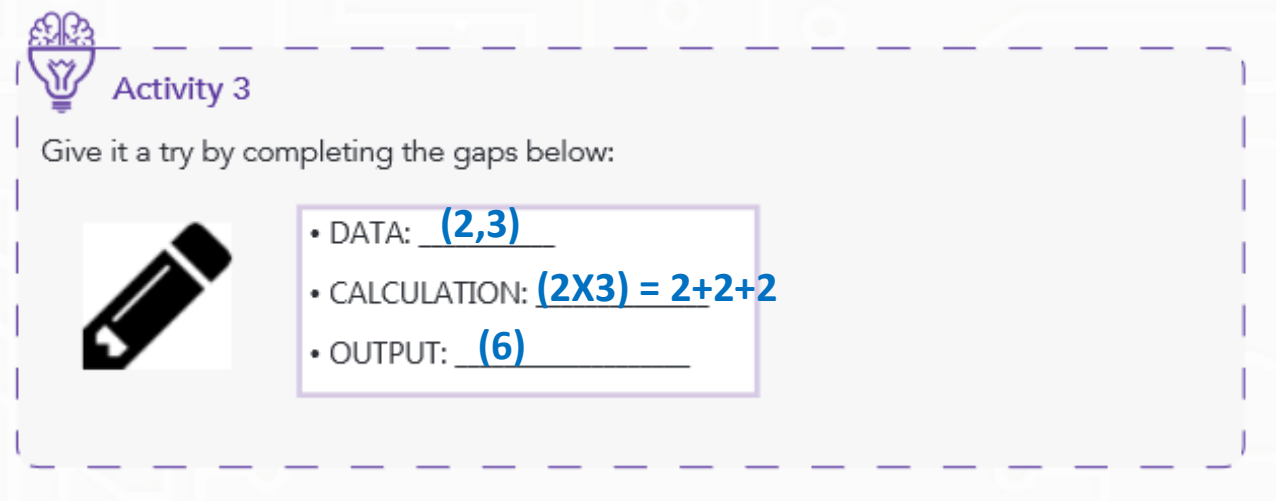
We need to apply the Pattern Recognition

- If you have a problem that is just a little different from a problem that you have a solution for, what would you do?

We will use the same algorithm but with some changes

- Computer: is a machine that receives information or data (input) then processes it and provides answers to (outputs)

- Program: a list of instructions that tells a computer exactly what to do



Programs

Are made to complete a process that can be followed in written calculations by a computer

Or

Are made up from statements that the programming language knows and understands

Algorithms

Are the written calculations that the computer uses to complete the process

Programming

Is when you change these algorithms into a computer program.

- Charles Babbage (The father of the compute) was an inventor and mathematician. He invented the first mathematical calculation machine' in 1822.
- Ada Lovelace was an English mathematician (First computer programmer)

- Programming language is a set of commands that work together to make instructions like (Java, C++ and Python). These instructions tell the computer what to do.

- The programming language is understood by both the human and the computer.

- **What is an algorithm?**

    - Is a set of instructions that helps you solve a problem step-by-step
    - Example of algorithm:
        - A recipe for making food
        - Method you use to solve addition or long division problems
        - Folding a shirt or a pair of pants

- Algorithms are sometimes written as a flowchart or in pseudocode

- Pseudo code: This is when you write your ideas for a program in plain English to give you a good idea of how to structure your coding.

- **Basic things to know in order to really understand the problem:**
    - What are the inputs of the problem?
    - What will be the outputs of the problem?
    - In what order do instructions need to be carried out?
    - What decisions need to be made in the problem?
    - Are any areas of the problem repeated?

- **Example of creating a program from an algorithm**

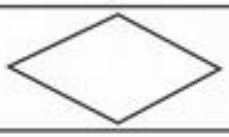
  A restaurant is offering free drinks to anyone who is under 10.

    - Algorithm is:
        - Find out how old the person is.
        - If the person is younger than 10 then say, “You are allowed free drinks.”
        - Otherwise, say “You are not allowed free drinks.”

    - In code (Program), the algorithm would look like this:

OUTPUT "How old are you?"
INPUT - User inputs their age
STORE the user's input in the age variable
IF age < 10 then OUTPUT "You are allowed free drinks."
ELSE
IF age > 10 then OUTPUT "You are not allowed free drinks."

- A flowchart is a diagram that represents a set of instructions.

Name	Symbol	Use
Start or Stop		The beginning or end of the programme
Input or output		Used when you want to display something on the screen or take the users input.
Decision		Like your if statement, either yes or no to the question (decision).
Direction of flow		Connects the symbols. The arrow shows the direction of flow of instructions.

- **Example of flowchart for the Free drinks offer**

Activity 4

Create your own algorithm for eating your breakfast.

Be as specific with the instructions as possible. Computers don't understand what you normally do. So if you aren't very clear that you need to get out the bowl first, you will pour milk on the floor!

1. Bring a bowl
2. Place the cereal in the bowl
3. Pour the milk on the cereal
4. Pour the milk in the glass
5. Get the spoon
6. Say: Besm allah Al Rahman Al Raheem
7. Start eathing the cereal with milk
8. Drink the milk
9. Say: Al hamdu le'allah rabu Al Alameen

Activity 5

Which one of these is the definition of an algorithm?

- An algorithm is a plan, a set of step-by-step instructions to solve a problem.
- An algorithm involves breaking down a difficult problem or system into smaller parts that are easier to understand.
- An algorithm is looking for similarities between problems.

Why do we need algorithms?

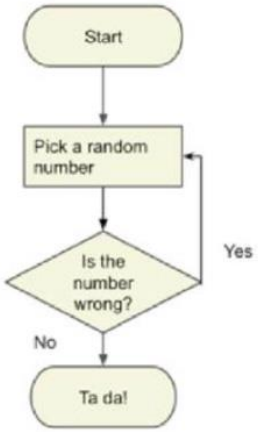
To solve the problems step by step to have the right solution for the problem

What things do we need to think about when making an algorithm?

1) The big picture (the final goal)
2) The individual stages (the hurdles need to be overcome on the way to the goal)

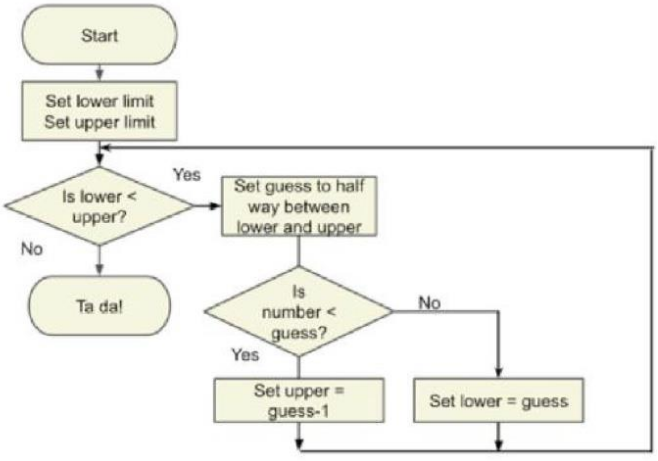
- **Methods of Searching items in a list:**

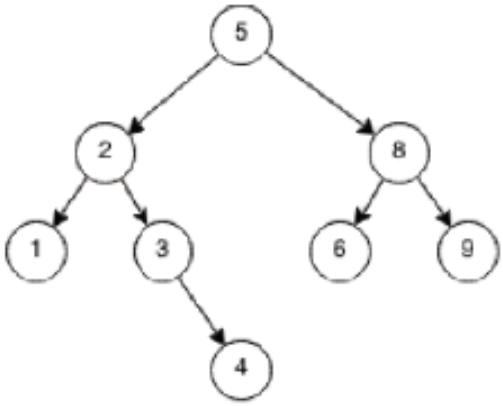
1) **A random search:** We could pick a random word. Check if it's the right word. Repeat this until we get the one we want.



2) **A linear search:** We could start at the beginning. Check each word one-by-one until we get to the word we want.

3) **A binary search:** We could pick a word in the middle. Decide whether our word is before or after that. Pick a word in the middle of that half. Keep narrowing down until we get to the word we want.





All three of these search methods are algorithms. Which search method was the fastest?

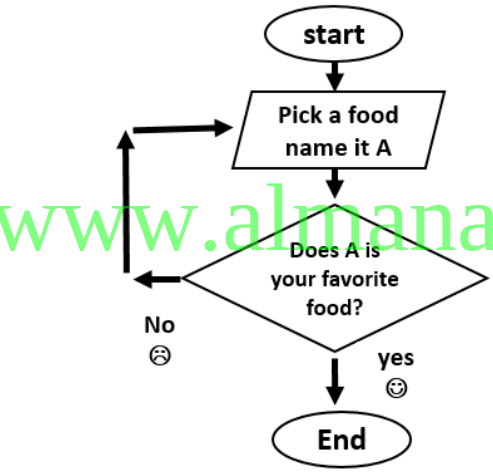
Binary search

- The Binary search algorithm takes the problem (finding a number) and reduces it down to smaller chunks. The search is still the same, but with smaller chunks each time until you solve the problem (find the answer).

Activity 7

Use the search method to create your own algorithm for finding your classmate's favorite food.

Draw the search method you use below:



Activity 8

Are these sentences True (T) or False (F)?

1. An algorithm is a detailed step-by-step instruction set or formula for solving a problem or completing a task. **T**
2. Input is information that comes out of a computer. **F**
3. A linear search breaks the problem down into smaller chunks. **F**

Can you remember which search method is the fastest to solve the problem?

Binary search

Unit 2 what is a Robot?

- A robot is a machine that can do the work of a human. Robots can be automatic, or they can be computer-controlled
- They can be fast and precise
- Robots that look like humans are known as androids

Activity 1

Complete the table with the application of each robot.

1 cleaning robot	2 space exploration robot	3 military robot
4 fun and entertainment robot	5 medical robot	6 industrial robot






- **Parts of a Robot:**

1) **Sensors/Input Sensors**: Tell the robot about its like:
   - **Light sensors** detect light or brightness.
   - **Sound sensors** allow measurements of sound.
   - **Touch sensors** are sensors that must be touched by an object to operate.
   - **Temperature sensors** detects (find out) the surrounding temperature.

2) **Control System (Brain of the robot)**: Is a device that manages or controls the behavior of other systems.

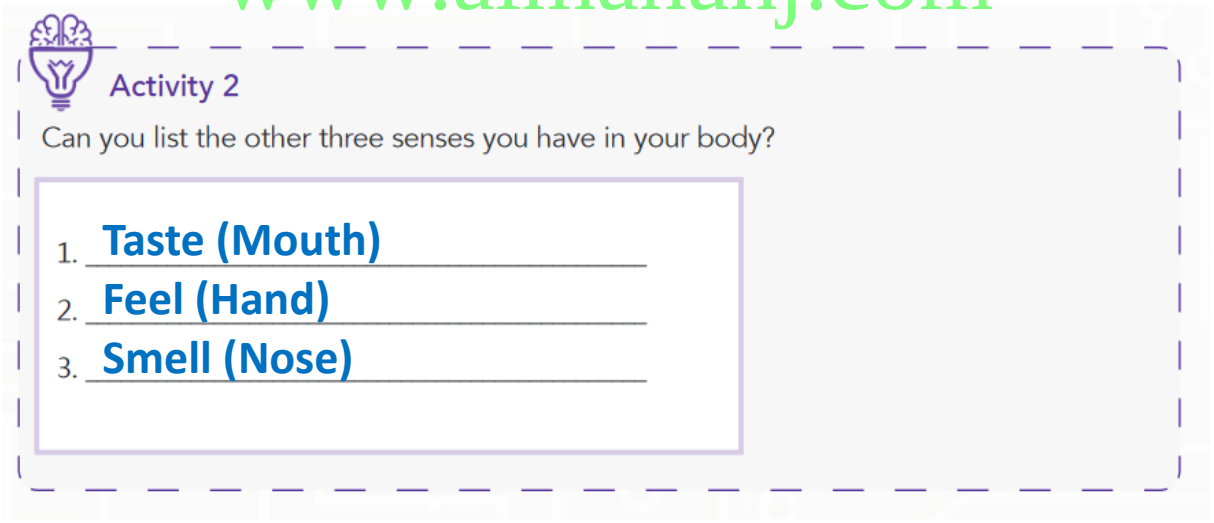
3) **Actuator/Output:** Is the part of the robot that performs a physical action like:
   - Fun
   - Motor
   - Buzzer

- The Mohamed Bin Zayed International Robotics Challenge **(MBZIRC)** is an international robotics competition.

- Why we are using robot?
  - Fun and entertainment, like playing computer games
  - Building things like cars
  - Carrying heavy things from one place to another

- Robotics is the science of robot that covers:
  - How we design robots?
  - How we build robots?
  - How robots work?
  - Where we use them?

- In a robot, the sensors are the inputs. They can sense light and sound. The sensors work like your eyes and ears do.



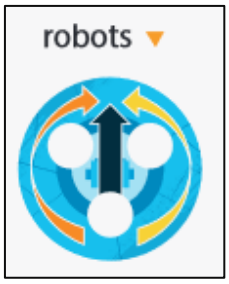
- Input: The robot senses things around him.

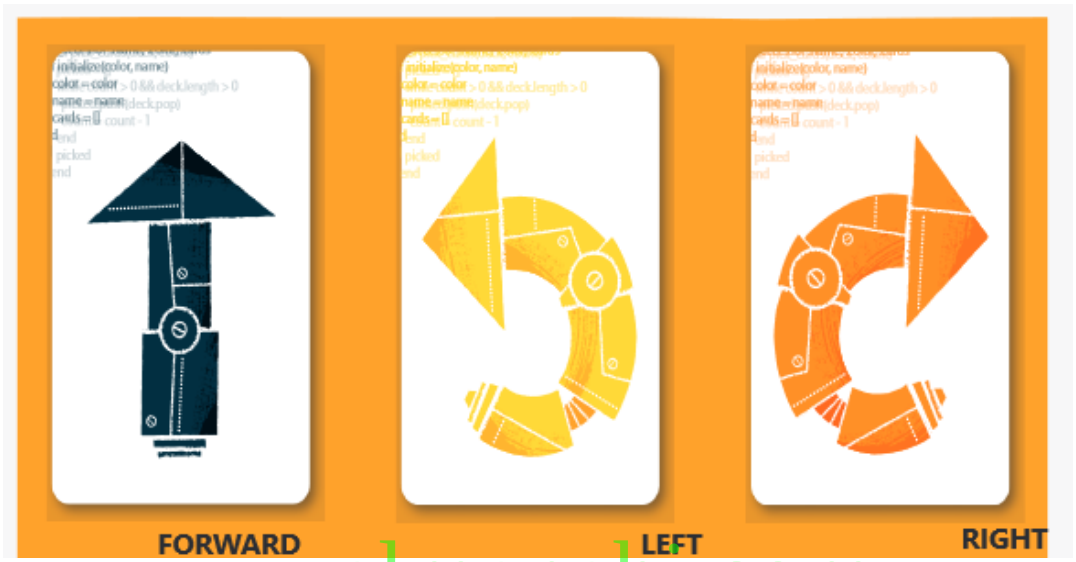
- Output: The robot acts on what he senses.

- The programming language can be understood by the robot and the human

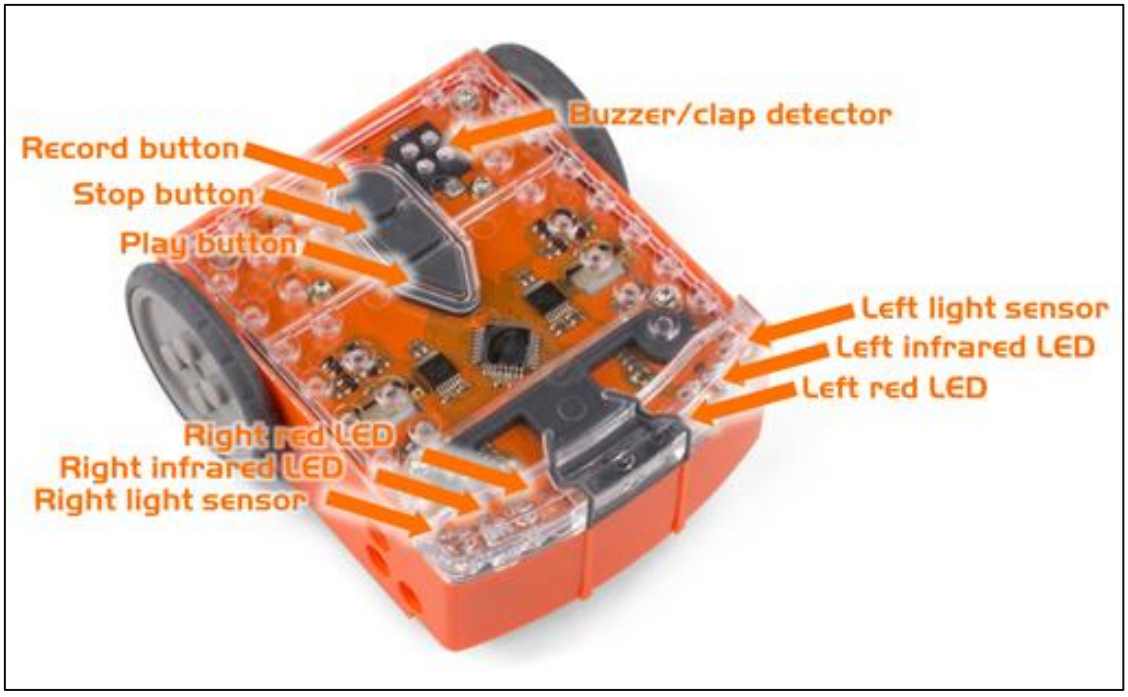
- Logical reasoning is when we use rules to solve a problem to ensure that the algorithm works properly

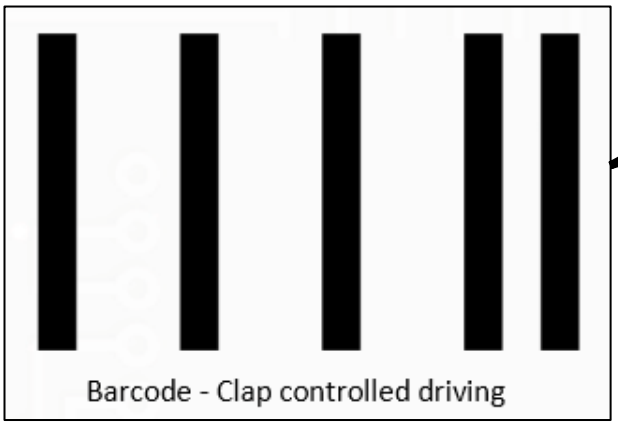
- **Robogem**

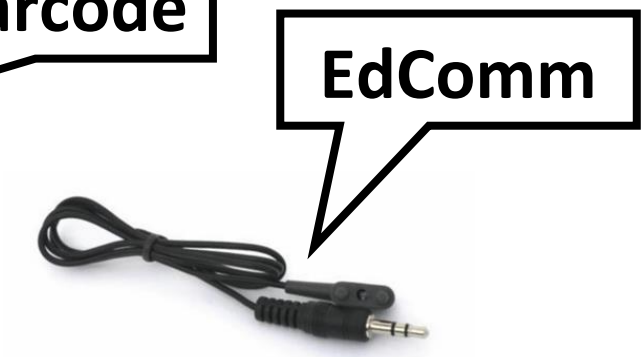


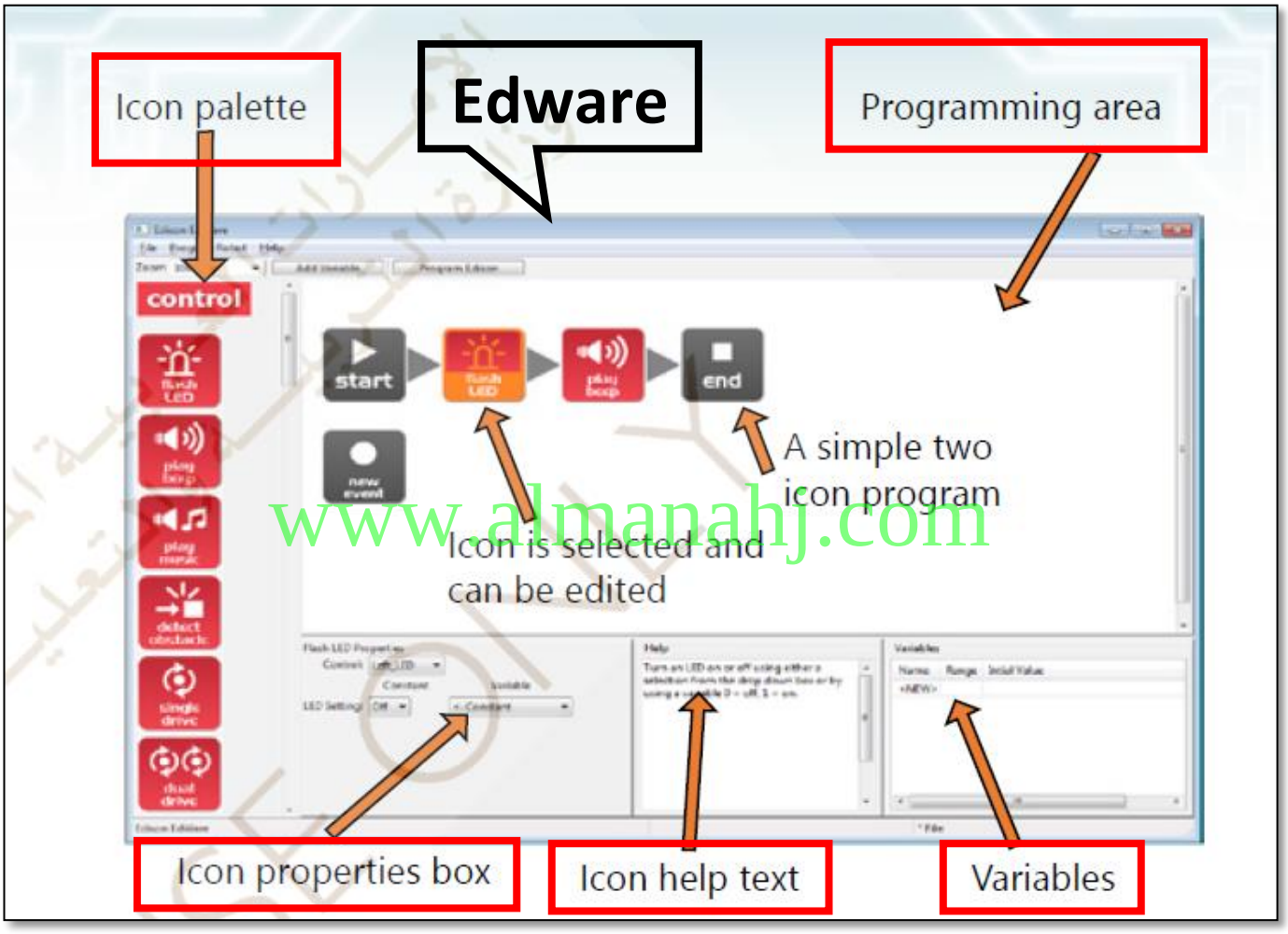


Unit 3 What is Edison?









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