STEM from Home

Coding & Design

Coding and Design are two important branches of STEM. Wouldn't it be fun to design, code and create your own games, animated projects, or quizzes?

Coding is how we communicate with computers. A code tells a computer what actions to take, and writing code is like creating a set of instructions for the computer telling it what to do or how to behave in a much faster way. You can use this skill to make websites and apps, process data, and do lots of other cool things.

Critical thinking, persistence, problem solving, computational thinking and creativity are only some of the key skills that coding and design can help you achieve in a fun and motivating way.

Your challenges include coding an interactive quiz, using codes to recreate pictures and designing a room which has two light bulbs and a toggle switch.

Main Activity: **Gobo's Earth Quiz**

Introduction

In this activity, you will create an interactive quiz, calculate the score and set rewards.

Let's get started! Take a look at the quiz here.

You can access guidelines for the project here.

What You Will Need

Hardware
A computer capable of running Scratch or Scratch 3 software (either online or offline).

Software
Access Scratch 3 either online at https://scratch.mit.edu/ or download from https://scratch.mit.edu/download.

What you will learn

1. To design a simple interface using basic design elements.

2. To add, show or hide characters and different backgrounds.

3. To use simple programming constructs like Ask block, Variables, Operators, and If-Else Blocks to convert logic to code and programme the following:

   a. How to ask questions and accept responses

   b. How to define and use variables

   c. How to evaluate responses and assign rewards

Bonus Activities

Activity 1: Using Codes To Create Pictures

Introduction

The term "pixel" is actually short for "Picture Element." These tiny little dots are what make up the images on computer displays. The screen is divided up into a matrix of innumerable pixels. Normally, you cannot see the individual pixels because they are so small. Each pixel can only be one colour at a time. However, since they are so small, pixels often blend together to form various shades and blends of colours.

If pictures are made of millions of pixels (mega-pixels), how can they be represented efficiently? In this activity, with the help of numbers which are actually a given code for a picture, you will recreate the picture on a grid. Each square on the grid is one pixel. Some pixels will stay white, and some you'll need to colour black.

What You Will Need

- A pencil (ideally 2B or darker)

- Grid: squares: about 2mm to 5mm (about 1/8 to 1/4 inches.)
  Note : *You can use graph paper or draw your own grid using a ruler and light pencil. Make sure your measurements are precise*.

- Code for the picture

What You Will Learn

The concept of Run Length Coding *(The idea of coding a run of the same colour with a number is called "run-length" coding. It can significantly reduce the amount of space needed to store the image on a computer, or the time needed to send it over a network.)*

[Let's get started](#)

Challenge Activity: Switch Toggle

Introduction

In the Main Activity in this STEM Pack, you learnt to do the following:

1. Design a simple interface using basic design elements to add, show or hide Sprites and different backgrounds.

2. Use simple programming constructs like Variables, Operators, and If-Else Blocks to convert logic to code and create a Scratch programme

In this challenge, you will apply the skills learnt in the Main Activity to code a new challenge.

Your Challenge

Your task is to design a room which is fitted with two light bulbs and a toggle button. You need to write code in [Scratch](#) to do the following:

- One Light bulb is in switched OFF state and One Light Bulb is in switched ON state when the project starts.

- Clicking on the button switches on/switches off the light bulbs alternately.

- The images given alongside are only for your reference. Use your creativity and imagination to design a unique project.
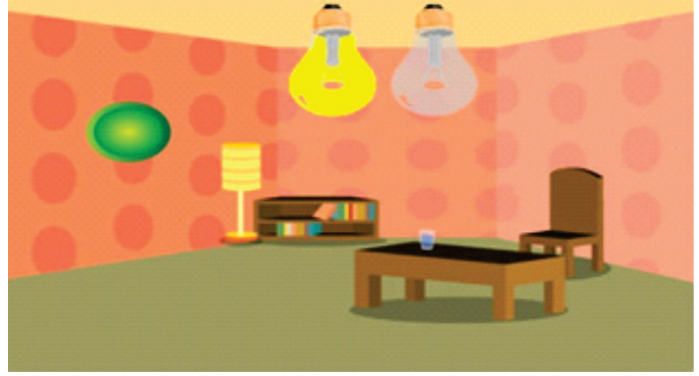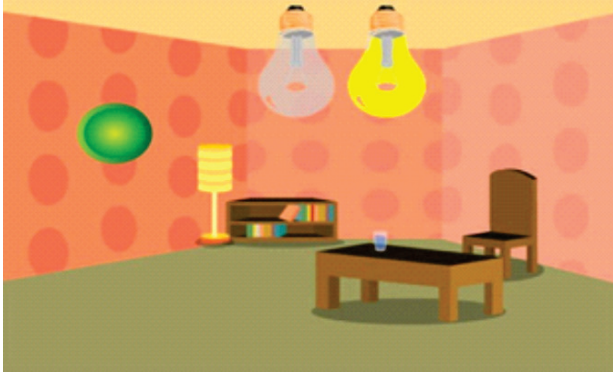
Resources

Hardware

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Software

Access Scratch 3 either online at https://scratch.mit.edu/ or download from https://scratch.mit.edu/download.

Submit your final project and code digitally using Docs or Presentation software.