Year 7 Topic 4 – Programming essentials in Scratch – part I

Lesson	Can you?
Lesson 1: Introduction to programming	Compare how humans and computers understand instructions Define a sequence as instructions performed in order Predict the outcome of a simple sequence Modify a sequence
Lesson 2: Sequence and variables	Define a variable Recognise that computers do input/process/output Trace the values of variables Make a sequence that includes a variable
Lesson 3: Selection	Define a condition Identify that selection uses conditions to control the flow Identify where selection statements can be used Modify a program to include selection
Lesson 4: Operators	Create conditions that use comparison operators (>,<,=) Create conditions that use logic operators (and/or/not) Identify where selection statements can be used
Lesson 5: Iteration	Define iteration Describe the need for iteration Identify where iteration can be used in a program Detect and correct errors in a program (debugging)
Lesson 6: Problem-solving	Apply programming constructs to solve a problem (subroutine, selection, count-controlled iteration, operators, and variables)

KNOWLEDGE ORGANISER
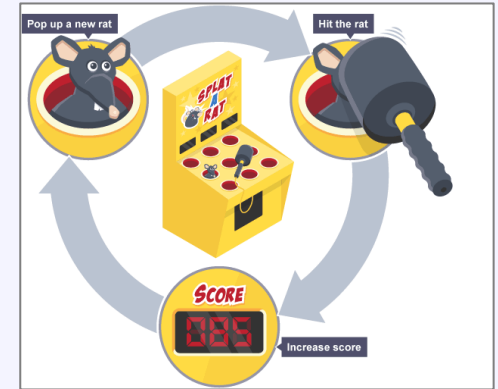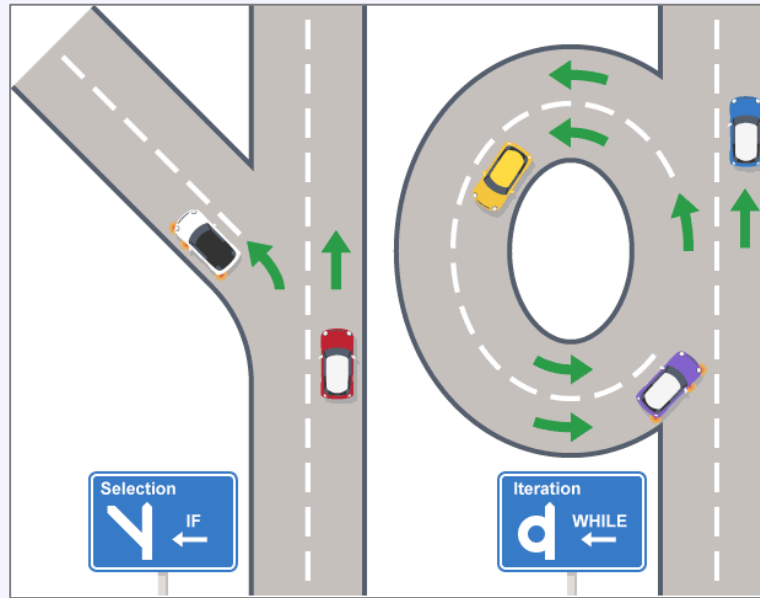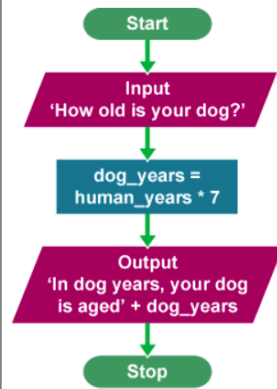**Key Stage 3 - COMPUTING**
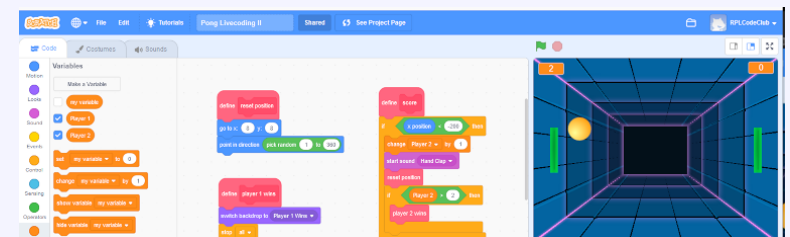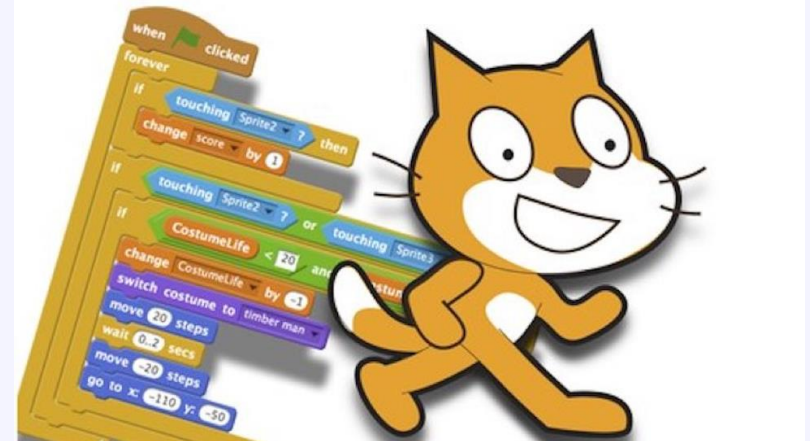
Sequencing in algorithms

An **algorithm** is a plan, a set of step-by-step instructions to solve a problem. There are three basic building blocks (constructs) to use when designing algorithms:

- sequencing
- selection
- iteration

These building blocks help to describe solutions in a form ready for **programming**.

Representing sequencing in a flowchart

Start

Input 'How old is your dog?'

dog_years = human_years * 7

Output 'In dog years, your dog is aged' + dog_years

Stop

The ELSE IF instruction

The **ELSE IF** instruction allows there to be more than two paths through an **algorithm**. Any number of ELSE IF **instructions** can be added to an algorithm. It is used along with other instructions:

- **IF** represents a **question**
- **THEN** points to what to do if the answer to the question is **true**
- **ELSE IF** represents another **question**
- **THEN** points to what to do if the answer to that question is **true**
- **ELSE IF** represents another **question**
- **THEN** points to what to do if the answer to that question is **true**
- **ELSE** points to what to do if the answer to the question is **false**

Selection IF

Iteration WHILE

Pop up a new rat — Hit the rat — SCORE 085 — Increase score

algorithm	A sequence of logical instructions for carrying out a task. In computing, algorithms are needed to design computer programs.
flowchart	A diagram that shows a process, made up of boxes representing steps, decision, inputs and outputs.
programming	The process of writing computer software.
programming language	A language used by a programmer to write a piece of software.
pseudocode	Also written as pseudo-code. A method of writing up a set of instructions for a computer program using plain English. This is a good way of planning a program before coding.
sequence	In computer programming, this is a set of instructions that follow on one from another.

Start

number_of_teeth_cleaned = 0

Put toothpaste on toothbrush

Clean tooth

number_of_teeth_cleaned = number_of_teeth_cleaned + 1

Does number_of_teeth_cleaned = 32?

NO

YES

Rinse toothbrush

Stop

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