PROGRAMMING CONCEPTS AND SKILLS SUPPORTED IN SCRATCH

Lifelong Kindergarten Group
MIT Media Lab
http://scratch.mit.edu

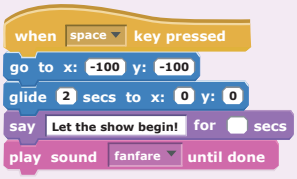
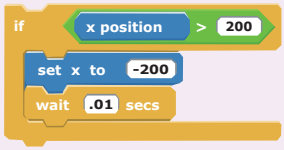
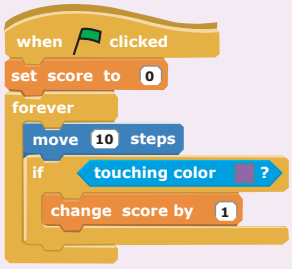
PROBLEM-SOLVING AND PROJECT-DESIGN SKILLS

- logical reasoning
- debugging problems
- developing ideas from initial conception to completed project
- sustained focus and perseverance

FUNDAMENTAL IDEAS ABOUT COMPUTERS AND PROGRAMMING

- Computer programs tell the computer precisely what to do, step-by-step
- Writing computer programs doesn't require special expertise, just clear and careful thinking

SPECIFIC PROGRAMMING CONCEPTS

Concept	Explanation	Example
Sequence	To create a program in Scratch, you need to think systematically about the order of steps.	
Iteration (looping)	**forever** and **repeat** can be used for iteration (repeating a series of instructions)	
conditional statements	**if** and **if-else** check for a condition.	
variables	The **Variables** category allows you to create a new variable and use it in a program. Scratch supports both global and object-specific variables.	
event handling	**when key pressed** and **when sprite clicked** are examples of event handling – responding to events triggered by the user or another part of the program.	

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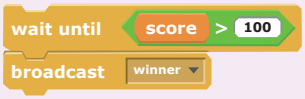
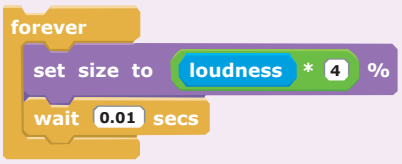
threads (parallel execution)	Launching two stacks at the same time creates two independent threads that execute in parallel.	
one-to-many communication	**broadcast** and **when I receive** can coordinate the actions of multiple sprites. (using "broadcast and wait" allows synchronization)	For example, Sprite1 sends the message winner when condition is met:  This script in Sprite2 is triggered when the message is received: 
random numbers	The **pick random** block selects random integers within a given range.	
boolean logic	**and, or, not** are examples of boolean logic.	
dynamic interaction	**mouse_x, mouse_y,** and **loudness** can be used as dynamic input for real-time interaction	
user interface design	You can design interactive user interfaces in Scratch – for example, using clickable sprites to create buttons.	

PROGRAMMING CONCEPTS NOT CURRENTLY INTRODUCED IN SCRATCH:

- data structures (arrays, etc.)
- procedures and functions
- recursion
- inheritance
- defining classes of objects
- exception handling
- parameter passing and return values
- text input
- file input/output