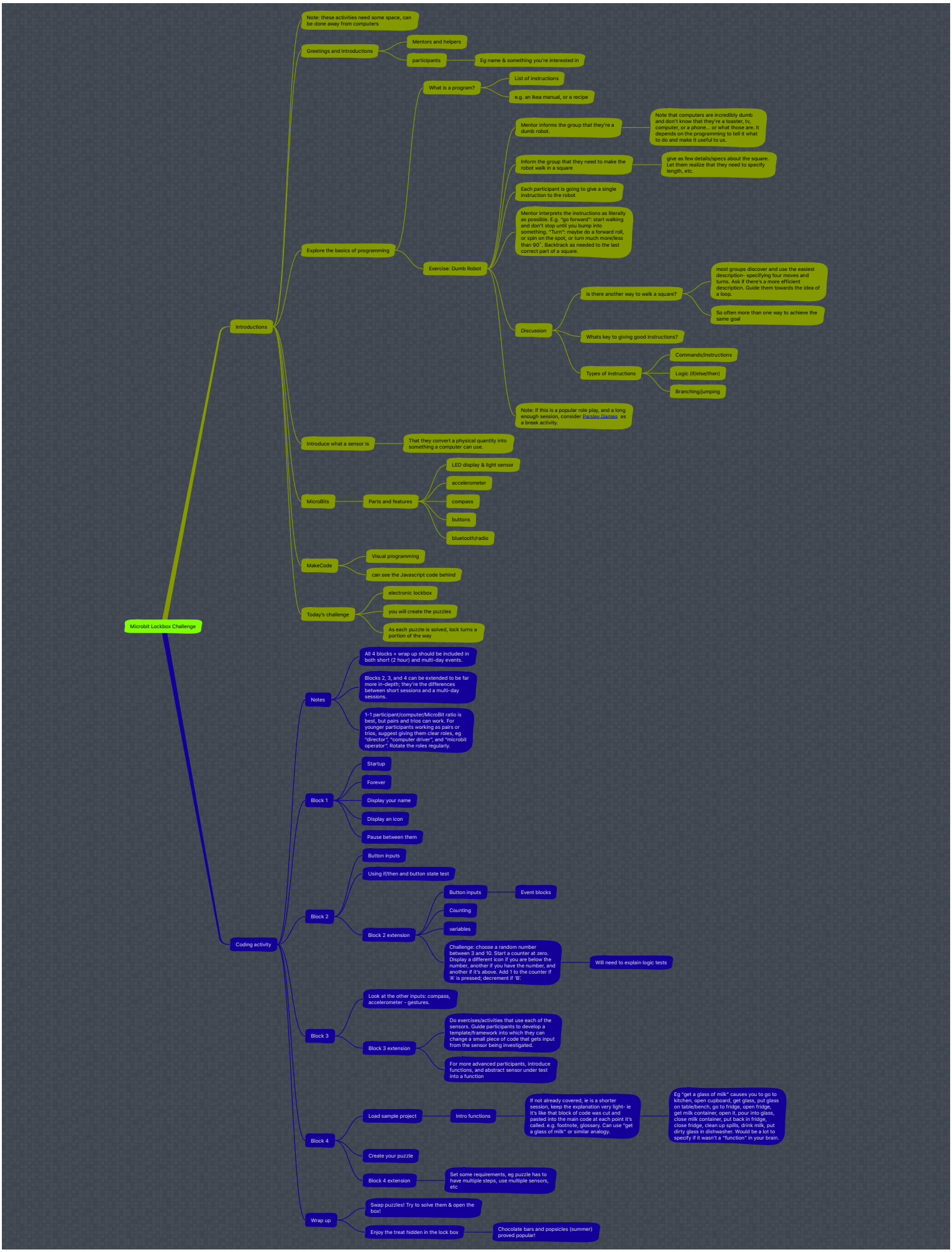
Microbit Lockbox Challenge
Introductions
Note: these activities need some space, can be done away from computers
Greetings and Introductions
Mentors and helpers
participants
Eg name & something you're interested in
Explore the basics of programming
What is a program?
List of instructions
e.g. an Ikea manual, or a recipe
Exercise: Dumb Robot
Mentor informs the group that they're a dumb robot.
Note that computers are incredibly dumb and don't know that they're a toaster, tv, computer, or a phone... or what those are. It depends on the programming to tell it what to do and make it useful to us.
Inform the group that they need to make the robot walk in a square
give as few details/specs about the square. Let them realize that they need to specify length, etc.
Each participant is going to give a single instruction to the robot
Mentor interprets the instructions as literally as possible. E.g. "go forward": start walking and don't stop until you bump into something. "Turn": maybe do a forward roll, or spin on the spot, or turn much more/less than 90°. Backtrack as needed to the last correct part of a square.
Discussion
Is there another way to walk a square?
most groups discover and use the easiest description- specifying four moves and turns. Ask if there's a more efficient description. Guide them towards the idea of a loop.
So often more than one way to achieve the same goal
Whats key to giving good instructions?
Types of instructions
Commands/instructions
Logic (if/else/then)
Branching/jumping
Note: if this is a popular role play, and a long enough session, consider Parsley Games as a break activity.
Introduce what a sensor is
That they convert a physical quantity into something a computer can use.
MicroBits
Parts and features
LED display & light sensor
accelerometer
compass
buttons
bluetooth/radio
MakeCode
Visual programming
can see the Javascript code behind
Today's challenge
electronic lockbox
you will create the puzzles
As each puzzle is solved, lock turns a portion of the way
Coding activity
Notes
All 4 blocks + wrap up should be included in both short (2 hour) and multi-day events.
Blocks 2, 3, and 4 can be extended to be far more in-depth; they're the differences between short sessions and a multi-day sessions.
1-1 participant/computer/MicroBit ratio is best, but pairs and trios can work. For younger participants working as pairs or trios, suggest giving them clear roles, eg "director", "computer driver", and "microbit operator". Rotate the roles regularly.
Block 1
Startup
Forever
Display your name
Display an icon
Pause between them
Block 2
Button inputs
Using if/then and button state test
Block 2 extension
Button inputs
Event blocks
Counting
variables
Challenge: choose a random number between 3 and 10. Start a counter at zero. Display a different icon if you are below the number, another if you have the number, and another if it's above. Add 1 to the counter if 'A' is pressed; decrement if 'B'.
Will need to explain logic tests
Block 3
Look at the other inputs: compass, accelerometer - gestures.
Block 3 extension
Do exercises/activities that use each of the sensors. Guide participants to develop a template/framework into which they can change a small piece of code that gets input from the sensor being investigated.
For more advanced participants, introduce functions, and abstract sensor under test into a function
Block 4
Load sample project
Intro functions
If not already covered, ie is a shorter session, keep the explanation very light- ie it's like that block of code was cut and pasted into the main code at each point it's called. e.g. footnote, glossary. Can use "get a glass of milk" or similar analogy.
Eg "get a glass of milk" causes you to go to kitchen, open cupboard, get glass, put glass on table/bench, go to fridge, open fridge, get milk container, open it, pour into glass, close milk container, put back in fridge, close fridge, clean up spills, drink milk, put dirty glass in dishwasher. Would be a lot to specify if it wasn't a "function" in your brain.
Create your puzzle
Block 4 extension
Set some requirements, eg puzzle has to have multiple steps, use multiple sensors, etc
Wrap up
Swap puzzles! Try to solve them & open the box!
Enjoy the treat hidden in the lock box
Chocolate bars and popsicles (summer) proved popular!