

Musical Theremin

Introduction

1. Choose someone to read aloud to the group:

“A conditional is like a rule-of-thumb that you follow to make a decision. For example, before you go outside, you may say to yourself, “If it is cold outside, then I’m going to put my jacket on.” Can you think of any more examples? Write them down, or share them verbally with the group.”

Hints:

- If it is after 9pm, then it’s time to go to sleep.
- If I want to ask my teacher a question, then I need to raise my hand first.
- If I’m younger than 14, then I can’t stay home by myself.

2. Choose someone to read aloud to the group:

“Knowing what to do if something happens is good, but sometimes it’s best to add a backup-plan if things don’t work out. In coding, adding the word “else” makes it easy to add another option to the conditional. For example, let’s imagine your Dad says: “If I have time to make dinner, then everyone can eat, or else I’ll just order pizza.” If your Dad follows through, everyone will always eat, even on days when he can’t cook. Great plan Dad! Can you think of any more examples? Write them down, or share them verbally with the group.”

Hints:

- If my friend comes over, then we can play tag, or else I’ll read my book.
- If my favorite T-shirt is dry by the morning, then I’ll wear it, or else I’ll wear my other T-shirt.
- If I have more than \$5, then I’ll buy a hot lunch, or else a snack will have to do.

3. Choose someone to read aloud to the group:

“In the next section we will create a conditional statement so the mBot can decide what to do if there is an object nearby. How the mBot reacts is up to you. To measure the distance to an object, the mBot uses an ultrasonic sensor (it’s eyes). The ultrasonic sensor uses echolocation. It’s the same science that a bat uses to “see” at night.”



Guided Practice

1. Build this code on your screen. The blocks are colour-coded to match the menu colour. (Do not use the “Motion” menu, this controls the screen character, not the robot.)

```

when green flag clicked
  forever loop
    say ultrasonic sensor Port3 distance
    if ultrasonic sensor Port3 distance < 30 then
      play tone on note C4 beat Half
    else
      play tone on note C8 beat Half
  
```

```

when space key pressed
  run forward at speed 0
  stop all
  
```

2. The Ultrasonic sensor is the robot’s eyes. It uses Echolocation to measure the distance in centimeters.
3. The Panda Bear will help us out by saying what the sensor is “seeing”.
4. Double click any block to run it, or click the green flag to start the code.
5. Put your hand in front of the robot’s eyes. What does the mBot do?
6. Press the Spacebar to stop the robot.

Independent Practice

1. Try adding more conditionals to add notes that the robot can play.
2. Try coding the robot to drive around the room without crashing.

Curriculum Connection - Math

1. The code above plays two discrete notes. Try code below, it plays notes continuously.
2. What is the difference between discrete and continuous data? Ask Google!

```

when green flag clicked
  forever loop
    say ultrasonic sensor Port3 distance
    play tone on note ultrasonic sensor Port3 distance beat Half
  
```

3. Can you use math operators to make the pitch change more dramatically with less hand movement? (see example below)

```

when green flag clicked
  forever loop
    say ultrasonic sensor Port3 distance
    play tone on note ultrasonic sensor Port3 distance * 100 beat Half
  
```

