

MARTY TEACHER GUIDE

Prompts and Questions to Support Delivery of Lessons



Estimating with Distance Sensors

What is a distance sensor?

An infrared distance sensor, like the add-on for Marty, uses light to determine how far away an object is. A beam of light is emitted from an LED and the reflected light is detected by the sensor, both of which are built onto the add-on. The angle that the sensor detects the reflected light informs the sensor as to the distance of an object.

Encourage learners to have near and far objects and test against known distances: make markings to precisely measure a distance and check against what the distance sensor returns. Inform learners that the value is in millimetres and encourage them to convert to more useful units of measure.

Making use of more precise measurements

Learners have already explored conditional statements and nested statements as well as logic blocks. The example code, below, is one way to apply a second level to a conditional statement. It asks:

- Is the distance more than a set amount?
 - Yes, is it more than a second amount?
 - yes, then do something
 - no, then do a different something (this second something meets the first condition but not the second)
 - No, then do a different something (this something does not meet the first condition so the second condition isn't even considered)

The second way that this code could be carried out is through the use of logic blocks; with logic blocks, the nested conditional is unnecessary: each individual condition would have a minimum and maximum range. There would be multiple if statements that would result in the same movement output. The only difference between these two methods is that there needs to be no overlap between the logic statements or more than one action can occur at the same time; this is a problem when the different actions use the same limb.

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Explaining the Conditional statements

There are two conditional statement blocks in the code. One is nested inside the other.

```
when clicked
  forever loop
    if Distance Sensor > 800 then
      if Distance Sensor > 1200 then
        Play sound: confusion
        Move right arm to 105° in 1 s
        Walk 4 steps forwards
      else
        Play sound: excitement
        Wave left arm
        Wave right arm
    else
      Move right arm to 170° in 1 s
      Move left arm to 170° in 1 s
      Play sound: no!
      Walk 2 steps backwards
```

- The loop runs until the program is stopped.
- The distance sensor value is checked and if it is greater than 800, it is checked to see if it is also greater than 1200.
- If the distance to an object is greater than 1200, Marty makes the confused sound, raises his arm and walks forward (this is to simulate Marty wanting to find out what it is)
- If the distance to the object is not more than 1200 but more than 800, Marty will play the excitement sound and wave his arms (this is to simulate Marty waving hello)
- If the distance is not more than 800, the arms will raise to 170 degrees, the no sound will play and Marty will walk back (this is to simulate that Marty is too close / nervous and needs to back away)
- As the object changes distance, the results will change
- If Marty is farther away than 1200 mm, Marty will walk toward until he starts waving; he will continue waving until the object moves closer
- Then, Marty will move away until he is more than 800 mm distant, at which point he will wave continually