

Coding and Design	Grade 7
Form, Function and Design of Structures	
Coding Guide	

Task 1: Code a Goniometer (between 0 and 90°)

Objective: Create a program that used the Micro:Bits accelerometer to measure an angle between 0 and 90 degrees.

Algorithm: This program measures the data from the accelerometer and uses a formula to convert the tilt of the Micro:Bit into an angle.

```

forever
  while true
  do
    set x to acceleration (mg) x
    if x > 0 and x < 980 then
      set x to round(180 * x / 2000)
    else
      set x to 0
    show number x
  
```

Task 2: Code a Bubble Level

Objective: Create a program uses the LEDs on the Micro:Bit to display how level an object is, based on the values read from the built in accelerometer.

Algorithm: This program measures the deviation along the ‘x’ and the ‘y’ axis and connects its position to the LEDs. Note that the code is done almost identically twice, once for each direction.

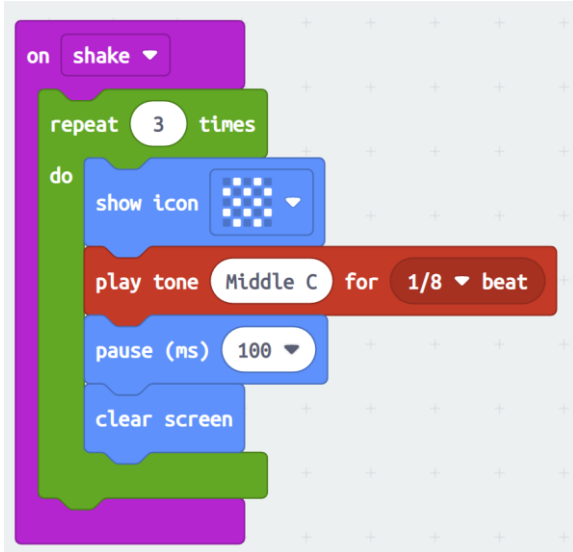
```
forever
  clear screen
  if acceleration (mg) x ≥ 600 then
    set x to 0
  else if acceleration (mg) x ≥ 300 and acceleration (mg) x < 600 then
    set x to 1
  else if acceleration (mg) x > -300 and acceleration (mg) x < 300 then
    set x to 2
  else if acceleration (mg) x ≤ -300 and acceleration (mg) x > -600 then
    set x to 3
  else
    set x to 4
  plot x x y y
  pause (ms) 200
```

```
forever
  clear screen
  if acceleration (mg) y ≥ 600 then
    set y to 0
  else if acceleration (mg) y ≥ 300 and acceleration (mg) y < 600 then
    set y to 1
  else if acceleration (mg) y > -300 and acceleration (mg) y < 300 then
    set y to 2
  else if acceleration (mg) y ≤ -300 and acceleration (mg) y > -600 then
    set y to 3
  else
    set y to 4
  plot x x y y
  pause (ms) 200
```

Task 3: Code a Seismometer

Objective: Create a program that reacts to movement or shaking.

Algorithm: In this program, an alarm is activated if a shake is detected.



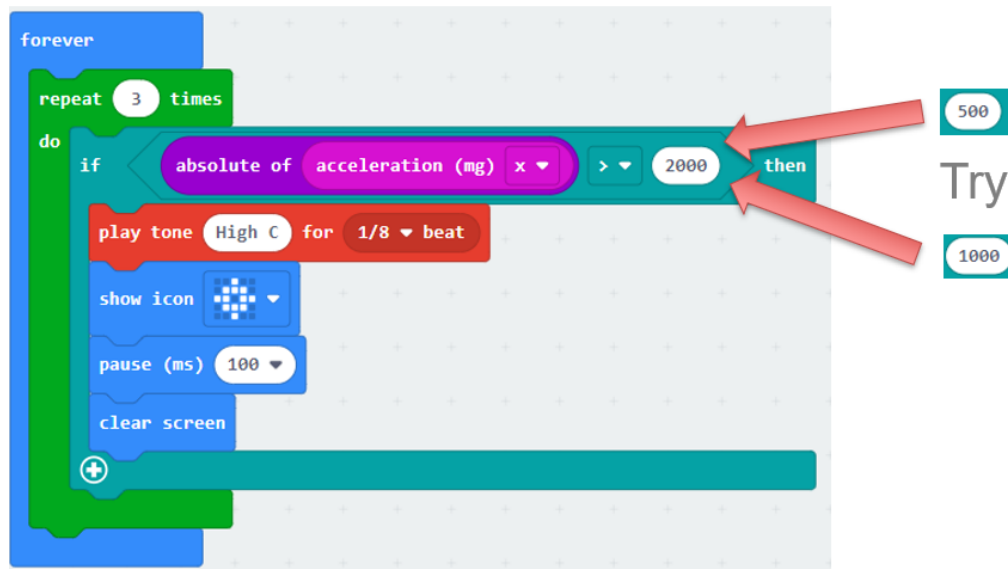
```

on shake
  repeat 3 times
    do
      show icon [grid icon]
      play tone Middle C for 1/8 beat
      pause (ms) 100
      clear screen
  
```

Task3B: Try to detect “P-waves”

Objective: Create a program that reacts more sensitively to changes in position in space.

Algorithm: This program measures the data from the accelerometer and compares it with different values to check for sensitivity.



```

forever
  repeat 3 times
    do
      if absolute of acceleration (mg) > 2000 then
        play tone High C for 1/8 beat
        show icon [grid icon]
        pause (ms) 100
        clear screen
      +
  
```