

Form, Function and Design of Structures

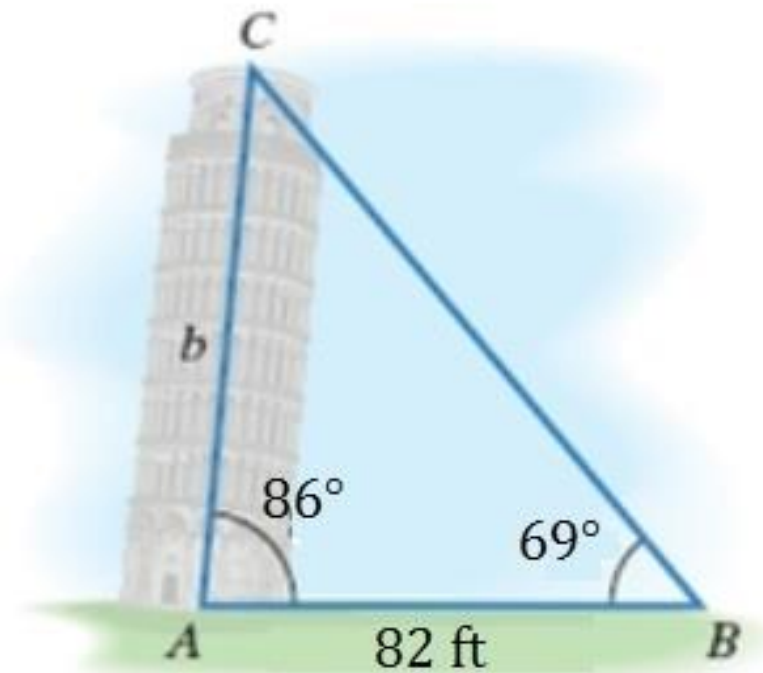
Grade 7

D1.1 evaluate environmental, social and economic factors that should be considered when designing and building structures to meet specific needs for individuals and communities

D2.7 describe methods engineers and other professionals use to assess, improve, and maintain the safety of structures

Leaning Tower of Pisa

What do you observe?



Tools used for measuring angles and level relative to the ground



Angle Protractor

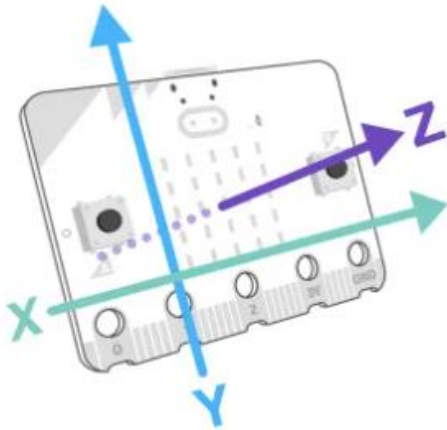


Goniometer



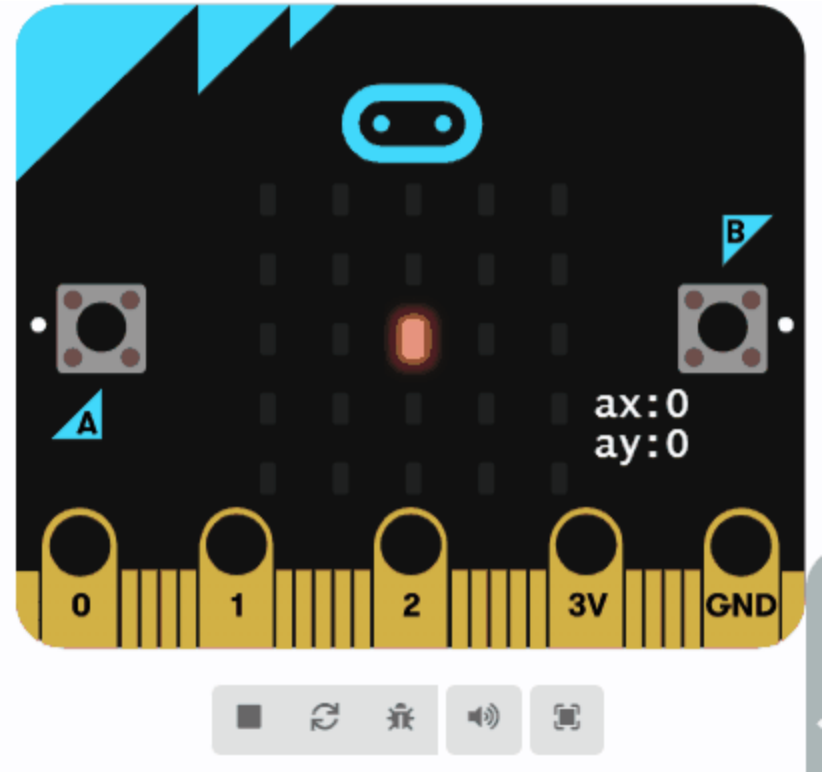
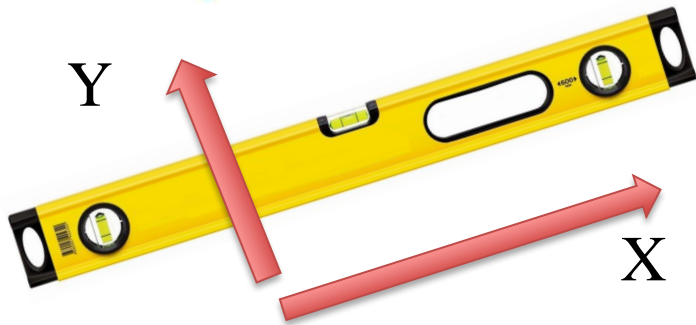
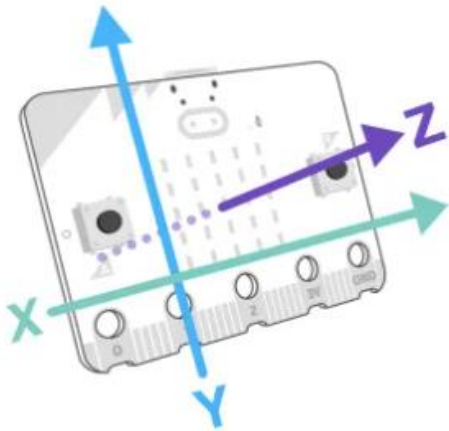
Bubble Level

Task 1. Use the accelerometer to program a Goniometer (0...90 deg)



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

Task 2. Create a Bubble Level



Task 2 . Create a Bubble Level

```
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
```

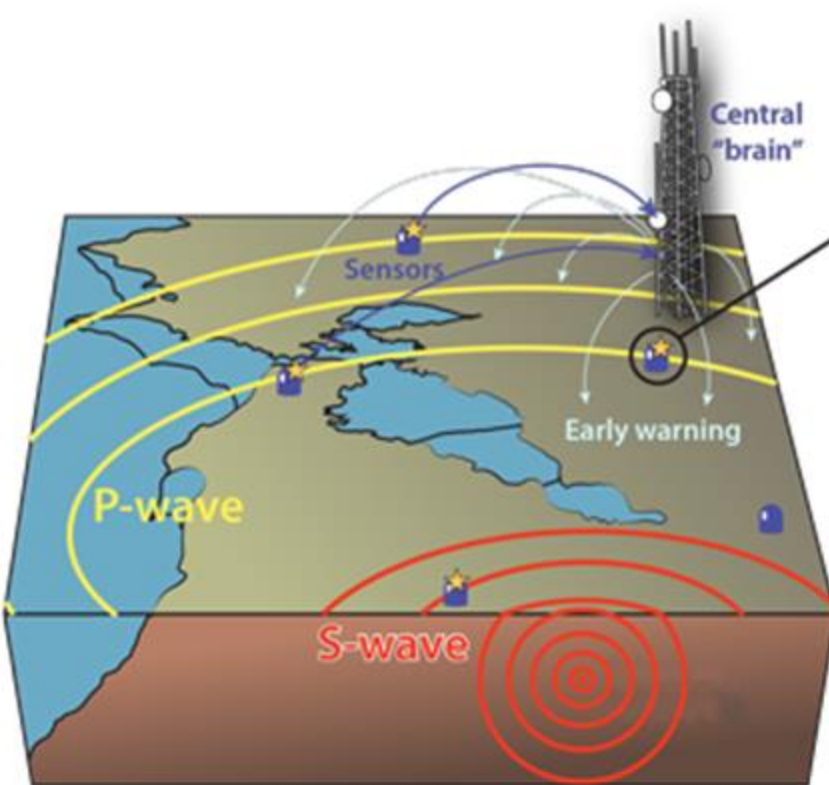
Part 1

Task 2. Create a Bubble Level

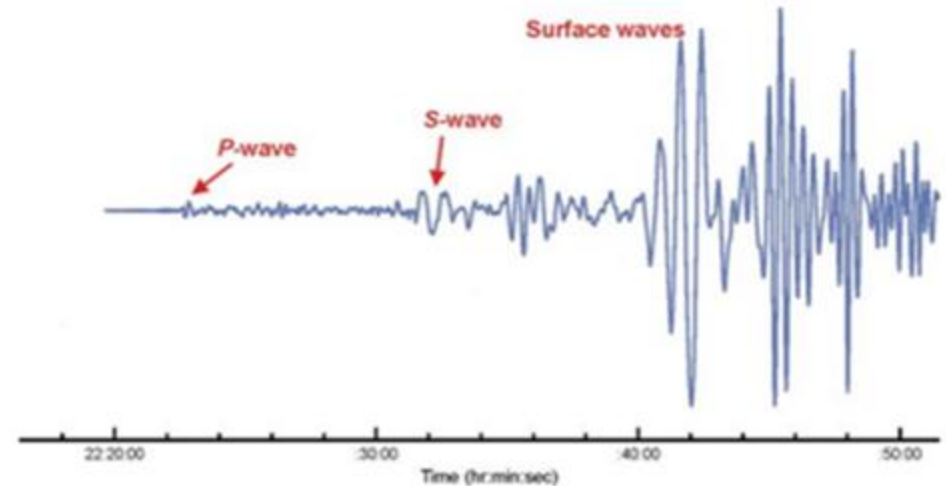
```
forever
  clear screen
  if acceleration (mg) y ≥ 600 then
    set y to 0
  else if acceleration (mg) y ≥ 300 and acceleration (mg) y < 600 then
    set y to 1
  else if acceleration (mg) y > -300 and acceleration (mg) y < 300 then
    set y to 2
  else if acceleration (mg) y ≤ -300 and acceleration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

Part 2

Earthquake detection



ShakeAlert:



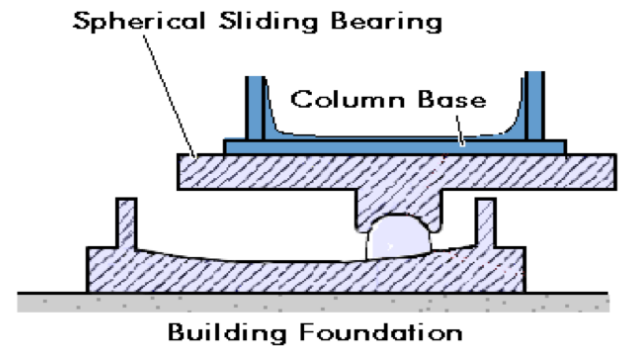
Some solutions



Active Mass Damping

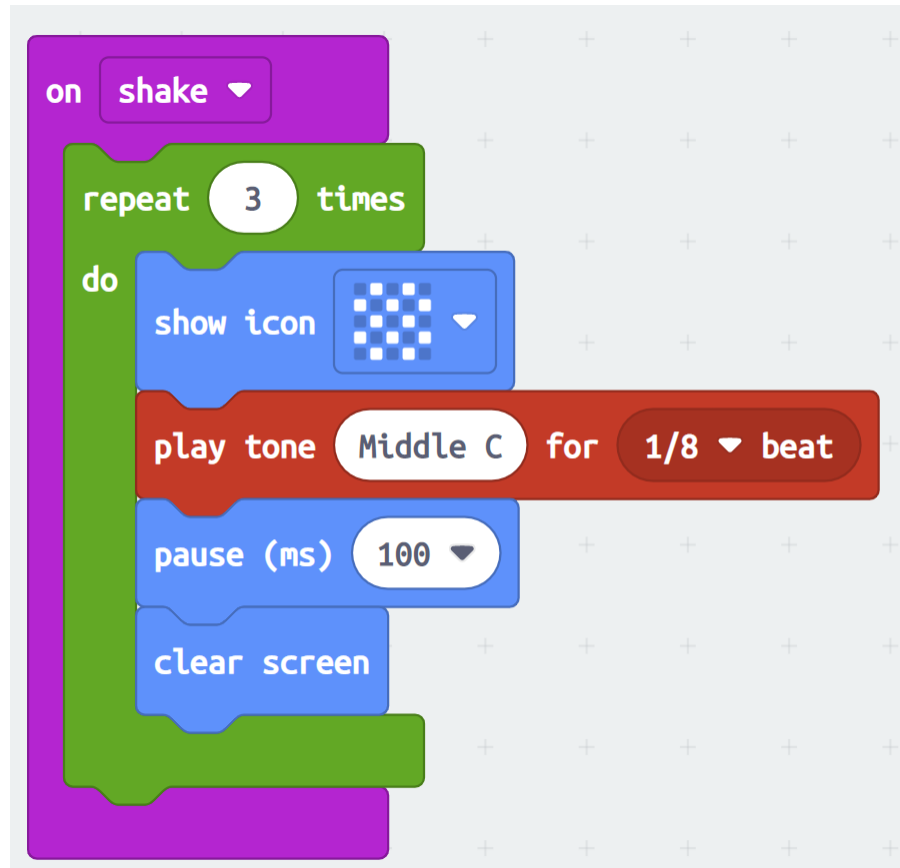


Springs-with-damper base



Spherical Sliding technology

Task 3 . Program a Seismometer



Task 3B . Test for P-Waves

