

創意編程

設計大賽

2020/21

Creative Coder Competition

micro:bit
初階工作坊
Basic Training Workshop

合辦機構
Co-organizer



香港青年協會
the hongkong federation of youth groups



Department of Electrical and
Electronic Engineering
電機電子工程系

贊助
Sponsor



創新科技署
Innovation and
Technology Commission

初階工作坊內容

- 學習micro:bit內置的輸入/輸出元件
 - LED、按鈕、加速計、磁力、溫度、光度
 - V2 麥克風、輕觸感應、喇叭
- 編程結構：序列、條件
- 學習變數

什麼是micro:bit？

- 由英國BBC牽頭，聯同全球29間科技公司共同研發的微電腦
- 2015年免費提供給英國所有Year 7的學生學習編程
- 為BBC第二代以教育為主的微電腦系統



BBC Micro (1981 - 1994)



5 X 5 = 25顆 LED螢幕/ 光感

micro:bit V2

輕觸感應

麥克風

B按鈕

低功耗藍牙天線
Bluetooth Low Energy (BLE)

A按鈕

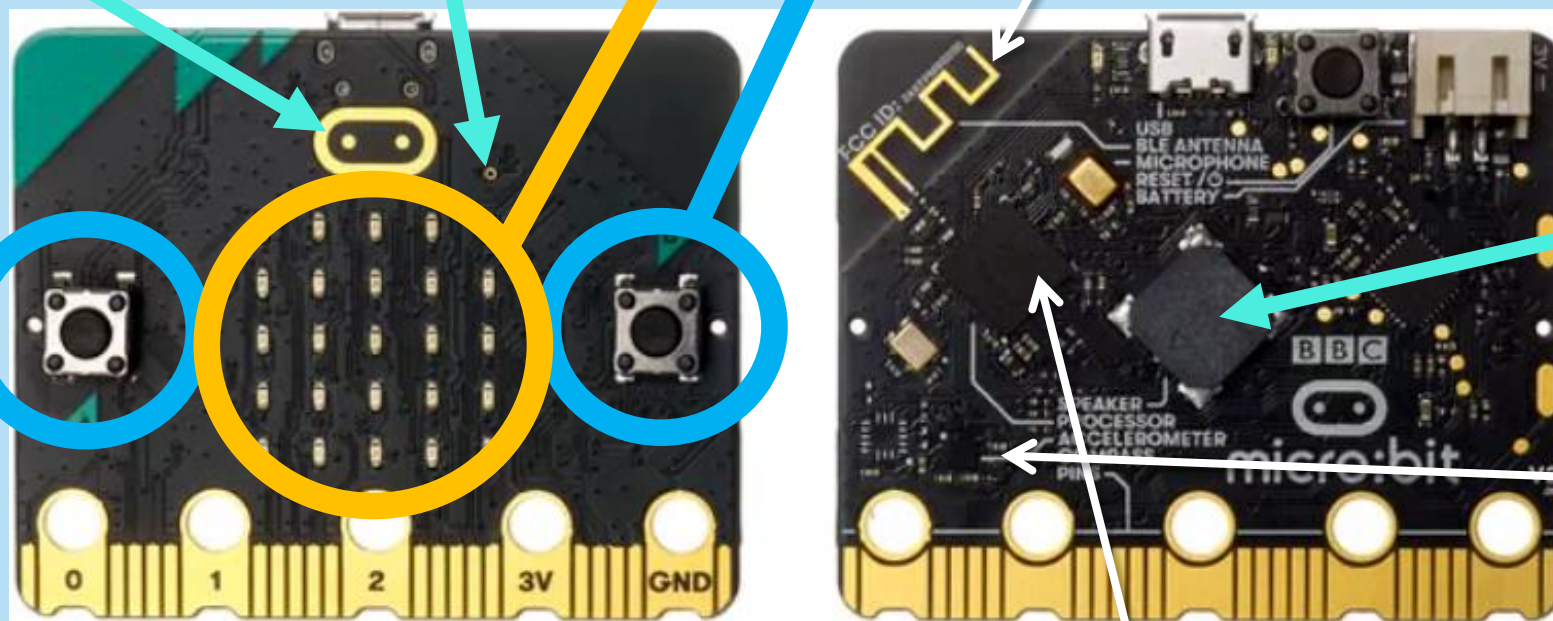
蜂鳴器

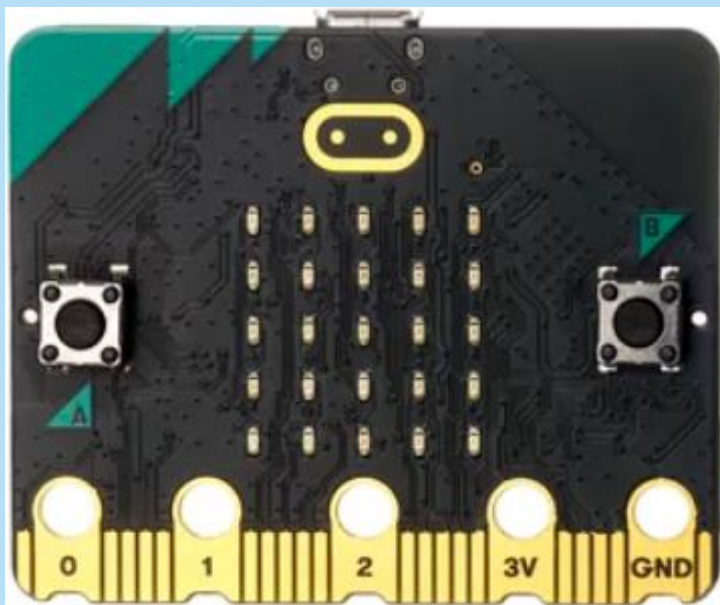
指南針 (磁場)
+
加速計

中央處理晶片 (感溫)

腳位/3V、接地

- 加強中央處理器
- 慳電模式





特色

1. 可用回所有第一代 micro:bit 的程式
2. 同一個編程介面
3. 延伸性大（人工智能）

輸入指令

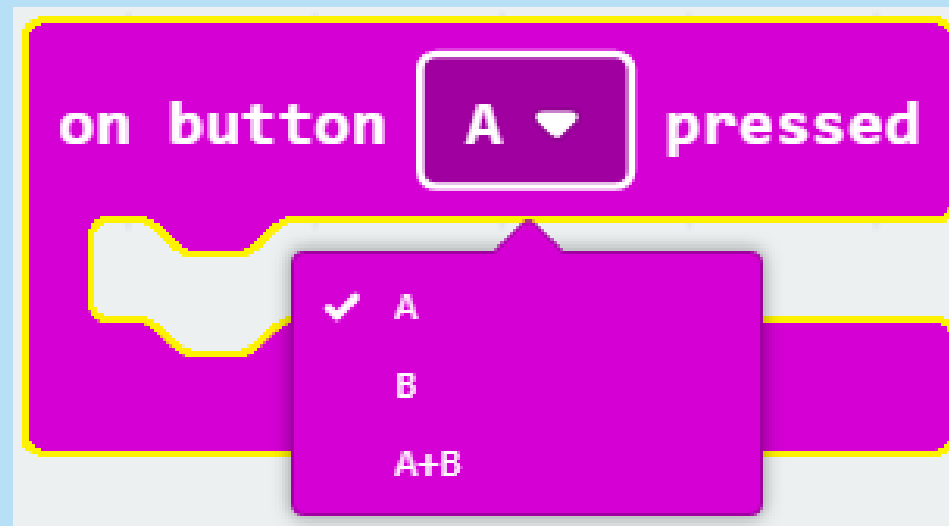
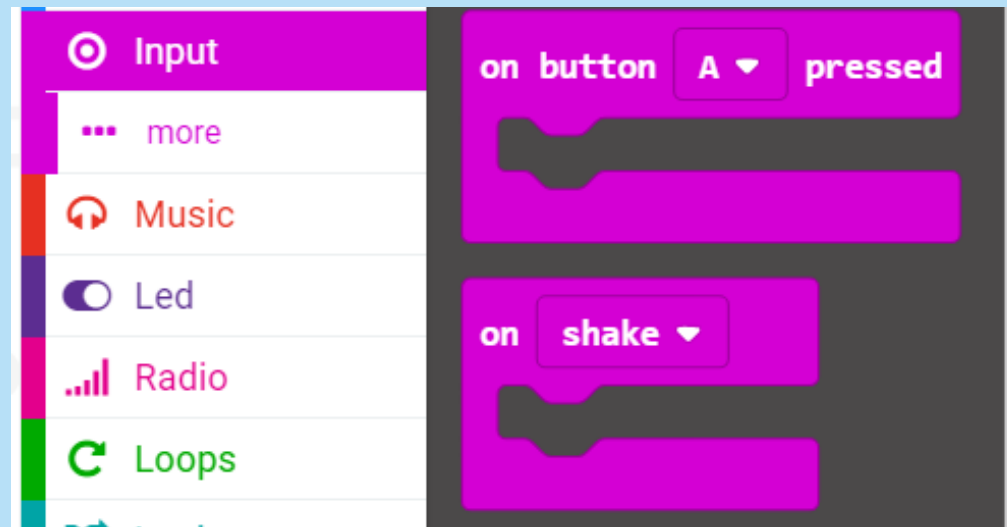
學習重點！

1. 使用按鈕（A、B及A+B）
2. 移動micro:bit觸發不同效果

A按鈕



B按鈕



on shake ▼



shake



logo up



logo down



screen up



screen down



tilt left



tilt right



free fall



3g



6g



8g

on button **A** pressed

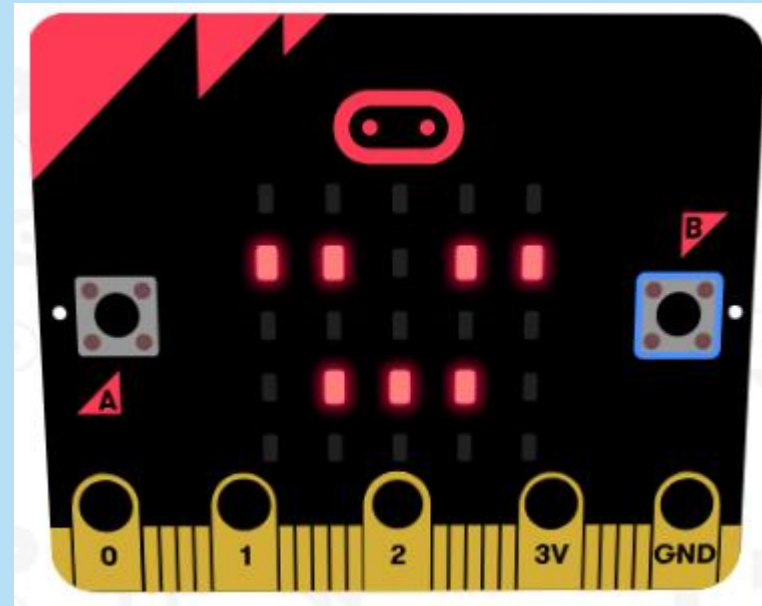
show number **88**

on button **B** pressed

show string **Hello!**

on **logo up**

show icon



光度+輸入指令

on button **B** pressed

set brightness 55

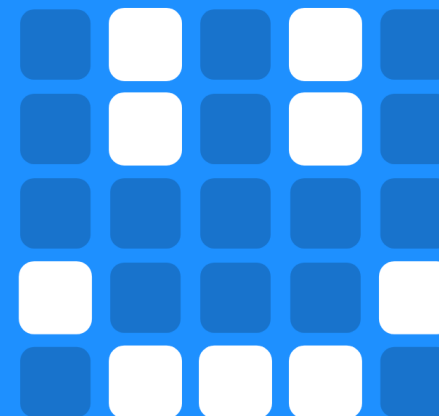
on button **A+B** pressed

clear screen

on button **A** pressed

set brightness 255

show leds



公定字？

- 學習重點：

1. 運用隨機生成布林值
2. 運用隨機數字 (Random Number)指令積木
3. 認識數學指令



未知的作者的 [此相片](#) 已透過 [CC BY-SA](#) 授權

布林值 Boolean

- 只有兩個可能性：True（是）或False（非）

pick random true or false

true

false

公定字？

on button **A** pressed

if **pick random true or false** then

show icon



else



show icon



計步器

- 學習重點：

1. 認識及使用變數 (Variables)



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Search...



Basic



Input



Music



Led



Radio



Loops



Logic



Variables



Math



Variables

Make a Variable...

New variable name:

Ok



Cancel



打上Step

Search...



Basic



Input



Music



Led



Radio



Loops



Logic



Variables



Math



Advanced



Variables

Make a Variable...

Step ▼

set

Step ▼

to

0

change

Step ▼

by

1

計步器

on start

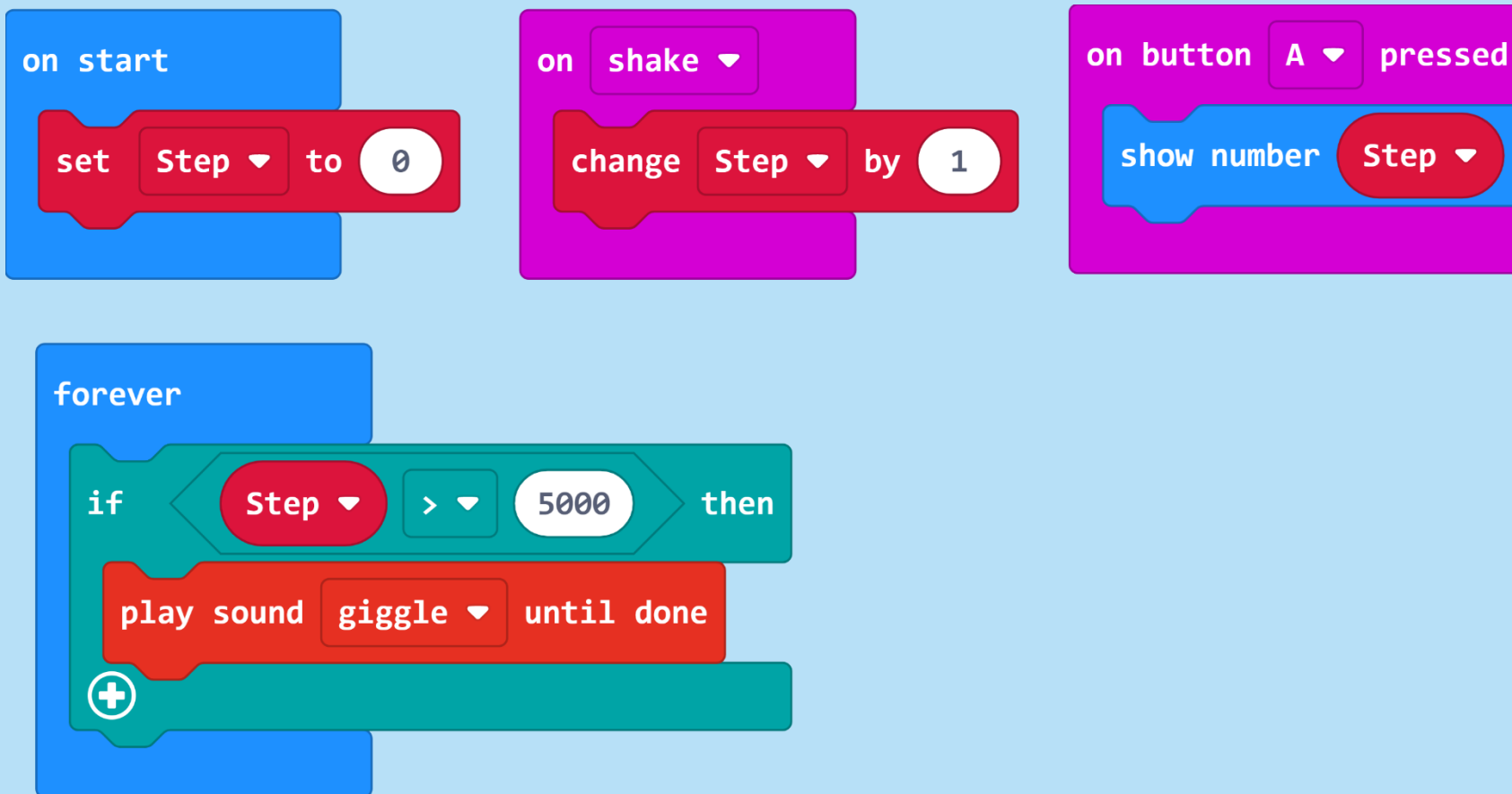
set step to 0

on shake

change step by 1

show number step

計步器 (micro:bit V2)



最公平的包、剪、揼

挑戰題：

運用所學的編程，編寫程式製作包剪揼機：

- 搖micro:bit後，隨機出現包、剪、揼符號
- 按A鍵加一分，按B鍵減一分



最公平的包、剪、揼

參考答案：

```
on start
  set Score to 0
```

```
on button A pressed
  change Score by 1
```

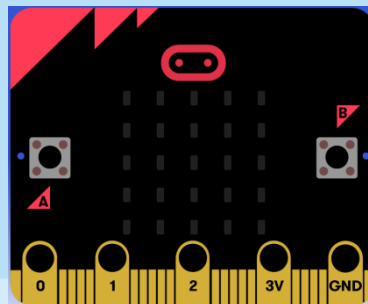
```
on button B pressed
  change Score by -1
```

```
on shake
  set Hands to pick random 0 to 2
  if Hands = 0 then
    show icon [Rock icon]
  else if Hands = 1 then -
    show icon [Paper icon]
  else -
    show icon [Scissors icon]
  +
```

電子溫度計

學習重點！

1. 使用內置溫度感應
2. 溫度感應積木及燈光指令積木

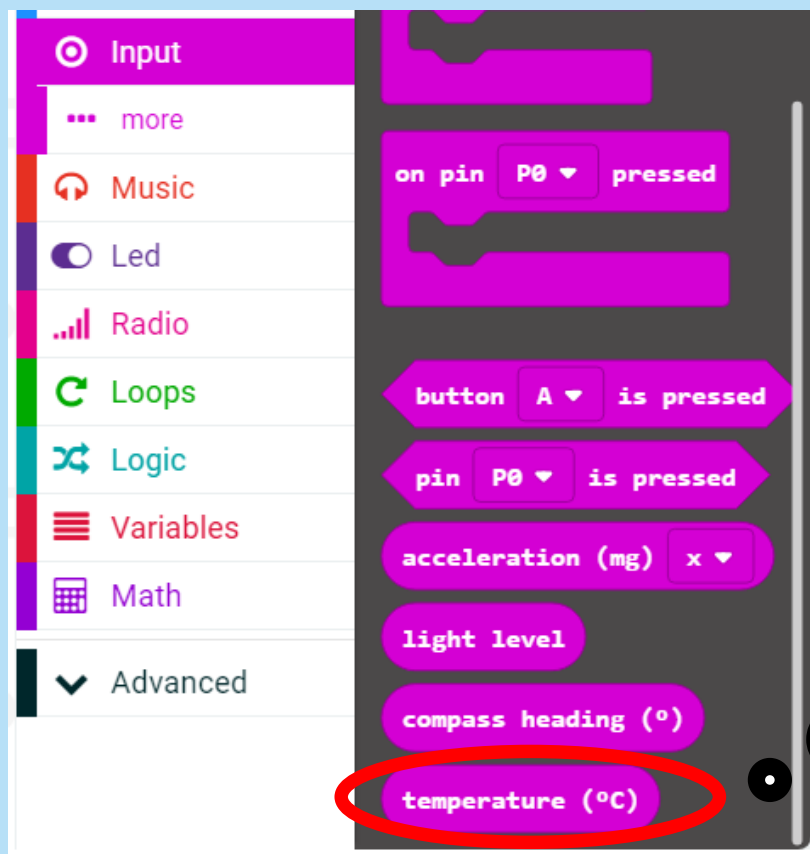


我是閱讀自己中央處理器的溫度

電子溫度計

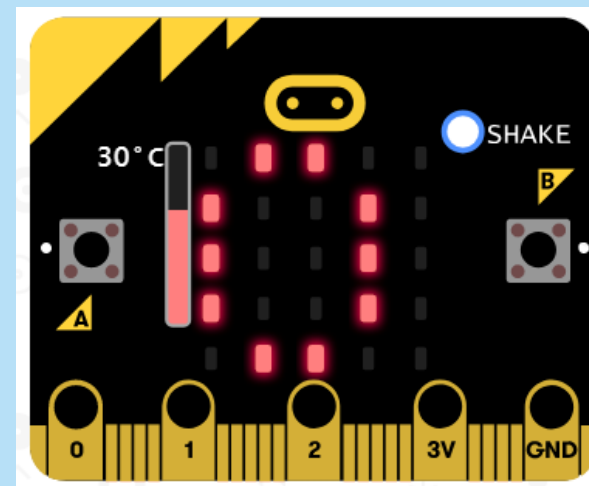
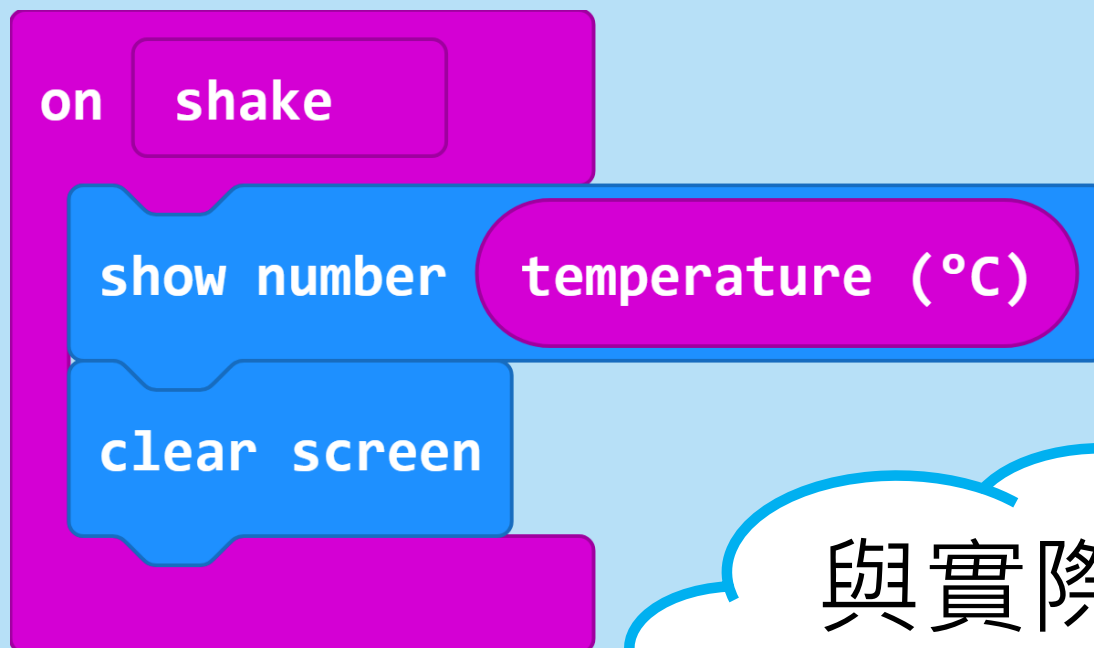
量度攝氏溫度
($^{\circ}\text{C}$)

閱讀範圍： -5°C
至 50°C



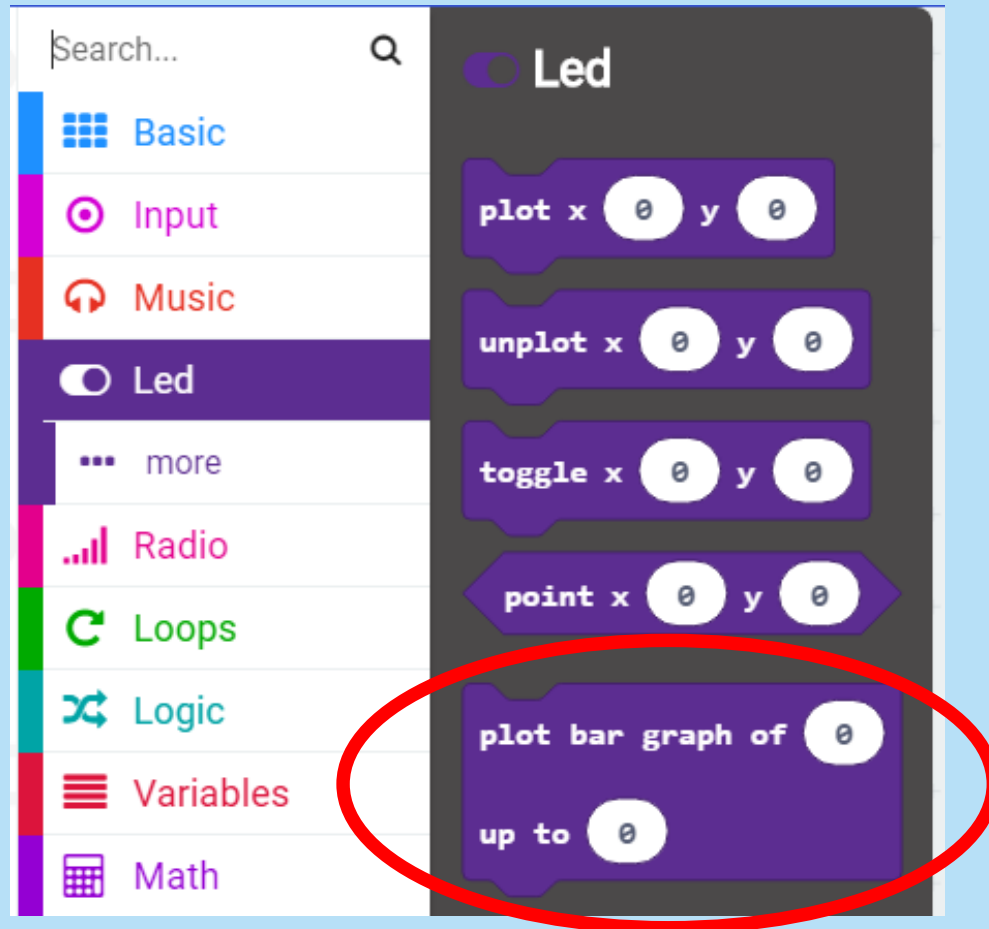
以什麼型式
顯示？

電子溫度計



與實際環境的
溫度比較一下

電子溫度計

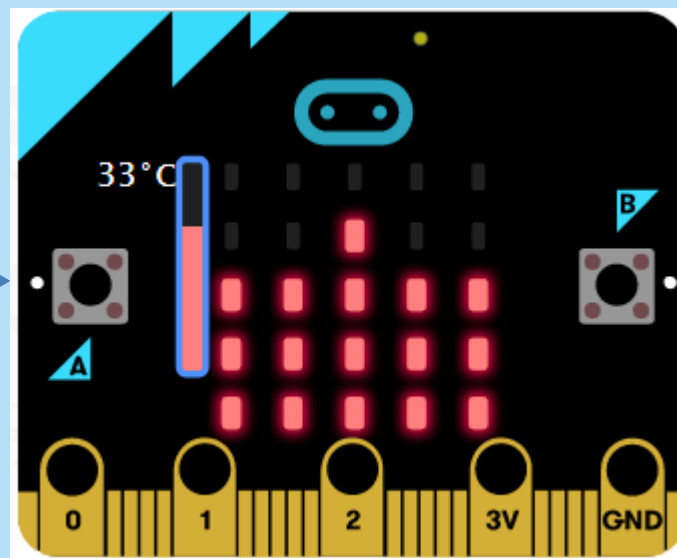
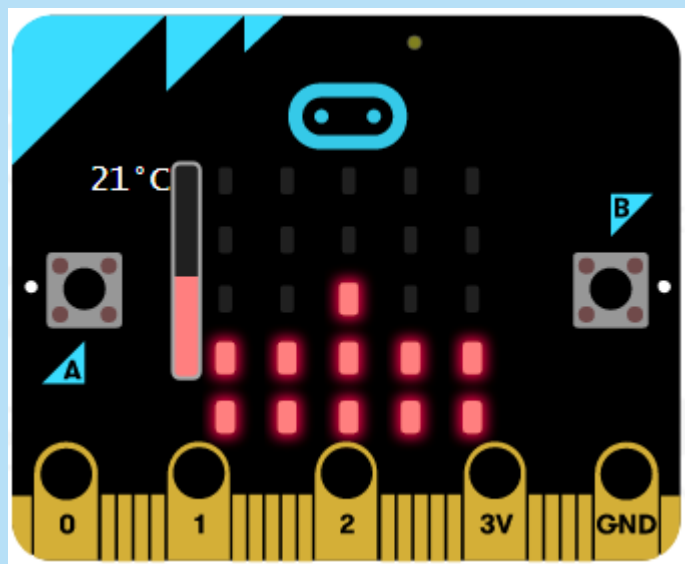


電子溫度計

on shake

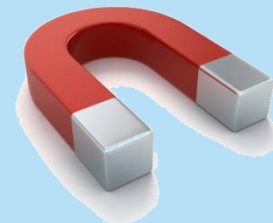
plot bar graph of temperature (°C)

up to 50



每一點LED代表幾多度？

找出磁力王！



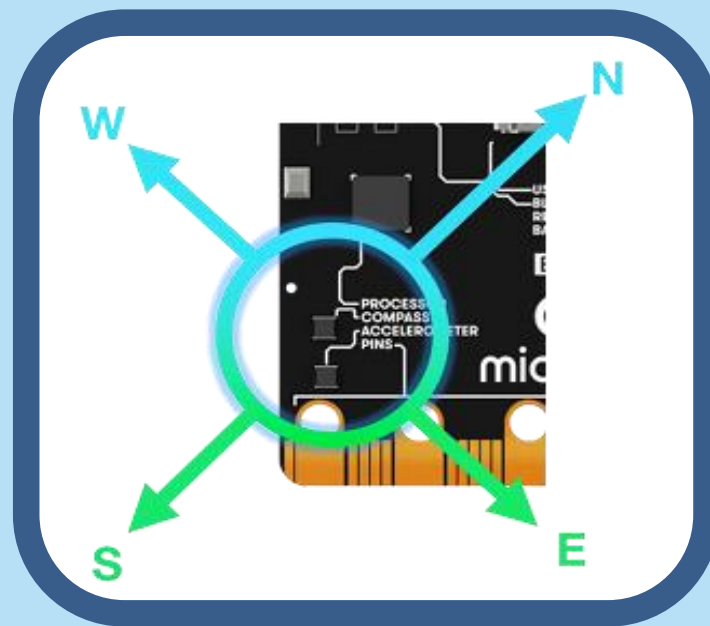
- 學習重點！

1. 磁力感應

2. 校正

magnetic force (μT)

x ▼



找出磁力王！

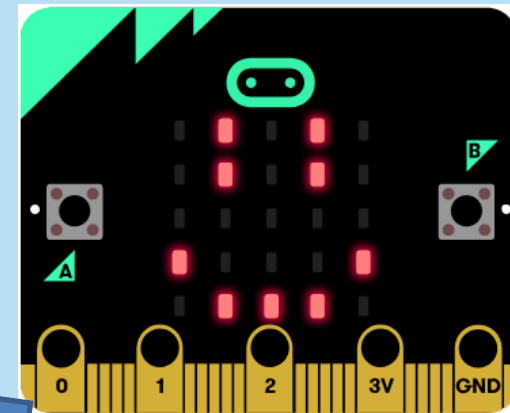
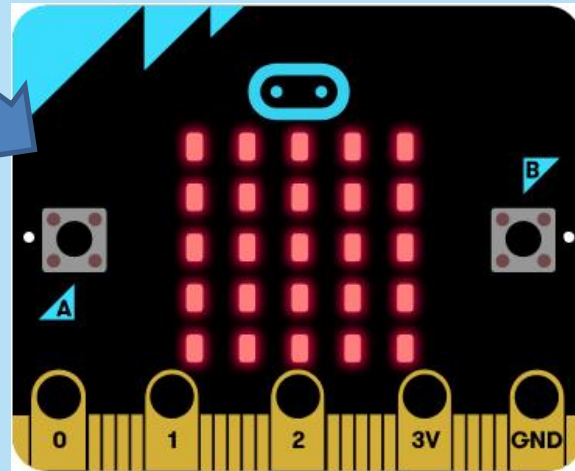
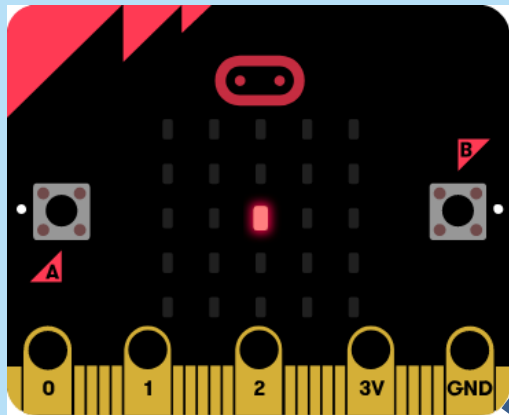
on shake

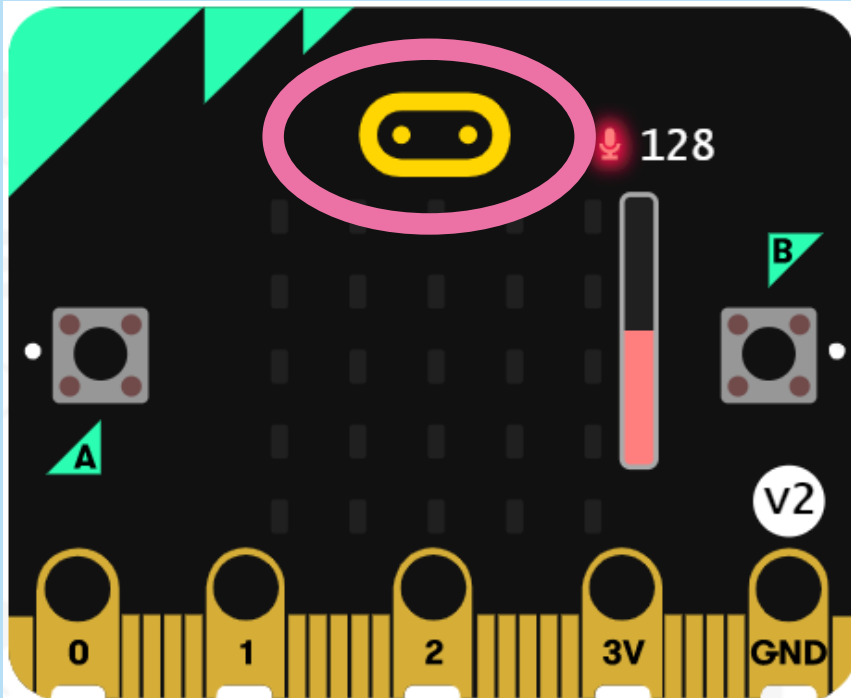
plot bar graph of magnetic force (μT) x

up to 3000

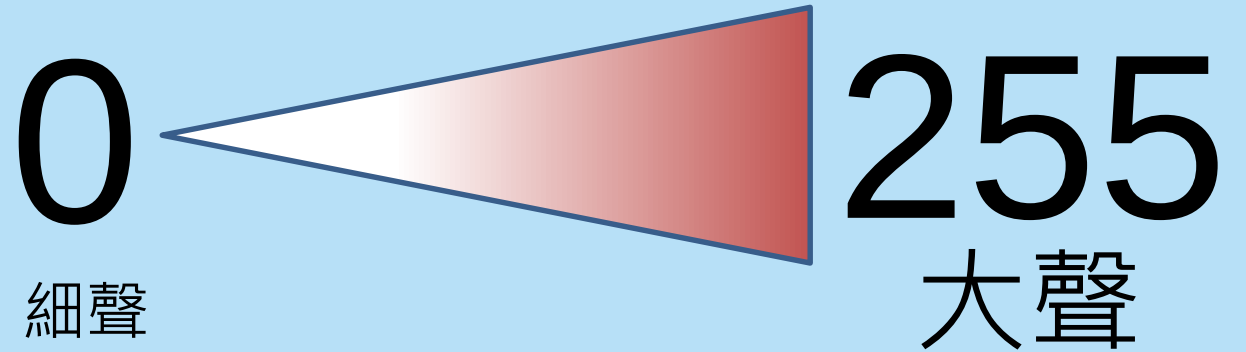
校正

校正：“TILT TO FILL SCREEN”
移動micro:bit讓閃燈填滿整個
LED螢幕



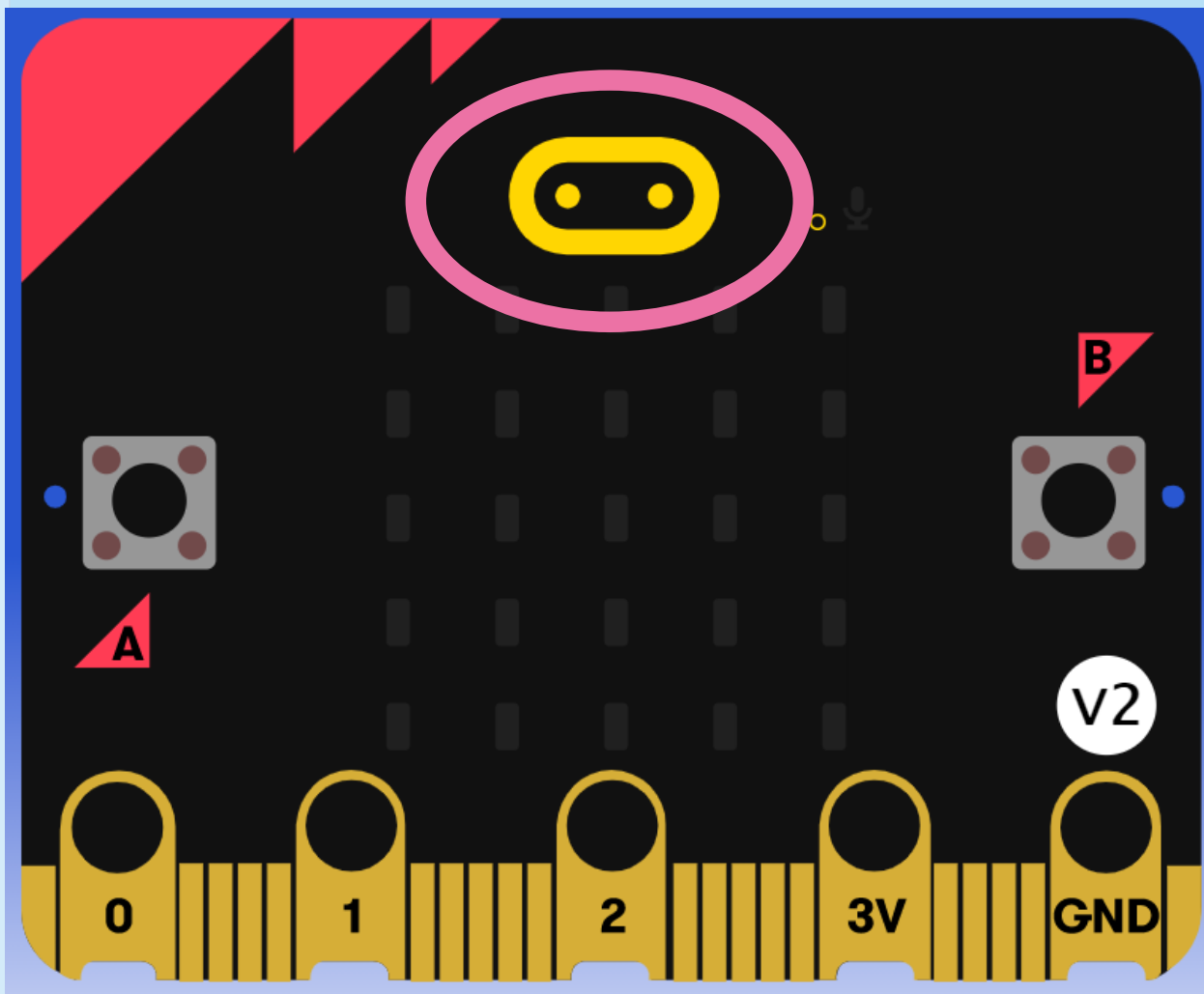


麥克風功能



聲音響度 Sound Level

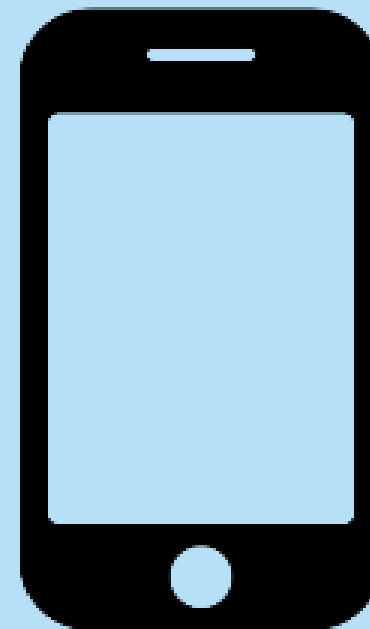
- 類比輸入 (analog in)

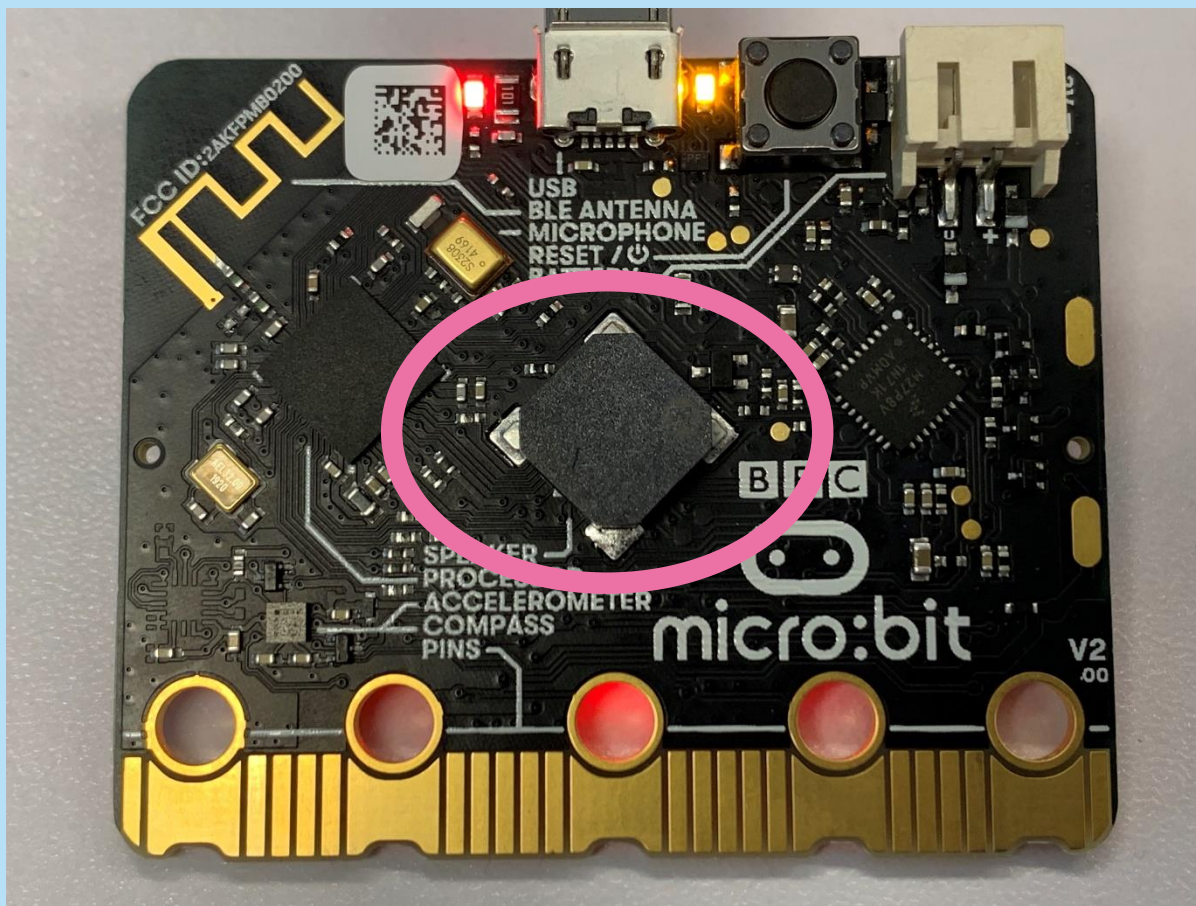


電容式輕觸

Capacitive Touch

~按鈕





蜂鳴器(喇叭)

可用music積木

micro:bit (V2)

play sound **giggle ▼** until done

play sound **giggle ▼**

set built-in speaker **OFF**

on 聲響 ▼ sound

on 安靜 ▼ sound

當啟動時

set 聲響 ▼ sound threshold to 128

聲音響度

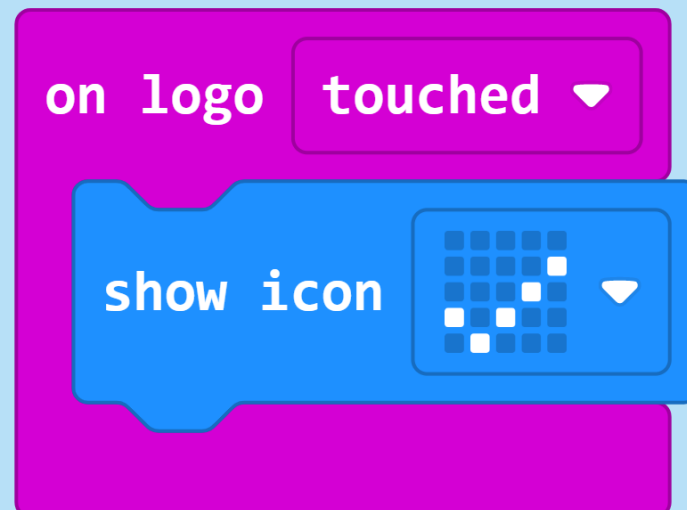
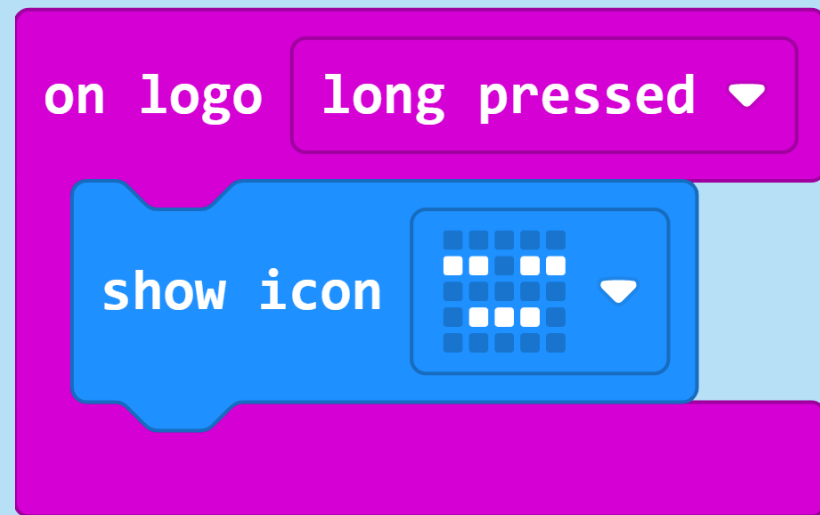
有什麼分別？

on logo pressed ▼

on logo released ▼

on logo touched ▼

on logo long pressed ▼



試一試！

活動：聲級計 Sound Meter

重複無限次

顯示 數字

聲音響度

活動：聲級計 Sound Meter（圖像版）

重複無限次

點亮長條圖 顯示值為

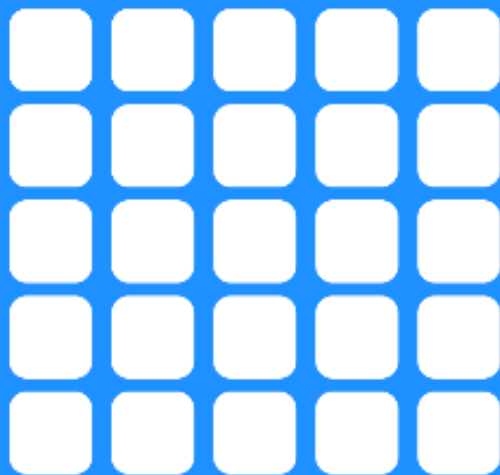
聲音響度

最大值為

255

當啟動時

顯示 指示燈



重複無限次

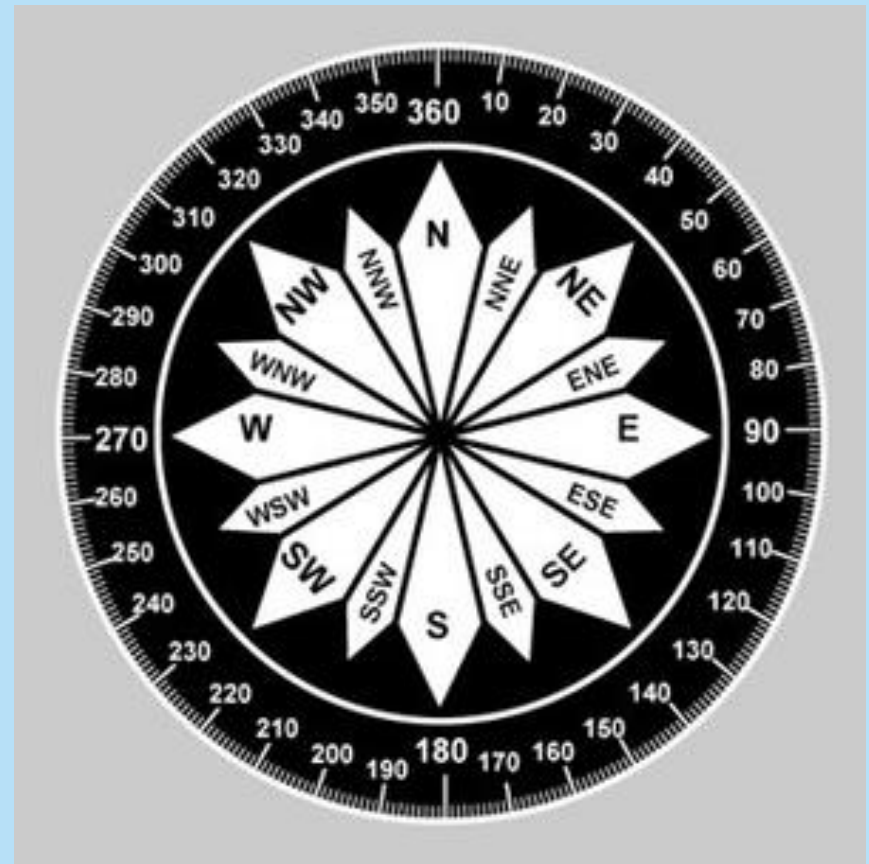
燈光 亮度設為 聲音響度

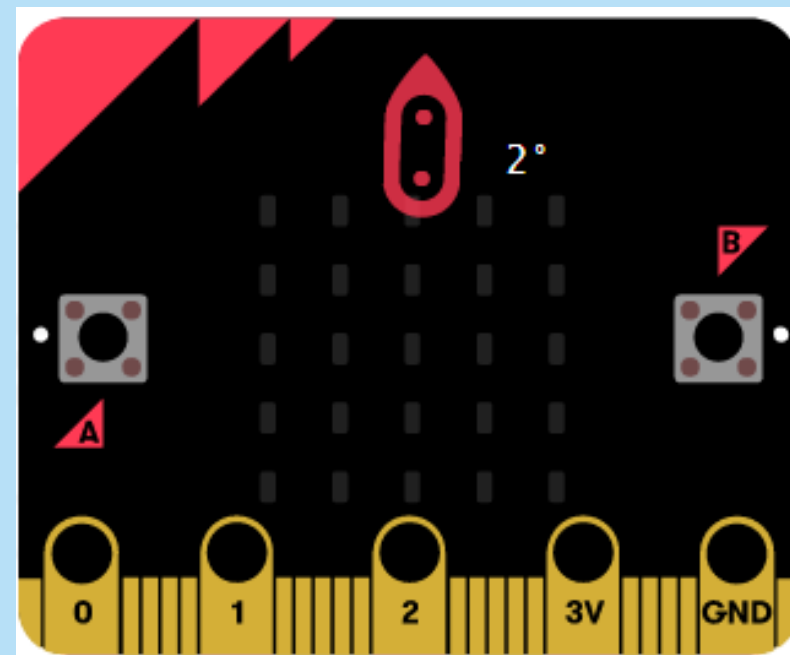
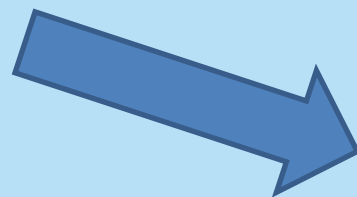
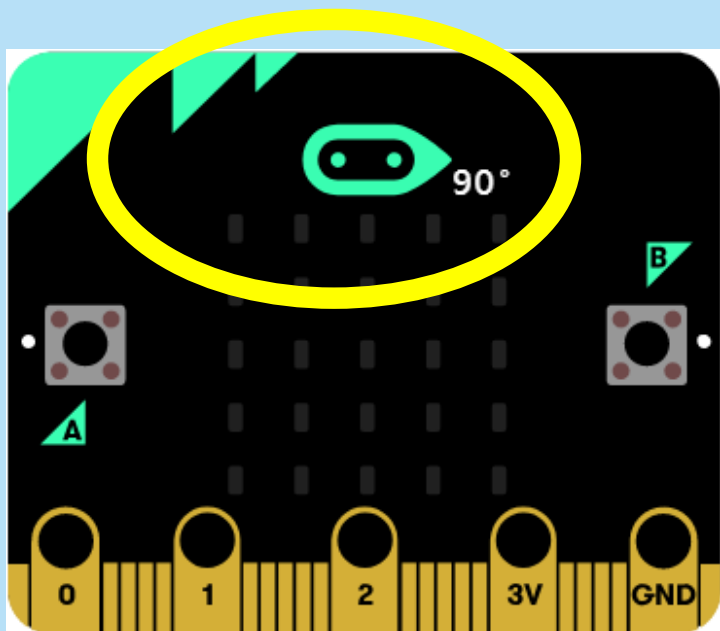
聲音燈

指南針方向

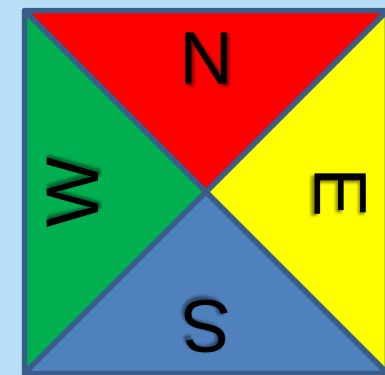
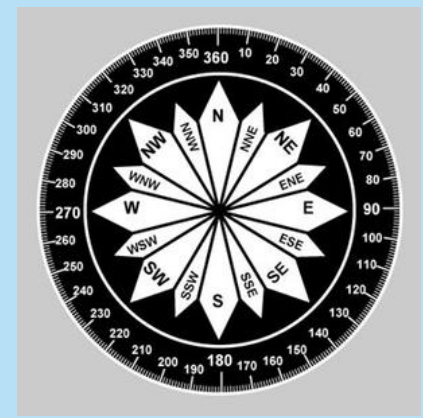
compass heading (°)

方向	角度 (°)
北(N)	0 / 360
東(E)	90
南(S)	180
西(W)	270





```
forever
  if < compass heading (°) < 45 > then
    show arrow North
  else if < compass heading (°) < 135 > then -
    show arrow East
  else if < compass heading (°) < 225 > then -
    show arrow South
  else if < compass heading (°) < 315 > then -
    show arrow West
  else -
    show arrow North
  +
```



forever

set Compass ▾ to compass heading (°)

if <Compass ▾ > 45 and <Compass ▾ ≤ 135> then

show string "E"

else if <Compass ▾ > 135 and <Compass ▾ ≤ 225> then ⊖

show string "S"

else if <Compass ▾ > 225 and <Compass ▾ ≤ 315> then ⊖

show string "W"

else ⊖

show string "N"

