C7

Reading Analog Signals

CHAPTER ASSIGNMENT

Name _____ Class _____ No. _____ Date _____

> Answer every question in the space given. Show your working. You may use the chapter page to help you.

Questions from the Guru Jazzy micro:bit chapter page.

Activity · Reading an analog pin

1. Build `show number (analog read pin P0)` inside `forever` with a 1 second pause. Touch the P0 clip to GND, then to the 3V pin, and write both readings.

2. The ADC is 10-bit. Work out how many different numbers it can give, and write the lowest and the highest.

3. Which three pins can read an analog voltage? Say why those three and not the others.

Activity · The battery tester

4. Clip P0 to the + end of a AA cell and GND to the – end. Build the tester:

```
on start:
    show string "Battery Tester"
on button B pressed:
    show number (analog read pin P0)
on button A pressed:
    set Voltage to ((analog read pin P0 × 3.3) / 1023)
    show number Voltage
    if Voltage < 1.2 then: show icon (No)
    else: show icon (Yes)
```

Test three cells and fill in the table.

Cell	Raw reading (button B)	Voltage (button A)	Tick or cross
1			
2			
3			

5. Work out the voltage for a raw reading of 372. Show every step.

6. Work out the raw reading you would expect from a brand new 1.5 V cell. Show your working.

7. Why does the program divide by 1023 and multiply by 3.3, rather than the other way round?

Check yourself

1. What does an analog-to-digital converter do? Answer in one or two sentences.

2. What is the highest voltage you may put on P0, P1 or P2, and what happens above it?

3. A cell reads 1.1 V. What does the tester show, and what would you tell its owner?

4. Explain why a 9 V battery must never be clipped straight to P0.

5. Name one other thing around school you could measure on an analog pin, and say how you would read it.

Chapter quiz

1. What is the digital output range of the 10-bit ADC when reading an analog pin on the micro:bit?
   A) 0 or 1 B) 0 to 255 C) 0 to 1023 D) 0 to 4095

2. What is the maximum safe input voltage that can be applied to micro:bit analog pins (P0, P1, P2)?
   A) 1.5 V B) 3.3 V C) 5.0 V D) 12.0 V

3. Which formula correctly converts a raw ADC integer reading into an actual voltage in Volts?
   A) V = ADC × 1023 B) V = (ADC × 3.3) ÷ 1023 C) V = ADC ÷ 3.3 D) V = ADC + 3.3

4 How should crocodile clips be connected when testing a 1.5V AA/AAA battery with micro:bit?

A	B	C	D
Positive (+) terminal to Pin P0, and Negative (-) terminal to GND	Both terminals to 3V	Positive to GND and Negative to P0	Connect positive to the USB port

---

5 In the battery tester, which voltage separates a healthy cell from a flat one?

A) 0.5 V B) 0.8 V C) 1.2 V D) 3.0 V

---

6 Which pins on the micro:bit can read an analog voltage?

A	B	C	D
P0, P1 and P2	P0 only	Every pin on the edge connector	P8 and P16

---

7 A reading of 1023 on pin P0 stands for which voltage?

A) 3.3 V B) 1.5 V C) 5 V D) 0 V

---

8 In the battery tester, which clip goes to the + end of the battery?

A) The one on P0 B) The one on GND C) The one on P2 D) The USB cable

---

End of assignment · Check your answers against the chapter at gurujazzy.com/subjects/microbit/chapter-7-analog-signals/