C5

Fun with Sensors

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 · The microphone

1. Build `plot bar graph of (sound level) up to 255` inside `forever`. Fill in the table with what the display shows.

What you do	Roughly how many LEDs light
The room is quiet	
You talk normally	
You clap once	

2. Build the clap counter that polls `sound level > 128` inside `forever`. Clap ten times quickly. What number does it reach, and why is it not always ten?

3. Rebuild the same counter with `on loud sound` instead. Clap ten times again. Which version counts better, and explain why.

Activity · The compass

4. Build `show number (compass heading)`. Write down what the board asks you to do the first time, and why it needs it.

5. Point the board at each wall of the room and record the heading.

Direction you face	Heading in degrees
Towards the whiteboard	
Towards the door	
Towards the windows	

6. Build the N / E / S / W version. Why does the last `else` show "N" again?

Activity · Movement, heat and light

7. Build the spirit level with `(acceleration (mg) x + 1023) / 420` for X and the same for Y. Tilt the board four ways and write where the dot goes each time.

8. Work out what the formula gives when the acceleration is -1023, 0 and +1023. Show your working, and say why 420 was chosen.

9. Build `show number (temperature)` and compare it with a real thermometer in the room. Which reads higher, and why?

10. Build `show number (light level)`, then cover the display with your hand and shine a torch on it. Write both readings.

Check yourself

1. The sound level goes from 0 to 255. What do those two ends mean?

2. Explain the difference between asking for a reading in a loop and waiting for an event.

3. Which sensor would you use to notice that the board is falling? Say how you know.

4. There is no light sensor on the board. So how does `light level` work?

5. Design a night light: it must come on when the room goes dark and go off again when it is bright. Write your blocks.

Chapter quiz

1. What is the numeric reading range of the micro:bit V2 MEMS microphone `sound level` block?

   A) 0 to 10 B) 0 to 255 C) 0 to 1023 D) -100 to +100 dB

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2. Before using the electronic compass for the first time, why does micro:bit ask you to tilt the board in a circle?

A	B	C	D
To charge the battery	To calibrate against surrounding hard and soft magnetic field distortion	To test the LED pixels	To connect to GPS satellites

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3. What degree range does the `compass heading` block return?

A	B	C	D
0° to 90°	0° to 180°	0° to 359° (clockwise from North)	-180° to +180°

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4. How does the spirit level map acceleration (-1023 to +1023 mg) onto LED coordinates 0 to 4?

A	B	C	D
By random choice	`(acceleration + 1023) / 420` scales about 2046 mg into the range 0–4	By multiplying by 5	Using `sound level`

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5. Where does the `temperature (°C)` block measure heat from?

A	B	C	D
An external mercury bulb	The silicon temperature sensor inside the nRF52833 processor	The battery terminals	The USB plug

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6. How does the micro:bit detect light levels when there is no dedicated photo-resistor on the front?

A	B	C	D
Through the camera lens	By reverse-biasing 9 of the display's red LEDs so they sense light	Through the MEMS microphone	It cannot detect light

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7 What does `plot bar graph of ... up to 255` draw on the display?

A	B	C	D
A bar that grows with the value	A single dot	A scrolling number	A ready-made icon

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8 Which block fires on its own the moment a clap is heard?

A) `on loud sound` B) `sound level` C) `on button A pressed`

D) `plot bar graph of`

End of assignment · Check your answers against the chapter at gurujazzy.com/subjects/microbit/chapter-5-sensors/