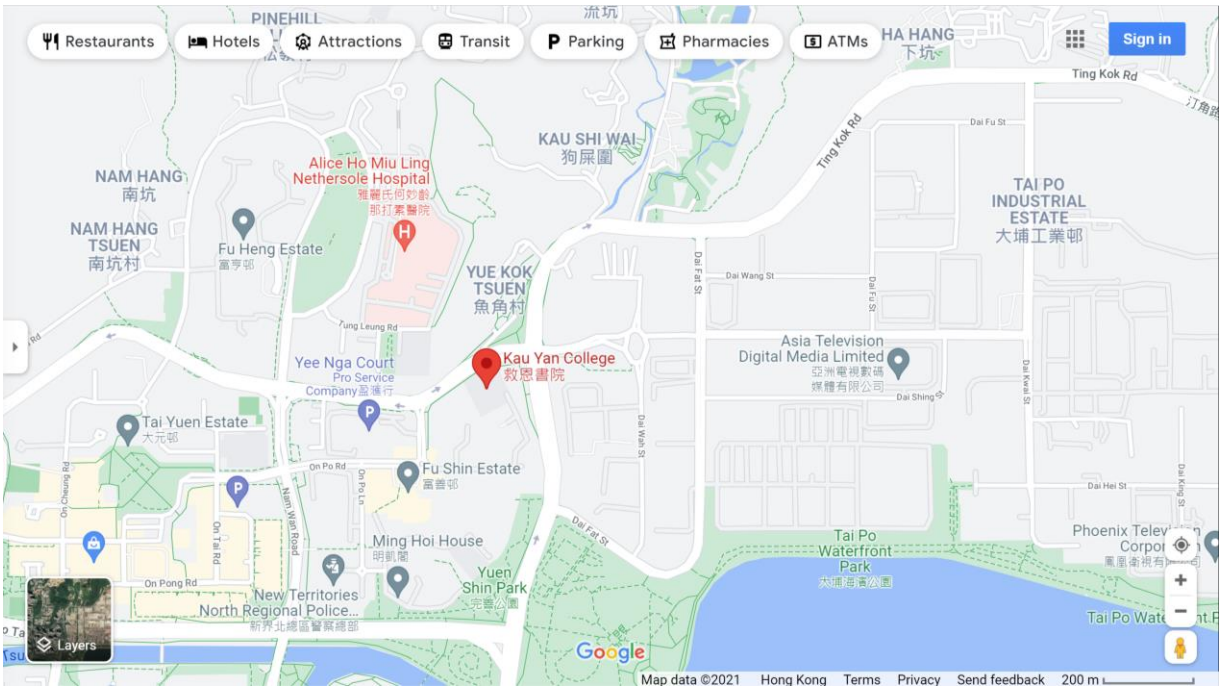
Kau Yan College

S.2 Science

Unit 7: Living things and Air – Air Quality

Class: S.2 ___ Name: _____ ( ) Date: _____

Your teacher asks you to measure the fine suspended particulates (FSPs): $PM_{2.5}$ that with a diameter less than or equal to 2.5 micrometres (μm, 1 μm = 0.000 001 m) in different locations around Kau Yan College by using a mobile datalogger connected with a sensor. The diagrams below show the maps of the school.



Site A is located near the Religious Room while site B is located at the school gate.

Prediction:

1. Predict which site, A or B, contains more $PM_{2.5}$. Explain your answer briefly.

Site …… contains more $PM_{2.5}$ than site …… because …….

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Observation:

2. Measure the $PM_{2.5}$ at sites A and B with the use of the mobile datalogger connected with a sensor respectively. Record your data by drawing an appropriate table in the box below. (Hint: you may measure and record more than one set of data at each site)

Explain:

3. According to your result, suggest which site, A or B, contains more $PM_{2.5}$. Explain your answer briefly.

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Further Question:

1. What is the advantage of making repeated measurements and taking an average of the results at each site?

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2. Site C is located at the covered playground (G/F) which has been undergoing construction since last summer. Compare the $PM_{2.5}$ at site C with that at site A. Explain your answer briefly.

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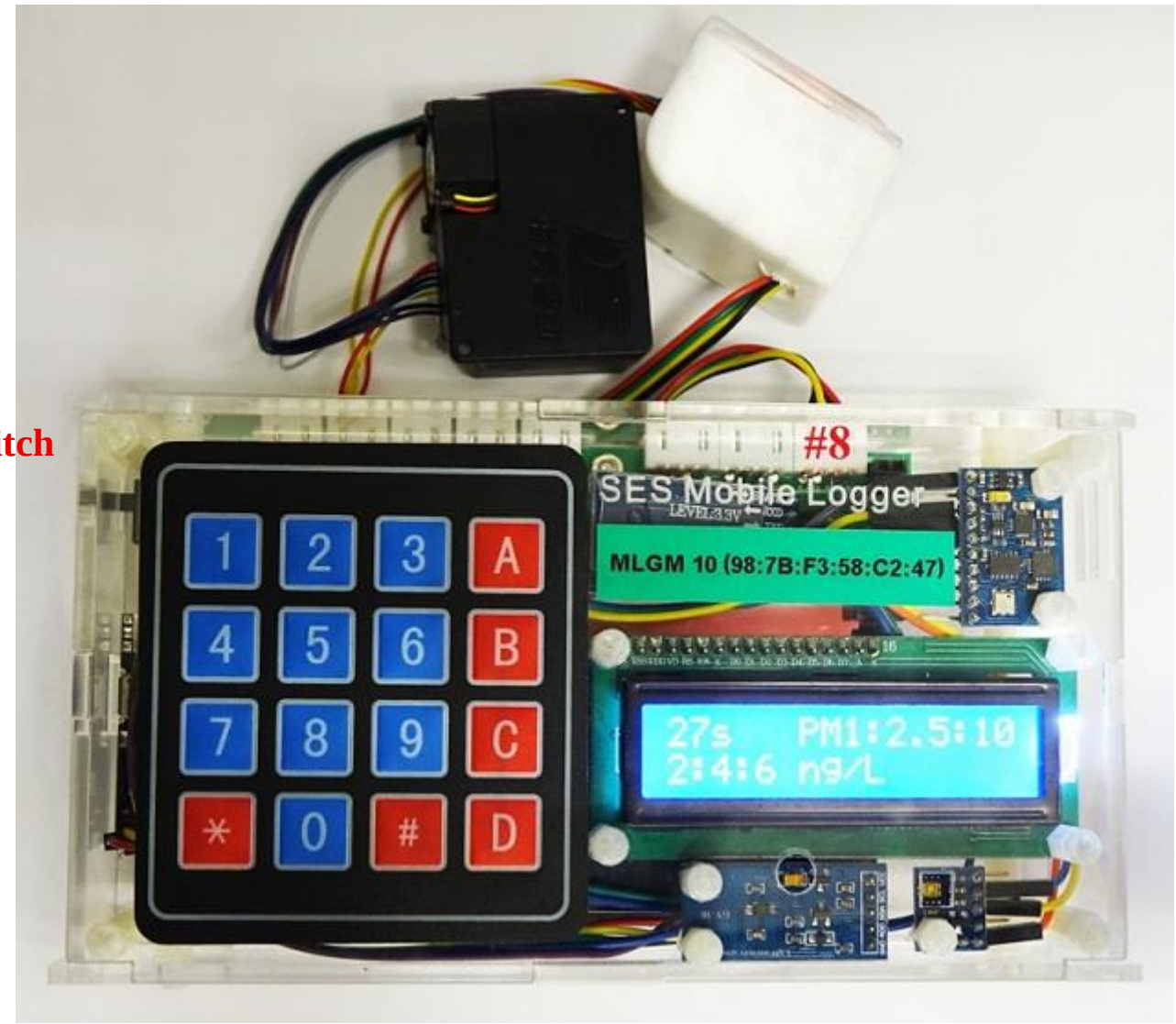
Guideline on the use of mobile datalogger

Measurement of particulate matter

1. Connect the particulate matter sensor into the slot #8 of the datalogger as shown in the below diagram.



2. Switch on the datalogger.
3. Press keypad “D2” to measure the PM_1, $PM_{2.5}$ and PM_{10} from the environment.
4. Record the data.
5. Make comparison of the collected data with the air quality index scale on p.5.
6. Switch off the mobile datalogger after use.

Particulate Matter Concentration and Air Quality Index Scale

$PM_{2.5}$ or PM_{10} concentration in ng/L	Air Quality Index (AQI)	Air Pollution Level
0 to 12	0 to 50	Good
>12 to 35.5	>50 to 100	Moderate
>35.5 to 55.5	>100 to 150	Unhealthy for Sensitive Groups
>55.5 to 150.5	>150 to 200	Unhealthy
>150.5 to 250.5	>200 to 300	Very Unhealthy
>250.5 to 350.5	>300 to 400	Hazardous
>350.5 to 500.5	>400 to 500	Hazardous

Source: US-EPA 2016 standard.

Note that 1 ng/L = 1 $\mu g/m^3$, i.e. one nanogram per litre = one microgram per cubic metre.