

UNIT 1: SEMMELWEIS DIARY**1. Full Credit:**

Responses that refer to the difference between the numbers of deaths (per 100 deliveries) in both wards, such as:

- Due to the fact that the first ward had a high rate of women dying compared to women in the second ward, obviously shows that it had nothing to do with earthquakes.
- Not as many people died in ward 2 so an earthquake couldn't have occurred without causing the same number of deaths in each ward.
- Because the second ward isn't as high, maybe it had something to do with ward 1.
- It is unlikely that earthquakes cause the fevers since death rates are so different for the two wards.

Partial Credit:

Responses that refer to the fact that earthquakes don't occur frequently, for example:

- It would be unlikely to be caused by earthquakes because earthquakes wouldn't happen all the time.
- Responses that refer to the fact that earthquakes also influence people outside the wards, for example:
- If there were an earthquake, women from outside the hospital would have got puerperal fever as well.
- If an earthquake were the reason, the whole world would get puerperal fever each time an earthquake occurs (not only the wards 1 and 2).
- Responses that refer to the thought that when earthquakes occur, men don't get puerperal fever for example:
- If a man was in the hospital and an earthquake came, he didn't get puerperal fever, so earthquakes cannot be the cause.
- Because girls get it and not men.

No Credit:

Any other response or missing answer

- Responses that state (only) that earthquakes cannot cause the fever, for example:
 - An earthquake cannot influence a person or make him sick.
 - A little shaking cannot be dangerous.
- Responses that state (only) that the fever must have another cause (right or wrong), for example:
 - Earthquakes do not let out poison gases. They are caused by the plates of the Earth folding and faulting into each other.
 - Because they have nothing to do with each other and it is just superstition.
 - An earthquake doesn't have any influence on the pregnancy. The reason was that the doctors were not specialised enough.

2. **Full Credit:** Option A. Having students clean themselves after dissections should lead to a decrease of puerperal fever.
- No Credit:** Any other response or missing answer
3. **Full Credit:**
- Responses that refer to killing of bacteria .
 - Because with the heat many bacteria will die.
 - Bacteria will not stand the high temperature.
 - Bacteria will be burnt by the high temperature.
 - Bacteria will be cooked.
 - Responses that refer to killing of microorganisms, germs or viruses.
 - Because high heat kills small organisms which cause disease.
 - It's too hot for germs to live.
 - Responses that refer to the removal (not killing) of bacteria.
 - The bacteria will be gone.
 - The number of bacteria will decrease.
 - You wash the bacteria away at high temperatures.
 - Because you won't have the germ on your body.
 - Responses that refer to the removal (not killing) of microorganisms, germs or viruses or to the sterilisation of the sheets.
- No Credit:**
- Responses that refer to killing of disease.
 - Because the hot water temperature kills any disease on the sheets.
 - The high temperature kills most of the fever on the sheets, leaving less chance of contamination.
 - Any other response or missing answer
4. **Full Credit:** Option B. Bacteria become resistant to antibiotics.
- No Credit:** Any other response or missing answer

Classification of Test Item:

Q No	Competency	Type / Item Format	Cognitive Load
1.	Interpret data and evidence scientifically (Identifying evidence)	Open Constructed	Easy
2.	Explain phenomena scientifically (Demonstrate the understanding of scientific concept)	MCQ	Difficult
3.	Interpret data and evidence scientifically (Identifying evidence)	Open Constructed	Medium
4.	Explain phenomena scientifically (Demonstrate the understanding of scientific concept)	MCQ	Difficult

UNIT 2: THE GRAND CANYON

5. **Full Credit:** Option D. Freezing water expands in the rock cracks.
No Credit: Any other answer or missing answer
6. **Full Credit:** Option C. An ocean covered this area at that time and then receded later.
No Credit: Any other response or missing answer
7. **Full Credit:** Yes, No in that order.
No Credit: Any other response or missing answer

Classification of Test Item:

Q No	Competency	Type / Item Format	Cognitive Load
5	Explain phenomena scientifically (Demonstrate the understanding of scientific concept)	MCQ	Easy
6	Explain phenomena scientifically (Demonstrate the understanding of scientific concept)	MCQ	Medium
7	Evaluate and design scientific enquiry (Substantiating an inference with reason)	Binary Design	Medium

UNIT 3: ACID RAIN

8. **Full Credit:** Responses that mention any one of: car exhausts, factory emissions, burning fossil fuels such as oil and coal, gases from volcanoes or other similar things.
- Burning coal and gas.
 - Oxides in the air come from pollution from factories and industries.
 - Volcanoes.
 - Fumes from power plants.
 - They come from the burning of materials that contain sulfur and nitrogen.
 - Responses that include an incorrect as well as a correct source of the pollution.
 - Fossil fuel and nuclear power plants. [*Nuclear power plants are not a source of acid rain.*]
 - The oxides come from the ozone, atmosphere and meteors coming toward Earth.
- Also the burning of fossil fuels.
- Responses that refer to “pollution” but do not give a source of pollution that is a significant cause of acid rain.
- Pollution.
 - The environment in general, the atmosphere we live in – e.g., pollution.
 - Gasification, pollution, fires, cigarettes.
 - Pollution such as from nuclear power plants.

No Credit: Any other answer or missing answer
 -Other responses, including responses that do not mention “pollution” and do not give a significant cause of acid rain.

- They are emitted from plastics.
- They are natural components of air.
- Cigarettes.
- Coal and oil. [Not specific enough – no reference to “burning”.]
- Nuclear power plants.
- Industrial waste. [Not specific enough.]

9. **Full Credit:** Option A. Less than 2.0 grams
No Credit: Any other response or missing answer

10. **Full Credit:** Responses such as:

- To show that the acid (vinegar) is necessary for the reaction.
- To make sure that rainwater must be acidic like acid rain to cause this reaction.
- To see whether there are other reasons for the holes in the marble chips.
- Because it shows that the marble chips don’t just react with any fluid since water is neutral.

Partial Credit: Responses which compare with the test of vinegar and marble, but do not make clear that this is being done to show that the acid (vinegar) is necessary for the reaction.

- To compare with the other test tube.
- To see whether the marble chip changes in pure water.
- The students included this step to show what happens when it rains normally on the marble.
- Because distilled water is not acid.
- To act as a control.
- To see the difference between normal water and acidic water (vinegar).

No Credit: Any other response or missing answer

Classification of Test Item:

Q No	Competency	Type / Item Format	Cognitive Load
8	Explain phenomena scientifically (Demonstrate the understanding of scientific concept)	Open-constructed response	Easy
9	Explain phenomena scientifically (Drawing or evaluating conclusion)	MCQ	Difficult
10	Evaluate and design Scientific Inquiry (Identifying scientific issues)	Open-constructed response	Average

UNIT 4: STICKLEBACK BEHAVIOUR

11. **Full Credit:** Anyone of the following is correct. There is no relationship between colour and aggressive behavior.
- (i) The brighter the colour of the fish, more aggressive is the behavior of the male stickleback.
 - (ii) Male stickle back reacts more aggressively to a red coloured model than to a silver coloured model.
 - (iii) There is a positive relationship between colour and aggressive behavior.
- No Credit:** Any other answer or missing answer

Note for the teachers:* A hypothesis is a tentative assumption and a proposed explanation for a phenomenon. In research, the null hypothesis is considered more appropriate –option (i) here is null hypothesis.

****** A null hypothesis is type of that proves that no difference exists in a set of given observations.

12. **Full Credit:** No, No, Yes in that order.
No Credit: Any other answer or missing answer
13. **Full Credit:** C, A, C, B in that order.
Partial Credit: Three of the four entries correct.
No Credit: Any other answer or missing answer

Classification of Test Item:

Q No	Competency	Type / Item Format	Cognitive Load
11	Evaluate and design Scientific Inquiry (Identifying scientific issues)	Open-constructed response	Medium
12	Explain phenomena scientifically (Drawing or evaluating conclusion)	Binary Choice	Difficult
13	Interpret data and evidence scientifically (Communicating valid conclusions)	Open-constructed response	Easy

UNIT 5: MAJOR SURGERY

14. **Full Credit:** No, Yes, Yes in that order.
No Credit: Any other answer or missing answer
15. **Full Credit:** Student mentions both the need to ensure that there are no bacteria/germs on the instruments AND that this stops the spread of disease.
- To stop bacteria getting in the body and infecting the patient.
 - So that no germs get into the body of another person going in for major surgery.

- Partial Credit:** Student mentions the need to ensure that there are no bacteria, BUT not that this stops the spread of disease.
- To kill the germs on them.
 - Student mentions that this stops the spread of disease, BUT not that it is because any bacteria on the instruments are killed.
 - So the patient is not infected.
 - To prevent any transfer of disease.
- No Credit:** Any other answer or missing answer
16. **Full Credit:** Option D. To provide necessary nutrition.
No Credit: Any other answer or missing answer.
17. **Full Credit:** No, No, Yes in that order.
No Credit: Any other answer or missing answer.

Classification of Test Item:

Q No	Competency	Type / Item Format	Cognitive Load
14	Explain phenomena scientifically (Demonstrate the understanding of scientific concept)	Binary Choice	Easy
15	Explain phenomena scientifically (Drawing or evaluating conclusion)	Open-constructed response	Difficult
16	Interpret data and evidence scientifically (Communicating valid conclusions)	MCQ	Average
17	Interpret data and evidence scientifically (Communicating valid conclusions)	Binary Choice	Average

UNIT 6: BMI

18. **Full Credit:** $5'4'' = 12 \times 5 + 4 = 64$ meters
 $64 \times 2.5 = 160$ cm
 $BMI = \frac{64 \times 100 \times 100}{160 \times 160}$
 $BMI = 25 \text{kg/m}^2$
- No Credit:** Any other answer or missing answer.
19. **Full Credit:** Option B.
No Credit: Any other answer or missing answer.
20. **Full Credit:** Option A.
No Credit: Any other answer or missing answer.
21. **Full Credit:** Option B.
No Credit: Any other answer or missing answer.

Classification of Test Item:

Q No	Competency	Type / Item Format	Cognitive Load
18	Explain phenomena scientifically (Demonstrate the understanding of scientific concept)	Open-constructed response	Easy
19	Explain phenomena scientifically (Drawing or evaluating conclusion)	MCQ	Difficult
20	Interpret data and evidence scientifically (Communicating valid conclusions)	MCQ	Average
21	Evaluate and design Scientific Inquiry (Identifying scientific issues)	MCQ	Average