

MATRIC LIFE SCIENCES PAPER 2 (2009): MEMORANDUM

Environmental studies; Diversity, change and continuity

SECTION A QUESTION 1

- 1.1.1 B√√
1.1.2 C√√
1.1.3 B√√
1.1.4 D√√
1.1.5 B√√ 5 x 2 (10)

- 1.2.1 mass extinction√
1.2.2 adaptation√
1.2.3 food web√
1.2.4 biodiversity√
1.2.5 pentadactyl√ 5 x 1 (5)

- 1.3.1 B√
1.3.2 C√
1.3.3 G√
1.3.4 E√
1.3.5 F√
1.3.6 A√ 6 x 1 (6)

- 1.4.1 Mark first three; 3 x 2 marks = 6 + 1 for table format (7)

Homo	Chimpanzee
Canines not well developed	Canines well developed to form fangs
No ridge at base of skull	Ridge at base of skull
Less protruding jawline	Protruding jawline
Brow ridge less pronounced	Brow ridge pronounced
Foramen magnum positioned towards middle of skull	Foramen magnum position at back of skull
Cranium is proportionally large	Cranium is proportionally small

- 1.4.2 The chimpanzee √ (1)
1.4.3 The foramen magnum is positioned at the back of the skull. √√ (2)
1.4.4 Mrs Ples, the Taung child and Little Foot. Mark first two√√ (2)

- 1.5.1 Almost 4 times as many √ (1)
1.5.2 Drop in temperature (to below freezing) √
High humidity √
No wind √
Accumulation of smoke and sulphur dioxide √ (4)

- 1.5.3 The wind dropped resulting in the accumulation of smoke and SO₂ levels. √√ (2)

1.5.4

- The same number of plants (4) were used in each condition.
- The same type of plant, i.e. radish, was used in both cases.
- The investigation was left for a two-week period before results were compared.
- The same sized plant tray was used in both cases.
- Both plant trays were enclosed in clear plastic.

Any three points; two marks each (6)

1.5.5

- Repeat the experiment several times to check accuracy of results.
- Repeat the experiment with different types of plants.
- Increase the number of plants.
- Measure the time taken for plants to die.
- Repeat the experiment with a range of sulphur dioxide concentrations.

Any two points, two marks each (4)

[50]

QUESTION 2

2.1.1 The sewage contains nutrients that bacteria use[√] and as they use these nutrients they deplete the oxygen in the water.[√] (2)

2.1.2 This is when the bacteria have used up all the available oxygen[√] as they use the nutrients in the sewage.[√] (2)

2.1.3 The bacteria are no longer active[√] and the water is naturally aerated as it travels downstream.[√] (2)

2.1.4 There is overflow from overuse of existing systems.^{√√}
No new sewage systems have been put in place.^{√√} (mark first two) (4)

2.1.5 Negative: diseases;[√] positive: nutrients for crops[√] (2)

(12)

2.2.1 109[√] (1)

2.2.2 Unbanded shells are better camouflaged[√] and therefore less likely to be seen and snails don't get eaten as much. The banded shells are easy for the birds to see,[√] so they get preyed on more easily.[√] (3)

2.2.3 No,[√] but only for this habitat;[√] no results are given for the grassed area.[√] (3)

2.2.4 Large numbers of shells to be counted; investigation to be repeated several times in each defined area; variables such as time of year when counting occurs, natural distribution of snails and birds etc. to be considered, i.e. controlled; no live snail shells to be counted (4)

2.2.5 When snails reproduce, they produce offspring which have a variety of colours and banding patterns. If the environment changes, e.g. woodland trees cut down, snails with particular patterns with favourable variations will be selected for, e.g. banded snails will be camouflaged against a background of shadows caused by cut-down trees. Banded snails will not be preyed on as much, as thrushes will pick out and eat more snails with unbanded shells because they are poorly camouflaged. Although the banded snails will mostly survive, they will compete for resources such as food, breeding space, etc. Only those that get the resources will survive and breed.

(7)

(18)

Total for Question 2: 30

QUESTION 3

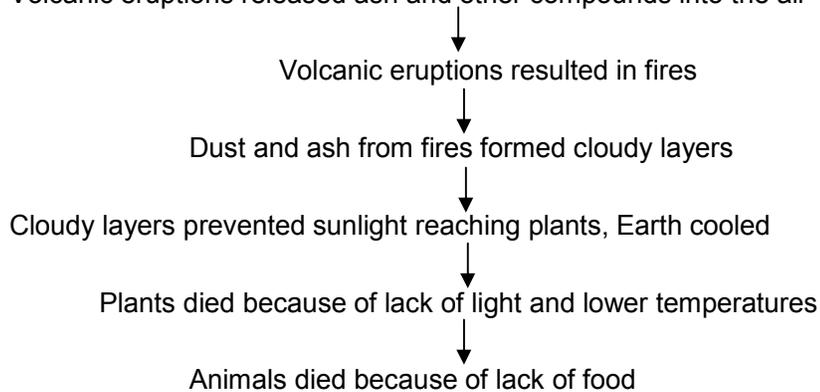
3.1.1 Exposure to poisonous chemicals in the waste (e.g. lead, mercury, etc.);[√]
Increased possibility of exposure to disease-carrying organisms in the waste (e.g. tetanus, typhoid, dysentery, etc.);[√]
Increased risk of lung diseases when present on landfills during burning (incineration);[√] or any other acceptable answers (3)

3.1.2 There could be littering[✓] when wind blows plastic bags from landfill sites into surrounding areas;[✓]
Risk of ground water pollution[✓] due to chemicals draining through to the bottom of the landfills when it rains;[✓]
Air pollution[✓] resulting from waste being burned on the landfills;[✓] or any other acceptable answer. Mark any two. (4)

3.1.3 They could have compost heaps rather than throwing away organic waste.[✓] (or any other acceptable answer) (1)

3.1.4 The Cape Town municipality is faced with a huge problem of having to deal with approximately 6 000 tons of waste which is generated daily as a result of Cape Town's expanding population, rapid increase in visitors and its ever-growing economy. A broad strategy that can be adopted depends on the effective re-use and recycling of the waste. This strategy needs to involve all stakeholders – from the manufacturers to consumers – working together to reduce the amount of waste that is dumped daily. Manufacturers must ensure that their products are either re-useable and/or re-cycleable. This will entail setting up an effective waste prevention programme involving the rethinking and redesigning of items. Consumer education is important to promote sorting of items. Packaging waste, glass and paper can be sorted so that the municipality can ensure that pick-ups are more effective. Households can recycle organic waste and should be encouraged to develop compost heaps for use in their gardens. In this way millions will be saved, which in turn can be used to improve the lives of the people of Cape Town by providing decent housing. (7)
(15)

3.2.1 Volcanic eruptions released ash and other compounds into the air



(5)

3.2.2 Both theories are possible

Choice of theory[✓] (+ reasons)

Asteroid theory: Evidence is present in the form of soot and iridium in clay layer;[✓] craters off

Mexican coast,[✓] and others such as in Siberia.

Volcanic theory: comparisons can be made from present day eruptions[✓] where data were collected. Data collected from different types of eruptions and their effects.[✓]

For either theory: rate of photosynthesis is negatively affected√ by lower light intensity and lower temperatures and lack of food√ would have resulted in dinosaurs dying.√

Max (5)

3.2.3

Volcanic theory: Extinction happened millions of years ago.

Sixth Extinction: Present day; caused by human impact on planet. (two marks for differences)

Both resulted in habitat loss,√ food loss√ and therefore disappearance of species.√ (three marks for similarities)

(5)

(15)

Total for Question 3: [30]

SECTION C

QUESTION 4

- 4.1.1 Primary√ and secondary particles√ (2)
- 4.1.2 The particles are so small that they can move through the cells√ that line the lung and penetrate the bloodstream if they are inhaled. These foreign particles could then affect the heart.√ (2)
- 4.1.3 To determine which of the five areas tested in the town had the highest amount of PM present.√√ (2)
- 4.1.4 Yes,√ the area of the collected dust on the slide was the same size;√
All the slides were covered with a thin layer of petroleum jelly;√
The period of exposure at the sites was the same;√
All locations were outdoors;
They tried to control the variables (any three answers) (4)
- 4.1.5 The slide in Location 3√ – lots of primary particles would be in the air√ and they are large enough to see with the hand lens√ (3)
- 4.1.6 The slide in location 5√ – taken from an area far from many possible sources of pollution, which would therefore not have much PM in the air.√ (3)
- (15)
- 4.2.1 It limits the production of food crops;
It affects the consistency of the production;
It limits the types of crops that can be farmed and the areas that can be farmed in.
(any suitable answer) (1)
- 4.2.2 It is more suited to the SA climate as it grows in a variety of soil types,√ from coastal to mountain habitats;
It does not have the potential to spread in an uncontrolled way as many introduced grasses do;√
It requires less fertiliser and liming of soil than for introduced crop species.√ (3)
- 4.2.3 Low genetic diversity of crops could mean that with current climate change we could lose certain species√ and we would require alternatives;
To stop the introduction of alien plants into countries we should try to use indigenous plants;√
Increasing population numbers mean a greater need for food√ and the need to use more land that may not be suited to current crop species;
Any other acceptable answer. (3)
- 4.2.4 Easier to harvest bigger seeds;√
Better chance of seed surviving when harvested;√

- Any other acceptable answer (1)
- 4.2.5 It reduces the genetic diversity and thereby raises the chances of defective mutations being expressed in the individuals. These organisms may also become more susceptible to disease as there is little genetic variation. (1)
- (10)
- (15)

4.3

Total for Question 4: [40]
GRAND TOTAL: 150