education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

FEBRUARY/MARCH 2009

MEMORANDUM

MARKS: **150**

This memorandum consists of 10 pages.

SECTION A

QUESTION 1

1.1
1.1.1 D✓✓
1.1.2 B✓✓
1.1.3 C✓✓
1.1.4 B✓✓
1.1.5 D✓✓ (5 x 2) = (10)

1.2
1.2.1 Phylogenetic tree✓/cladogram
1.2.2 Abiotic✓
1.2.3 Biological control✓
1.2.4 Food web✓
1.2.5 Archaeology✓
(5)

1.3
1.3.1 J✓
1.3.2 H✓
1.3.3 F✓
1.3.4 A✓
1.3.5 C✓
1.3.6 B✓ (6)

1.4
1.4.1 (a) Mayfly nymph ✓ (1)
(b) Sludge worms ✓ (1)
(c) Leeches ✓ (1)

1.4.2 - The size/volume of the water samples must be the same✓
- The samples must be taken at the same depth✓
- Samples must be taken at the same time in all three areas✓
- Use sterile containers✓
(***Mark first TWO only)*** any (2)

1.4.3 - Wear rubber gloves when taking the samples✓ so as not to get contaminated with germs✓
- Samples should be taken by using a container/bottle attached to a string ✓ to avoid stepping too close to the river bank✓/prevent drowning/ falling into water
(***Mark first TWO only)*** (4)

1.4.4 Oxygen✓/waste/amount of substances (1)
(***Mark first ONE only)***

1.4.5 The oxygen decreases✓ proportionally to the decrease in the waste✓ until the amount of waste reaches 'normal' level ✓when the amount of oxygen begins to increase✓ and stabilise/become constant✓
any (4)

1.4.6 Unpolluted water✓/less waste at X
therefore more plants will be present✓
producing more oxygen through photosynthesis✓ (any 2)
OR
Unpolluted water✓/less waste at X
therefore fewer aerobic bacteria will be present✓
hence using less oxygen✓ (any 2) (2)

1.4.7 Local government must provide proper sanitation✓
Water must be purified before it enters the river✓
Education✓ to make people aware of proper waste disposal measures
(***Mark first TWO only)*** any (2)

1.5
1.5.1

Homo	Chimpanzee
1. Canines not well developed ✓	1. Canines well developed✓/form fangs
2. Less protruding jaws✓/not prognathus	2. Protruding jaws/prognathus✓
3. Brow-ridge less pronounced✓	3. Heavily pronounced brow-ridge✓
4. Proportionally large cranium✓	4. Proportionally smaller cranium✓
5. Proportionally shorter cheek bone✓	5. Proportionally larger cheek bone✓
6. No ridge at base/back of skull✓	6. Ridge at base/back of skull✓

(Mark first THREE only) (any 3 x 2)
1 mark for table (7)

1.5.2 Chimpanzee✓ (1)

1.5.3 The foramen magnum is towards the posterior/back of the skull✓ (1)

1.5.4 Taung child✓
Mrs Ples✓
Little-foot✓ any (2)
(Mark first TWO only)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1

2.1.1 Long roots✓ (1)

2.1.2 Natural selection✓/survival of the fittest (1)

2.1.3
- There is variation✓ in the length of roots among the cacti plants
- The cacti with the long roots have the desirable characteristic✓/are better adapted/ long roots absorb water from deep underground
- for surviving under dry/unfavourable conditions✓
- more of the cacti with long roots survive✓
- most of the cacti with the short roots die✓
- most of the offspring produced have long roots ✓

any (5)

2.2

2.2.1
- During prophase 1✓
- crossing over✓ takes place
- and genetic material is exchanged✓/recombination occurs between chromatids of homologous chromosomes
- which ensures that the gametes formed are different✓ from each other
- During metaphase 1✓
- Homologous chromosomes arrange themselves randomly✓/ independent assortment along the equator
- which ensures that the gametes formed are different✓ from each other

any (6)

2.2.2
- Sudden random changes✓
- occur in the genetic code/gene/DNA✓ (2)

2.2.3
- Large number of gametes produced✓
- Gametes are different because they are produced by meiosis✓
- random fusion of gametes✓
- therefore the offspring✓ produced
- will be genetically different✓

any (4)

2.3
- The population will split up into two groups✓
- and each group adapts to the new environmental factors✓/ develops separately/each group undergoes natural selection independently
- each group may become genotypically✓
- and phenotypically different✓
- which might prevent them from interbreeding✓/become reproductively isolated leading to the formation of a new species (5)

2.4

2.4.1 Fossil✓evidence/Paleontological studies (1)

2.4.2 Radiometric dating✓ of the fossils or the rocks in which the fossils were found (1)

2.4.3
- A comet, an asteroid or part of a star✓ from outer space struck the Earth/Gulf of Mexico which resulted in
- large clouds of dust blocking out the sun✓
- stopped photosynthesis✓
- global cooling✓/dinosaurs might have been ectotherms and not able to live in the cold
- world-wide fire✓
- monstrous tsunamis✓

These factors caused the dinosaurs to become extinct any (4)
[30]

QUESTION 3

3.1

3.1.1 Both✓ the total amount of waste produced and the amount of recyclable material increased✓ from 2003 to 2006 (2)

3.1.2
- People collect and sell waste at buy-back centres✓ and benefits therefore economically✓/creates own jobs
- People who collect waste and take it to recycling depots✓ contributes to sustainable use of materials✓
- Recycling saves energy✓ and therefore reduces the amount of energy used to make new products✓

(Mark first TWO only) (any 2 x 2) (4)

3.2 Calculations of sectors for pie chart.

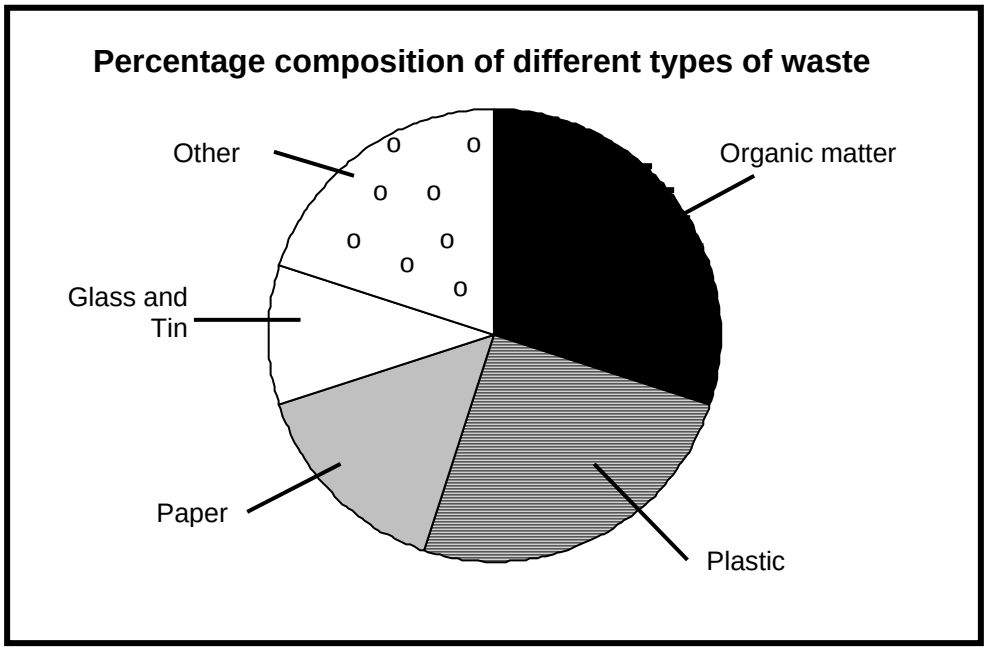
Organic matter: $\frac{30}{100} \times \frac{360}{1} = 108^o$

Plastic: $\frac{25}{100} \times \frac{360}{1} = 90^o$

Paper: $\frac{15}{100} \times \frac{360}{1} = 54^o$

Glass and tin: $\frac{10}{100} \times \frac{360}{1} = 36^o$

Other: $\frac{20}{100} \times \frac{360}{1} = 72^o$



Rubric for the mark allocation of the graph

Calculation/working to determine the correct proportions	1 mark for each calculation including the correct answer (5)	
Correct type of graph	1	
Title of graph	1	
Correct proportions for each labelled sector/slice	1 mark for each sector/slice (5)	(12)

Note:
If the wrong type of graph is drawn: marks will be lost for 'correct type of graph' as well as for drawing of sectors in correct proportion.

3.3
3.3.1 Nitrogen✓ (1)

3.3.2 - Run-off of nitrates and phosphates✓ from excess use of fertilizers has greatly increased the nitrate and phosphate in rivers✓ and lakes
- Leads to eutrophication✓
- overgrowth of microscopic algae✓/algal bloom
- Many algae and other organisms die✓as the oxygen is used up
- their bodies are broken down by bacteria✓
- bacteria need oxygen therefore oxygen levels in water gets further depleted✓
- Lack of oxygen causes animals to die✓ any (3)

3.4
3.4.1
a) 300✓million years ago (1)

b) Bacteria✓ (1)

c) Amphibians✓ (1)

d) Birds✓ (1)

3.4.2 Studying fossils✓/paleontology
Anatomy✓
Taxonomy✓
Biogeography✓ any (2)

3.4.3 We cannot observe these changes✓ because they took place millions of years ago✓
Gaps✓ in the fossil records✓/comparative anatomy, biochemistry embryology (any 1 x 2) (2)

TOTAL SECTION B: 60

SECTION C

QUESTION 4

4.1

4.1.1
- Increase✓ in numbers of the prey✓ that they feed on e.g. herring and squid
- Decrease✓ in numbers of predators✓ that feed on them
- Cause an imbalance✓ in the food chain/web✓
- Lack of cod✓ for human consumption✓

(Mark first TWO only) (any 2 x 2) (4)

4.1.2
- Declare a fishing season✓ so that no fishing occurs during the breeding season✓
- Have a bag limit✓ so that the breeding stock is not depleted✓
- Limit size of fish caught✓to allow fish to complete breeding✓
- Ban catching of cod completely✓ to allow cod population to recover✓
- Impose fines✓to encourage adherence to fishing regulations✓

(Mark first THREE only) (any 3 x 2) (6)

4.1.3
- Fishing methods are such that before the smaller cods (less than 50 cm in length) are thrown back✓ they would have already died✓
- Policing the ban on the fishing of cod or a quota system✓ is expensive✓ to maintain
- Illegal fishing will still take place✓ by unscrupulous people✓
- Could have a negative impact on people✓ who rely on cod-fishing as an income✓

(Mark first ONE only) (any 1 x 2) (2)

4.2

4.2.1 Grasping things to obtain a power grip✓/ precision grip/using tools

(Mark first ONE only) (1)

4.2.2
- Allows total awareness✓ of the environment in sensing danger✓/looking for food
- Enables hands to be free✓ to use implements✓/carry objects or offspring/throw/protect
- Exposes a large surface area✓ for thermo-regulation✓/lose body heat to surroundings in hot conditions/reduce overheating therefore reduce need for water
- Display of male sex organs✓ as part of courtship behaviour✓

(Mark first TWO only) (any 2 x 2) (4)

4.3.1 - Identical DNA structure in different species✓
- Similar protein synthesis✓ among different species
- amino acid sequence of haemoglobin✓similar /similar proteins✓
- Similar metabolic pathways✓/ cellular respiration in many species
- Similar sequence of genes✓ in different species also show close genetic relationship

(Mark first THREE only) any (3)

4.3.2 - Similar structure✓
- All vertebrate embryos have gill slits✓
- All vertebrate embryos have a tail✓

(Mark first TWO only) any (2)

4.4

4.4.1 - Outbreeding increases variability✓ of alleles in the gene pool
- making the population more resistant to disease✓
- and breeding disorders✓ any (2)

4.4.2 Desirable allelles can be selected and passed on to successive generations✓ (1)

4.5 **Possible answers for the mini essay**

Disadvantages in disposal of solid waste in landfill sites

- The wastes in a landfill attract vermin✓ (rats, cockroaches etc) and these often harbour disease vectors✓
- Landfills give off bad odours✓ /are ugly/presence leads to urban decay because only poor people are prepared to live near them✓
- Wind blown litter✓ causes a pollution problem✓
- Sites attract informal “pickers” ✓/poor people seeking food/ building materials often exposing themselves to health hazards✓/ risk/injury
- Highly flammable methane gas✓ sometimes escapes from the decomposing wastes can cause health hazards✓
- Streams near the landfill sites often become contaminated✓ with hazardous leachate/chemicals✓
- Borehole water gets contaminated✓ by leachate/chemicals that percolates into the groundwater✓

(Mark first TWO only) (any 2 x 2) (4)

Advantages of incineration

- Incineration plant is quite small✓ so valuable land is not used✓
- No attraction to pests✓ so less risk of disease✓
- Heat generated can be used/incinerators built as part of housing projects✓ can save energy✓

(Mark first TWO only) (any 2 x 2) (4)

Disadvantages of incineration

- May generate toxic fumes✓ (especially from burning plastics) cause health hazards ✓
- Can be expensive to build✓money can be used for other social interventions✓
- Seepage of wastes✓ may pollute groundwater✓
- Fuel is consumed✓ to begin the combustion process✓

(Mark first TWO only) (any 2 x 2) (4)

Description	Marks
Not attempted	0
Significant gaps in the logic and flow of the answer (only described landfill or incineration)	1
Minor gaps in the logic and flow of the answer (answered both landfill and incineration but left out some points)	2
Well structured – demonstrates insight and understanding (answered both landfill and incineration fully)	3

Content: (12)
Synthesis: (3)

TOTAL SECTION C: 40

GRAND TOTAL: 150