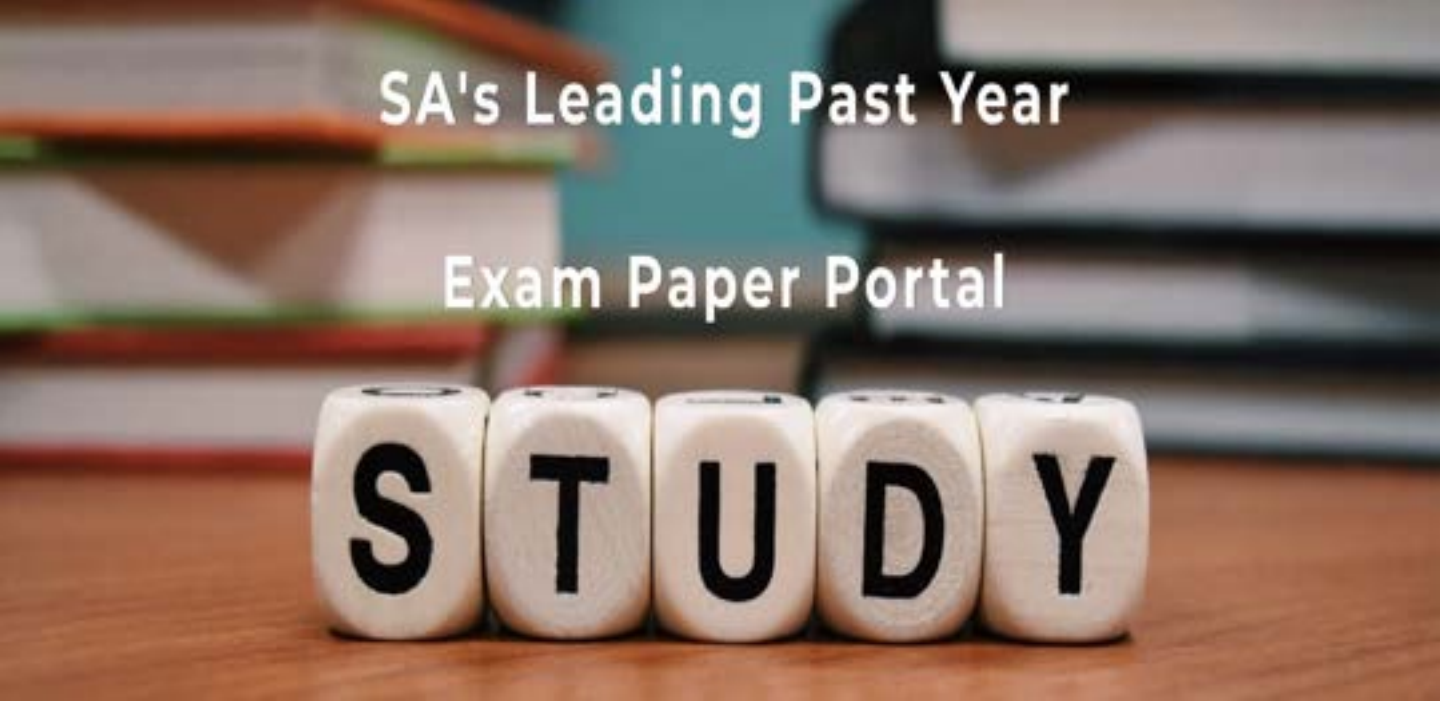

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GRADE 12

LIFE SCIENCES P2

NOVEMBER 2009

MEMORANDUM

Final Marking Guideline: 28 November 2009

MARKS: 150

TIME: 2½ hours

This memorandum consists of 12 pages.

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PRINCIPLES RELATED TO MARKING LIFE SCIENCES 2009

1. **If more information than marks allocated is given**
   Stop marking when maximum marks is reached and put a wavy line and 'max' in the right hand margin.

2. **If, for example, three reasons are required and five are given**
   Mark the first three irrespective of whether all or some are correct/incorrect.

3. **If whole process is given when only part of it is required**
   Read all and credit relevant part.

4. **If comparisons are asked for and descriptions are given**
   Accept if differences / similarities are clear.

5. **If tabulation is required but paragraphs are given**
   Candidates will lose marks for not tabulating.

6. **If diagrams are given with annotations when descriptions are required**
   Candidates will lose marks

7. **If flow charts are given instead of descriptions**
   Candidates will lose marks.

8. **If sequence is muddled and links do not make sense**
   Where sequence and links are correct, credit. Where sequence and links is incorrect, do not credit. If sequence and links becomes correct again, resume credit.

9. **Non-recognized abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation but credit the rest of answer if correct.

10. **Wrong numbering**
    If answer fits into the correct sequence of questions but the wrong number is given, it is acceptable.

11. **If language used changes the intended meaning**
    Do not accept.

12. **Spelling errors**
    If recognizable accept provided it does not mean something else in Life Sciences or if it is out of context**.**

13. **If common names given in terminology**
    Accept provided it was accepted at the National memo discussion meeting.

14. **If only letter is asked for and only name is given (and vice versa)**
    No credit

15. **If units are not given in measurements**
    Candidates will lose marks. Memorandum will allocate marks for units separately

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16. Be sensitive to the **sense of an answer, which may be stated in a different way**.

17. **Caption**
All illustrations (diagrams, graphs, tables, etc.) must have a caption

18. **Code-switching of official languages (terms and concepts)**
A single word or two that appears in any official language other than the learners' assessment language used to the greatest extent in his/her answers should be credited, if it is correct. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.

19. No changes must be made to the marking memoranda without consulting the Provincial Internal Moderator who in turn will consult with the National Internal Moderator (and the External moderators where necessary)

20. Only memoranda bearing the signatures of the National Internal Moderator and the UMALUSI moderators and distributed by the National Department of Education via the Provinces must be used.

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SECTION A

QUESTION 1

1.1	1.1.1	C✓✓		
	1.1.2	B✓✓		
	1.1.3	C✓✓		
	1.1.4	C✓✓		
	1.1.5	A✓✓	(5 x 2)	**(10)**
1.2	1.2.1	(Scientific) theory✓		
	1.2.2	Eutrophication✓		
	1.2.3	(Bio)diversity✓		
	1.2.4	Palaeontology ✓		
	1.2.5	Alien✓/Exotic/Invasive		**(5)**
1.3	1.3.1	None✓✓		
	1.3.2	Both A and B✓✓/A and B/Both		
	1.3.3	B only✓✓/B		
	1.3.4	A only✓✓/A		
	1.3.5	Both A and B✓✓/A and B/Both	(5 x 2)	**(10)**
1.4	1.4.1	Domestic✓ use		(1)
	1.4.2	40,5✓ thousand tons✓ **OR** Domestic waste -34,0 } ✓ thousand tons✓ Industrial waste - 6,5 } **OR** 40 500✓ tons✓		(2)
	1.4.3	Between 1996✓and 1998✓		(2)
	1.4.4	Domestic use increases✓ and industrial use increases✓ **OR** (Both) show an increase✓✓ **OR** Domestic use✓ is greater than industrial use✓		(2) **(7)**
1.5	1.5.1	Permian✓ period		(1)
	1.5.2	- The number of reptile species decreased✓✓ - The number of mammal species increased✓✓ **OR** - In the beginning of the Cretaceous period the number of reptile species was large✓ - but towards the end of the Cretaceous period the number of reptile species decreased✓ - In the beginning of the Cretaceous period the number of mammal species was very small✓ - but towards the end of the Cretaceous period the number of mammal species started to increase✓		(4)

	1.5.3	Reptiles✓, birds✓ and mammals✓	(3)
	1.5.4	Birds are more closely related to reptiles✓ They share a immediate✓/more recent common ancestor✓	(3) **(11)**
1.6	1.6.1	Accept any answer between 29 - 31✓arbitrary units	(1)
	1.6.2	(a) The sulphur dioxide level was higher in 2000 compared to 1995 in all countries✓ **OR** The sulphur dioxide level was lower in 2005 compared to 2000 in most countries✓ **OR** The sulphur dioxide level was the same in most countries in 2000✓	(1)
		(b) In France there was an increase✓ in the level of sulphur dioxide from 2000 to 2005 whereas in all of the other countries there was a decrease✓ from 2000 to 2005	(2)
	1.6.3	Japan✓	(1)
	1.6.4	• Using renewable sources of energy such as wind and solar energy✓/reducing use of fossil fuels • Implementing programmes✓/strategies to save energy • Improved/alternative technology to reduce pollution✓ • Improved legislation for air quality✓ • Effective monitoring✓ • Imposing heavy fines✓ • Make use of public transport✓/bicycles/hybrid cars • Increased environmental awareness✓/education • (It only has 50 arbitrary units of sulphur dioxide) ✓ **(Mark first TWO only)** (any 2)	(2) **(7)**
			[50]
		TOTAL SECTION A:	**[50]**

SECTION B

QUESTION 2

2.1 2.1.1 Adaptation✓ to eat different food✓/to different environmental conditions/niches (adaptive radiation)

OR

Different beaks because of variation✓ in the genotypes✓

OR

Mutations✓causes variation in types of beak✓ (2)

2.1.2 During continental drift ✓/ physical separation of the islands from the mainland
a part of the original population became isolated✓on the island

OR

Through strong winds✓/ocean currents the birds may have been blown/moved✓ from the mainland to the islands (2)

2.1.3

- There is a great deal of variation amongst the finches✓such as different shapes of beaks
- On each island the finches lived under different environmental conditions✓/ had different sources of food
- The finches underwent natural selection✓
- Only those finches that were better suited✓ to obtain the type of food available survived✓
- Continued natural selection on each island over many generations ✓
- resulted in each island having species that were very different (genotypically and phenotypically) from each other✓
- These differences prevented them from interbreeding✓ leading to the formation of new species
- This is termed allopatric speciation/adaptive radiation✓

(any 7) (7)

2.1.4

- More food ✓available on the mainland✓
- This decreases competition✓/decreases the effect of natural selection in forming new species.

OR

- More diverse✓ habitats✓ on islands than on mainland✓

OR

- Less diverse/more stable✓ habitats ✓on mainland than on islands✓ (3)

(14)

2.2 2.2.1
- A large number of offspring is produced✓
- There is a large amount of variation✓ within a species
- Of the large number of offspring only a small number survive✓
- Characteristics are inheritable from parent to offspring ✓
- Animal breeders can selectively breed for certain characteristics✓

(Mark first FOUR only) (any 4) (4)

2.2.2

✓

Lamarck	Darwin
1. Law of use and disuse✓	1. Law of natural selection✓
2. The acquired✓characteristics are passed on to the next generation	2. Inherent✓ genetic characteristics can be inherited from parents
3. Organisms have an internal drive to change✓/deterministic	3. Organisms do not have an internal drive to change✓/nature selects the best to survive
4. Individuals change✓	4. Populations change✓
5. Infers that no extinction because organisms get better and better and therefore survive✓	5. Extinction occurs since organisms may have features that do not favour survival ✓

(Mark first TWO only) any 2 x 2 + 1 table (5)

2.3 2.3.1 They have the same✓ index✓ fossils (2)

2.3.2 5 ✓and 12 ✓ (2)
(Mark first TWO only)

2.3.3 Radiometric dating✓/ Relative dating/ Absolute dating/ Carbon dating/ Isotope(carbon/uranium/potassium) dating/ Radio active dating (1)

2.3.4
- Conditions for fossilisation to take place were not always favourable✓
- All fossils NOT found yet✓
- All organisms are not fossilised✓/some are eaten by predators/some decay quickly
- Incomplete fossils✓
- Problems in identifying fossils✓

(Mark first TWO only) any (2)

(7)
[30]

QUESTION 3

3.1 3.1.1 Equal✓ number of light and dark-banded snails✓ will be eaten✓

OR

More✓light-banded snails✓ will be eaten✓

OR

Less✓light-banded snails✓ will be eaten✓

OR

More✓dark-banded snails✓ will be eaten✓

OR

Less✓ dark-banded snails✓ will be eaten✓ (3)

3.1.2 Natural selection✓/camouflage/predation/survival of the fittest/ micro-evolution (1)

3.1.3	Light-banded✓	**OR**	Dark-banded✓		(1)
3.1.4	Lower number✓ of light-banded shells found, indicating that they are not easily detected ✓ by the birds	**OR**	Higher number✓ of dark-banded shells found, indicating that they are not easily detected ✓/camouflaged by the birds		(2)

3.1.5 Started with equal numbers✓ of light and dark-banded snails in the environment (1)

(8)

3.2 3.2.1
- There was variation in the appearance✓ of the whales
- Whales probably evolved from a four-limbed terrestrial✓ ancestor
- Some ancestral whales became aquatic✓
- Whales with smaller hind limbs could swim well✓
- and escape predators✓/find food in deeper water and further in the ocean
- Those with larger hind limbs did not swim well✓ and could not reach food/escape from predators
- and therefore did not survive✓
- Through natural selection, more whales with smaller hind limbs survived✓
- Over many generations whales with smaller and smaller hind limbs✓ survived in greater numbers

(any 5) (5)

3.2.2 The genes✓ are still present✓ in the species (for the vestigial hind limbs)

OR

The vestigial structure is no longer✓ an advantage✓/disadvantage and therefore not selected for or against (2)

(7)

3.3 3.3.1

Aluminium	Paper
$\frac{10000}{95000}$ ✓**or** $\frac{10}{95}$ x $\frac{100}{1}$%	$\frac{3000}{7000}$ ✓**or** $\frac{3}{7}$ x $\frac{100}{1}$%
= 10,5✓%	= 42,8✓%

OR

Aluminium	Paper
$\frac{10000}{105000}$ ✓**or** $\frac{10}{105}$ x $\frac{100}{1}$%	$\frac{3000}{10000}$ ✓**or** $\frac{3}{10}$ x $\frac{100}{1}$%
= 9,5✓%	= 30✓%

Aluminium ✓ uses a smaller percentage of energy (5)

3.3.2
- Pollution/dumping is reduced✓ since more scrap✓/materials will be used
- Less demand for land ✓ since fewer rubbish dumps✓ would be required
- Cost effective✓/economical since decreased need✓ for new raw materials/materials re-used
- Creates jobs✓since more recycling plants✓ will be established
- Reduce exploitation of natural resources✓ due to lower dependence on raw materials✓ 3 x 2 (6)

(Mark first THREE only) **(11)**

3.4 Biodegradable
Pollutants that can be broken down✓by organisms such as bacteria and fungi
e.g. any organic waste✓/faeces/vegetable matter, etc.

Non-biodegradable
Pollutants that cannot be broken down✓ by organisms such as bacteria and fungi **(4)**
e.g. glass✓/plastic, etc. **[30]**

TOTAL SECTION B: 60

SECTION C

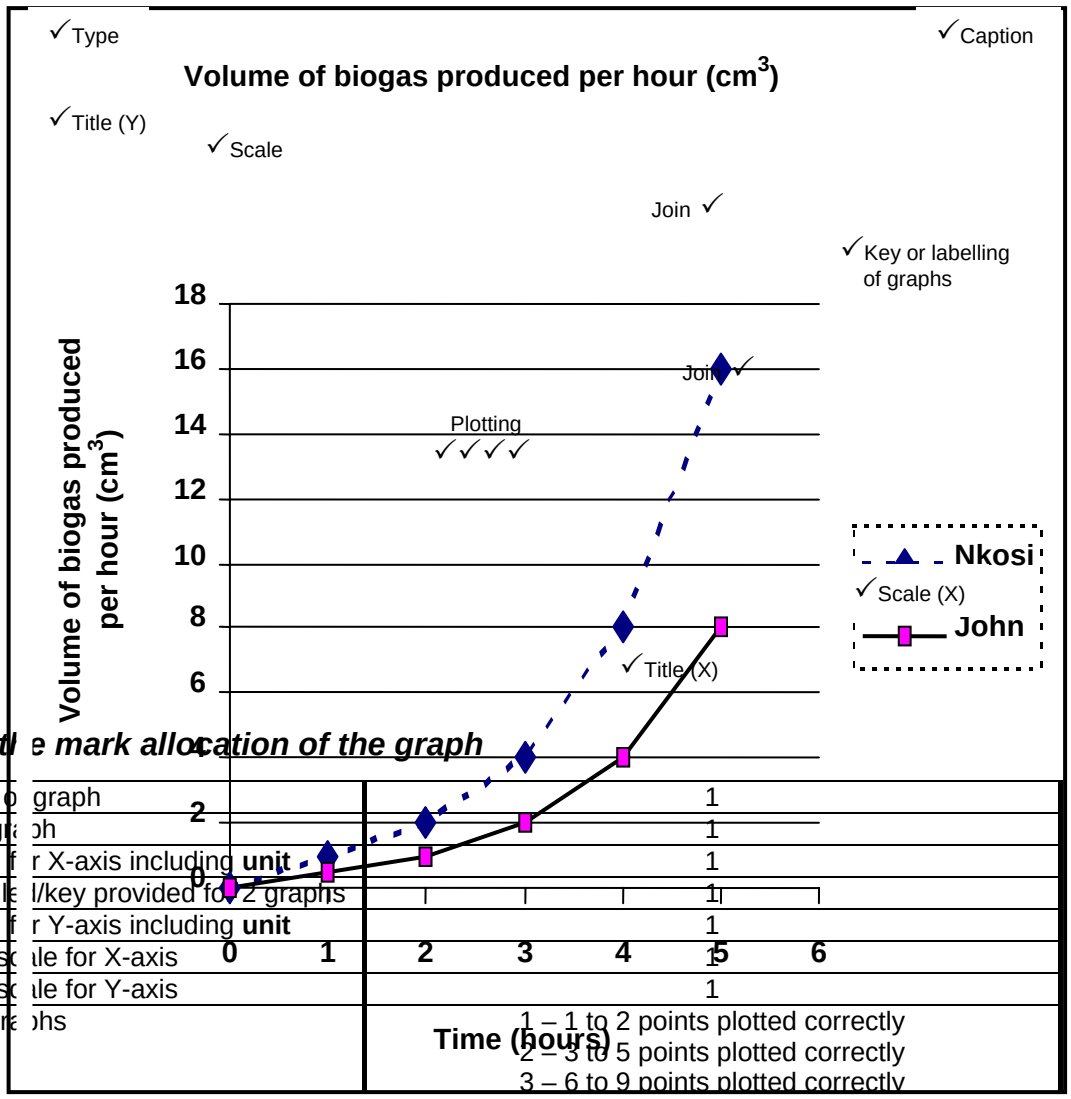
QUESTION 4

4.1 4.1.1 Volume of biogas produced✓ (1)

4.1.2 63✓/32 cm^3✓ (2)

4.1.3 Use same amount of water in chicken manure and dried compost✓
Keep all environmental conditions constant✓
Extend the period of the investigation✓
Take readings at shorter intervals✓
Repeat the investigation✓ and find averages
Investigation must be carried out jointly by John and Nkosi✓
Nkosi and John must each do both experiments✓
(Mark first TWO only) (2)

4.1.4



Rubric for the mark allocation of the graph

Correct type of graph	1
Caption for graph	1
Correct label for X-axis including **unit**	1
Graphs labelled/key provided for 2 graphs	1
Correct label for Y-axis including **unit**	1
Appropriate scale for X-axis	1
Appropriate scale for Y-axis	1
Drawing of graphs	1 – 1 to 2 points plotted correctly 2 – 3 to 5 points plotted correctly 3 – 6 to 9 points plotted correctly 4 – all 10 points plotted correctly
All points joined for graph A	1
All points joined for graph B	1

(13)
(18)

NOTE:
If the wrong type of graph is drawn:
- Marks will be lost for 'correct type of graph'
- Marks will be lost for 'joining of points'

If graphs are not drawn on the same system of axes:
- Mark the first graph only using the given criteria

If axes are transposed:
- Marks will be lost for labelling of 'X-axis' and 'Y-axis'

4.2 4.2.1 Lives in shallow water✓
Does not need expensive fishing equipment✓
Easy to remove✓
Sessile✓/don't move
(Mark first TWO only) any (2)

4.2.2
- Limit✓ the number caught
- Only licensed✓ fishermen may catch perlemoen
- Stipulate minimum size✓ of perlemoen that can be caught
- Impose seasonal limitations✓

} - Introduce strict legislation✓

- Heavy penalties✓/fines for those who contravene regulations
- Declare as a protective species✓
- Patrol all beaches✓ where perlemoen is found
- Improve education✓/awareness
- Encourage perlemoen farming/mariculture✓
- Establish marine protected areas✓

(Mark first TWO only) any (2)

4.2.3 The perlemoen is a herbivore✓/occupies the second trophic level
If the number of perlemoen is reduced:
Energy at the first trophic level✓ /algae that the perlemoen feeds on, will increase✓
because of decreased demand for algae ✓/ food by perlemoen.
There will also be a decrease✓ in the energy at the third trophic level✓/ organisms feeding on perlemoen
because of decrease in food supply✓ (perlemoen) available to them.
The energy flow through the habitat will thus be reduced✓
any (3)
(7)

4.3 Possible answer

Management strategies to improve the quality of water

- Introduce legislation✓ to control water pollution✓
- Monitor emissions from industries✓to ensure that legislation is being followed✓
- Impose heavy fines✓ to discourage repeated acts of pollution✓
- Provide incentives to companies✓ to encourage them to reduce pollution✓
- Provide adequate sewage systems✓ so that people do not urinate or pass faeces near a source of water✓
- Provide clean containers to collect water✓so that pollutants do not contaminate the water✓
- Use more organic fertilisers✓/less chemical fertilisers - so as to reduce the nutrient run-off into bodies of water✓
- Educate people✓ about the ill effects of pollution✓
- Reduce the use of pesticides ✓to decrease run-off into our rivers ✓
- Provide purified✓/safe water to everyone to reduce risk of them using contaminated water✓
- Research new technologies✓ to find more efficient methods of purification✓

maximum 4x2 (8)

Sources of water pollution

- Sewage✓
- Waste from factories✓
- Dumping of rubbish✓/waste
- Soap and chemicals entering the water✓

maximum (2)

Effects on human physiology and health

- Gastroënteritis✓
- Cancer✓
- Typhoid✓
- Allergies✓
- Cholera✓
- Diarrhoea✓

(Or any other relevant human disease of symptoms of disease)

maximum (2)
Content (12)

ASSESSING THE PRESENTATION OF THE ESSAY

Marks	Description
3	Discussed all 3 aspects with no irrelevant information
2	Discussed 2 or 3 aspects Or contains some irrelevant information
1	Discussed 1 or 2 aspect Or contains much irrelevant information
0	Not attempted/nothing written other than question number/no correct information

Synthesis (3)
(15)
[40]
GRAND TOTAL: 150

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