basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS

MARINE SCIENCES P2

MAY/JUNE 2024

MARKING GUIDELINES

Final Approved
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Internal Moderator
15.06.2024

Final Approved
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External Moderator
15.06.2024

MARKS: 150

These marking guidelines consist of 17 pages.

Please turn over

PRINCIPLES RELATED TO MARKING MARINE SCIENCES

1. **If more information is given than marks allocated**
   Stop marking when the maximum number of marks is reached, and draw a wavy line and write 'max' in the right-hand margin.

2. **If, for example, three reasons are required and five are given**
   Mark the first three reasons irrespective of whether these first three are correct or not.

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

4. **If comparisons are asked for, but descriptions are given**
   Accept the description if the differences or similarities are clearly stated.

5. **If diagrams are given with annotations when descriptions are required**
   Mark the description.

6. **If flow charts are given instead of descriptions**
   Mark the description only.

7. **If a described sequence is muddled and links do not make sense**
   Where sequence and links are correct marks are given. Should a logical sequence resume, marks are given.

8. **Non-recognised abbreviations**
   Accept the abbreviation if it is first defined in the answer. If the definition is not defined, do not give credit for the unrecognised abbreviation, but credit the rest of the answer if correct.

9. **Wrong numbering**
   If the answer fits into the correct sequence of questions, but the wrong number is given, credit the answer if the answer is in the correct order.

10. **If the language that is used changes the intended meaning**
    Do not accept the answer.

11. **Spelling errors**
    If a word is recognisable (if read out loud), accept the answer, provided it does not mean something else in Marine Sciences terminology or if it is out of context.

12. **In SECTION A, only accept and credit the correct letter.**

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

14. **Title**
    All illustrations (e.g. diagrams, graphs and tables) must have a title written above or below.

15. **Code-switching of official languages (terms and concepts)**
A term or concept written in any official language other than the learner's assessment language used in their answers should be credited, if it is correct. A marker that is proficient in Marine Sciences content and the official language used should be consulted. This is applicable to all official languages.

16. **Changes to the marking guidelines**
No changes must be made to the marking guidelines. The provincial internal moderator must be consulted, who in turn will consult with the national internal moderator (and the Umalusi moderators who will be consulted, where necessary).

17. **Official marking guidelines**
Only marking guidelines bearing the signatures of the national internal moderator and the Umalusi moderators and distributed by the National Department of Basic Education via the provinces must be used.

SECTION A

QUESTION 1

1.1	1.1.1	C ✓✓		
	1.1.2	A ✓✓		
	1.1.3	B ✓✓		
	1.1.4	A ✓✓		
	1.1.5	B ✓✓		
	1.1.6	C ✓✓		
	1.1.7	A ✓✓		
	1.1.8	D ✓✓		
	1.1.9	B ✓✓		
	1.1.10	D ✓✓		
			(10 x 2)	(20)
1.2	1.2.1	Biosphere ✓		
	1.2.2	Blastopore ✓		
	1.2.3	Greenwashing ✓		
	1.2.4	(Seafood) stock ✓		
	1.2.5	Pyloric caecae ✓		
	1.2.6	Meiofauna ✓		
	1.2.7	Buffer ✓ zone / Transitional (protection) zone		
	1.2.8	Balanoid ✓ zone		
	1.2.9	Madreporite ✓		
	1.2.10	Protochordates✓		
			(10 x 1)	(10)
1.3	1.3.1	Both A and B ✓✓		
	1.3.2	B only ✓✓		
	1.3.3	None ✓✓		
	1.3.4	Both A and B ✓✓		
	1.3.5	A only ✓✓		
			(5 x 2)	(10)
				[40]

TOTAL SECTION A: 40

SECTION B

QUESTION 2

2.1 2.1.1 Number of each fish species ✓ counted (1)

2.1.2 (a)

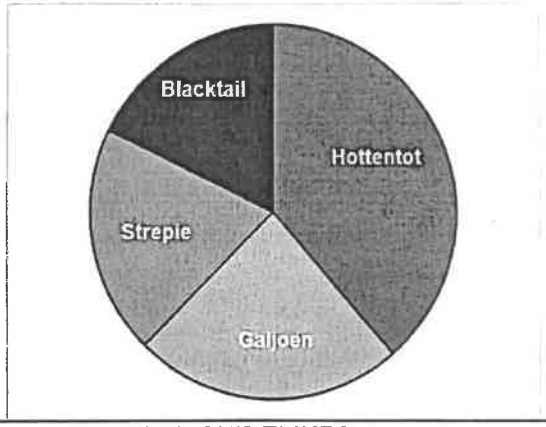
Hottentot Seabream	37
Galjoen	23
Strepie	19
Blacktail	17

1 mark for 1 – 2 correct
2 marks for 3 – 4 correct (2)

(b)

Fish species	Calculation	Degrees	Degrees rounded off
Hottentot	37/96*360 =	138.75	139
Galjoen	23/96*360 =	86.25	86
Strepie	19/96*360 =	71.25	71
Blacktail	17/96*360 =	63.75	64

Average number of individuals of each fish species counted
(over the investigation period)



MARKING GUIDELINES	
CRITERIA	**MARK ALLOCATED**
Type of graph, Pie chart (T)	1
Descriptive heading above or below the graph (H)	½
Heading references that describe both variables by name (V)	½
For each correct calculation from data to degrees (C)	½ x 4 = 2
Draw and labelled correct segment (S)	½ x 4 = 2

(6)

2.1.3
- (Same) time of day ✓
- (Same) site ✓ / location
- (Same) transect ✓
- (Same number) of divers ✓
- Time per dive (was constant) ✓
- Preventing double counting ✓
- Each pair counted the same species each time ✓

(Mark first 2) (2)

2.1.4 (a) West coast ✓ / South west coast (1)

(b)
- Cold ✓
- Upwelling occurs ✓
- bringing nutrient-rich water ✓
- With solid substrate ✓/ rocky substrate
- Active wave action ✓

(Mark any 3) (3)

2.1.5 Hottentot ✓ (1)

2.1.6
- Breeding ground ✓
- Natural habitat ✓
- Large amount of nutrients ✓
- Protection from predators ✓
- Safe haven ✓
- Abundance of food found in this area ✓
- Nurseries ✓

(Mark first 3) (3)

2.1.7 **If YES**
- Conducted by professionals under standardised condition ✓
- Data collected can be used to estimate population sizes ✓

If NO
- Not all fish species are found in the same area ✓ / swim around
- Double counting can occur ✓

(Any logical relevant substantiating answer, marker discretion for insightful thinking)
(1 mark for answer and motivation corresponding)
(1 mark for motivation) (2)
(21)

2.2 2.2.1
- Some limpets use the kelp as a source of food. ✓
- Provides protection for the limpet ✓
- Safe area for reproduction ✓
- Reduces wave action resulting in less of a disturbance for the limpet ✓
- Limpets attract other organisms that assist in niche partitioning ✓
- Kelp fronds reduce the light intensity from the sun. ✓

(Mark first 3) (3)

2.2.2 - Improvements in technologies ✓ and by studying nature or mimicking nature might find more sustainable (nature-safe) examples. ✓
- Nature has formed solutions to problems ✓ humans are facing, which engineers can replicate or mimic. ✓

(Any logical relevant substantiating answer, marker discretion for insightful thinking)
(Accept any other logical relevant answer)
(Mark statement and reason) (2)

2.2.3 (a) - Shell strength ✓
- Hydrodynamic ✓
- Camouflage ✓

(Mark first 2) (2)

(b) - (Shell strength) – Assist in protection from predators ✓
- (Hydrodynamic) – Mitigate the effects of wave action on the limpets ✓
- (Camouflage) – Blend into background to protect against predators when needed ✓

Must correlate with the answer given in Q 2.2.2(a)
1 mark for logical relevant description (1)

(c) - (Shell strength) – Can help us develop strong yet light materials ✓
- (Hydrodynamic) – Assist engineers in forming structures that can withstand large forces ✓
- (Camouflage) – Blend in during times when camouflage is needed ✓

Must correlate with the answer given in Q 2.2.2(a)
1 mark for logical relevant description (1)

2.2.4 - Biomimicry (principle). ✓
- Once a problem is identified (by engineers) ✓
- Biologists ✓ / ecologists / microbiologists
- study how nature finds solutions ✓ and
- designers then translate the biological solution into designs/plans ✓
- that can be applied to human need. ✓ **(Mark any 3)** (3)

2.2.5 If **YES**

- The shell is composed of light and strong material. ✓
- The shell is composed of affordable material and will lower cost of the project. ✓

OR

If **NO**

- The shell structure will not be adapted to extreme environmental conditions. ✓
- The two structures are not found in the same environment, they will not be able to withstand the same forces. ✓

(Any logical relevant substantiating answer, marker discretion for insightful thinking) (2)

(1 mark for answer and motivation corresponding)
(1 mark for motivation)

(14)
[35]

QUESTION 3

3.1 3.1.1
- Salinity is higher at **C** than at **A** ✓
- **A** has less wave action than **C** ✓
- Temperature at **A** and **C** will differ. ✓

(Mark first 2)
(Any logical relevant substantiating answer, marker discretion for insightful thinking) (2)

3.1.2 (a) Zone **A** ✓ (1)

(b)
- A breeding ground ✓ / shark nursery
- Protection ✓
- Easy source of food ✓
- Less exposure to wave action/ harsh ocean conditions ✓

(Mark any 3) (3)

3.1.3
- **Lateral line ✓* organ** – sense vibrations / pressure waves in the marine environment. ✓
- **Pits/ampullae of Lorenzini ✓*** - pick up electric impulses emitted by living organisms. ✓
- **Nasal pouches ✓* / Nostrils / olfactory cells** - detect blood✓ / rotting flesh / food.
- **Inner ears ✓*** - detect vibrations in the water ✓

(Compulsory marks ✓* and reason ✓)
(Mark first 3 pairs) (3 x 2) (6)

3.1.4 (a)
- Tourists are guided by professionals ✓
- mark recapture method used ✓ / scientific method used
- tourists are trained before participating ✓

(Mark any 2) (2)

(b)
- Managing the number of tourists, resulting in a lower impact than when not managed. ✓
- Having individuals pay to partake will result in a controlled number of tourists. ✓
- Only running the tour for a specific period will allow for any damage to recover. ✓
- Imposing fines to tourists not adhering to the regulations✓

(Mark first 2)
(Any logical relevant substantiating answer, marker discretion for insightful thinking) (2)

(c)
- Funds can be used to protect the sharks ✓
- Breeding grounds of sharks will be protected ✓
- Research on sharks promoted ✓

(Any logical relevant substantiating answer, marker discretion for insightful thinking) (2)

3.1.5 If **YES**
- The purpose of research occurring ✓
- Individuals are trained beforehand on catch and release/ their responsibilities and behaviour ✓
- Research organizations require funding ✓
- Better understanding of biological life cycles ✓

If **NO**
- Sharks should not be caught ✓
- Quality of catch and release is not guaranteed ✓ / sharks might be injured

(Any logical relevant substantiating answer, marker discretion for insightful thinking)
(1 mark for answer and motivation corresponding)
(1 mark for motivation) (2)
(20)

3.2.1
- Run-off from the refinery ✓ (warmer water / oil spill)
- Thermal pollution ✓
- Sound pollution ✓
- Light pollution ✓
- Air Pollution ✓ **(Mark first 1)** (1)

3.2.2
- Stakeholders should be consulted.✓
- Determine which species are found in the area ✓
- Identify if there are species that need conserving in this area, especially if endemic species ✓
- Analyse the role of existing reserves ✓
- Understand the influence human activities have on the area. ✓
- Understand the benefits / goals / objectives of the MPA ✓
- Understand who will govern / manage / monitor the MPA. ✓

(Mark first 3) (3)

3.2.3 If **YES**
- Area has the potential to house large amounts of biodiversity ✓
- Biodiversity associated with the estuary is abundant ✓
- NGOs have developed rehabilitation procedures that could be applied to this area ✓
- (Cheaper / cost-effective) technologies are continuously being developed to process waste ✓

If **NO**
- Area is polluted beyond repair. ✓
- Too many resources will be required to rehabilitate the area. ✓
- Damage from the refinery will take too long to fix. ✓
- It is expensive to decommission the refinery. ✓
- Rehabilitation costs/ expensive. ✓

(Any logical relevant substantiating answer, marker discretion for insightful thinking)
(1 mark for answer and motivation corresponding)
(1 mark for motivation) (2)
(6)

3.3 3.3.1 **YES**
- Sharks do not actively hunt humans. ✓
- Sharks might mistake humans for prey. ✓

NO
- Some sharks show active aggression towards humans. ✓
- When food supplies are low shark attacks increase. ✓

(Any logical relevant substantiating answer, marker discretion for insightful thinking)
(1 mark for answer and motivation corresponding)
(1 mark for motivation) (2)

3.3.2 Spiral valve ✓ (1)

3.3.3
- Increases surface area for absorption ✓
- Allows more nutrients to be absorbed ✓ (2)

3.3.4
- (Some shark species are active hunters) whilst other sharks are actively hunted and are lower down the food chain. ✓
- Most sharks are placed in the middle levels of food chains ✓ / webs.
- Larger sharks cannibalise on smaller sharks ✓ **(Mark any 2)** (2)

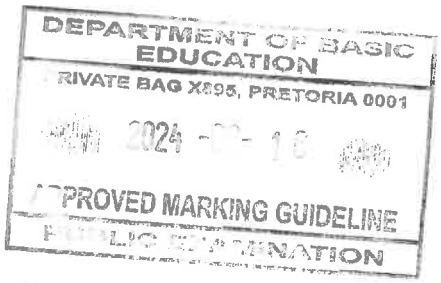
3.3.5
- Echolocation ✓
- Often working in groups to coordinate feeding ✓
- Catching their prey with homodontic dentition ✓ **(Mark any 2)** (2)

3.3.6

Shark	Dolphin
Single circulation ✓	Double circulation ✓
2-chambered heart ✓	4-chambered heart ✓
Constant oxygen supply through water ✓	Can store large amount of oxygen ✓
Moves through the heart once in a cycle ✓	Moves through the heart twice a in a cycle ✓

(1 Mark for having a table)
(Mark the first 2 pairs of comparisons, 2 Marks per pair) (5)
(14)
[40]

TOTAL SECTION B: 75



SECTION C

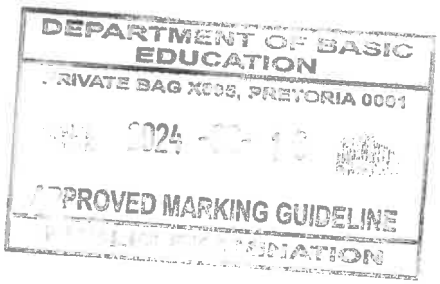
When marking essays, be aware of maximum marks per subsection (indicate with the designated letter to keep track) and compulsory marks per section (indicate with C). The breakdown of the synthesis marks is indicated for each question. Credit valid points content points which may come from external reading, but keep to maximum allocations per subsection.

ASSESSING THE PRESENTATION OF THE ESSAY

MARK ALLOCATION	2	1	0
INTRODUCTION 2 marks (INTR)	The introduction shows a contextual link that the candidate understands what the question is, by: Correctly stating in their own words what the question is about AND describing the intention/ purpose of the essay.	Some attempt to write an introduction/ stated intention of essay but to a large extent using the wording from the question. Unclear that candidate fully understands the topic. Stated the intention of the essay in their own words.	There is no introduction. Starts with the asked content straight away. Provides randomly arranged facts. Restating the question
USE OF PARAGRAPHS 2 marks (PAR)	The internal structure of a paragraph clearly planned. One main aspect / idea discussed in a paragraph. If more than one aspect is discussed in a paragraph, the connection is clearly visible.	Some paragraph division but is unclear (not linked) why content is grouped in these paragraphs.	All content sections written as one paragraph.
RELEVANCE 2 marks (REL)	Sufficient information with many good points made, more than 50% of the content is relevant to the question asked.	An attempt to write on the topic, but only 26% to 49% of the content discussed in the essay is relevant to the question asked.	Less than 25% of content that the learner addressed is relevant to the question asked.

LOGICAL SEQUENCE 2 marks (LSEQ)	Paragraphs show logical sequence and are demonstrably linked to each other.	Generally clear sequence but some facts not in place - content provided is correct but is meant to be in a different (relevant) paragraph. Essay poorly planned.	Very difficult to read the essay as no logical sequence. Many facts with no clear layout. Clearly unplanned.
CONCLUSION 2 marks (CONC)	Clearly bringing the aspects discussed in the essay together in a final paragraph in own words.	An attempt to write a conclusion, but closely quotes the words of the question asked. Still shows linkage of the topic to their response.	No conclusion. Learner clearly stopped after the content paragraphs – no attempt to pull the ideas together.

(10)



QUESTION 4

INTRODUCTION GUIDELINE
- Discusses the effect of climate change on thermoregulation and reproduction of seals and turtles
- Does not repeat / reproduce wording of the question

BREEDING ON LAND (B)

Turtles
- Females return to the islands on which they were born during breeding period ✓
- Turtles use their front flippers to drag themselves up on land ✓
- to dig nests ✓ in the sand
- in which they lay eggs ✓
- This process is repeated a number of times during the breeding season ✓

minimum 3

Pinnipeds
- Mating takes place on land ✓
- where internal fertilisation takes place ✓
- Males compete to mate with females ✓
- The young are birthed on land ✓
- And tended for by the female for several months ✓
- The female leaves the pup to forage for food in the ocean ✓
  The mother has to find the pup once she returns by recognising the call of the pup ✓

minimum 4
Max (11)

THERMOREGULATION (T)

Turtles
- **Turtles are ectothermic ✓***
- This can be advantageous as long as they remain ✓ / migrate in or to an environment with favourable temperatures.
- has a relatively smaller oxygen demand ✓ than endothermic metabolism,
- turtles are able to stay submerged for longer ✓ than equivalent-sized endotherms.
- Their sleeping / hibernating metabolism can be lowered even further, ✓
- enabling them to stay submerged for longer when hibernating. ✓

1 compulsory ✓* + minimum 2

Pinnipeds
- **Pinnipeds are endothermic ✓***
- producing heat through metabolic activities ✓
- therefore, their activity does not depend on the temperature of the environment ✓
- and they can be active for longer periods ✓
- Being endothermic also allows them to live in a bigger range of environments ✓

1 compulsory ✓* + minimum 2
Max (8)

EFFECTS OF CLIMATE CHANGE (C)
- The breeding habitat / nests would be flooded ✓ / disappear due to a rise in sea levels
- The food sources could disappear ✓ / move further offshore
- therefore seals would have to spend more energy ✓/ time finding food
- Less food ✓ / energy for pups
- Seals would have to leave their pups alone for longer, making them more vulnerable to predators ✓
- Higher temperatures will change the sex proportion of the turtle hatchlings ✓
- Seal pups can become dehydrated due to higher temperatures ✓
- Females would expend more energy when laying eggs / giving birth ✓
- as their metabolic rates would increase due to higher temperatures ✓

(Any logical relevant substantiating answer, marker discretion for insightful thinking)

Max 4 (4)

OPINION (J)

Learner receives a mark for increased OR decreased, only if substantiated.

INCREASED
- Less space will be available which means both classes will spend more time closer to each other ✓
- Pinnipeds need to return to land more often and will occupy the islands in greater numbers ✓

DECREASED
- Both classes can migrate to other islands ✓
- If the turtle nesting sites have disappeared the turtles will not return to the island ✓

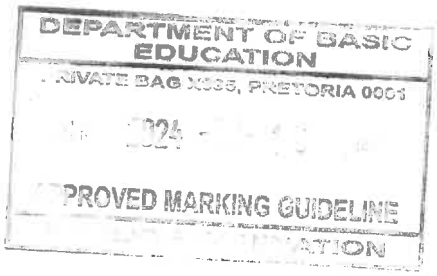
(Any logical relevant substantiating answer, marker discretion for insightful thinking)

Max 2 (2)

CONCLUSION GUIDELINE

- Links the effect of climate change on thermoregulation and reproduction of seals and turtles
- Does not repeat / reproduce wording of the question

Content: (25)
Synthesis: (10)
(35)



QUESTION 5

INTRODUCTION GUIDELINE
- Discusses interactions between fur seals and penguins
- Does not repeat / reproduce wording of the question

FUR SEALS HUNT (H)
- Fur seals hunt in the ocean ✓
- Where they use their flippers to propel themselves ✓
- They are agile ✓ / hydrodynamic
- which allows them to change direction ✓
- catch / keep up with fast moving prey ✓

Max (4)

SEALS CATCH PENGUINS (P)
- Penguins are slower on land ✓ (than seals) / seals are faster on land (than penguins)
- Penguins have short legs ✓
- Penguins waddle on land ✓
- Fur seals can rotate their hind legs downwards to make them more capable on land ✓
- Penguins are less agile on land✓ / Fur seals are more agile on land Max (3)

PENGUIN NUTRITION (N)
- Catch fish while swimming ✓ / diving
- The articulating jaws ✓
- are modified to form beaks. ✓
- Each beak shape is adapted to enable the targeting of a particular food source ✓
- Penguins have no teeth ✓
- instead they have barbed tongues ✓
- that enable them to hold onto ✓
- and swallow fish ✓
- unchewed, ✓
- and broken down by strong digestive fluids in the stomach ✓
- Further digestion and absorption take place in the intestine ✓
- and undigested food is egested via the cloaca ✓ Max (7)

SEAL SENSE ORGANS (S)

- **Whiskers ✓***
- In poor light conditions, ✓
- may assist them to move in confined spaces ✓
- and detect prey ✓

- **Eyes ✓***
- which are highly effective underwater ✓
- allows them to detect prey ✓
- and navigate their environment ✓

- **Noses ✓***
- which have reduced olfactory capabilities under water ✓
- but are effective on land ✓
- allows them to detect prey on land ✓

(3 Compulsory ✓* + any corresponding 2 marks)
Max (9)

OPINION (J)

- A decrease in the food source in the ocean ✓
- due to overexploitation by humans ✓
- Penguins are easier to catch ✓
- as they are exhausted after returning from ocean ✓

(Mark cause and effect)
(Any logical relevant substantiating answer, marker discretion for insightful thinking) (2)

CONCLUSION GUIDELINE

- Discusses interactions between fur seals and penguins
- Does not repeat / reproduce wording of the question

Content: (25)
Synthesis: (10)
[35]

TOTAL SECTION C: 35
GRAND TOTAL: 150