



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

MARINE SCIENCES P2

NOVEMBER 2023

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 21 pages.

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.

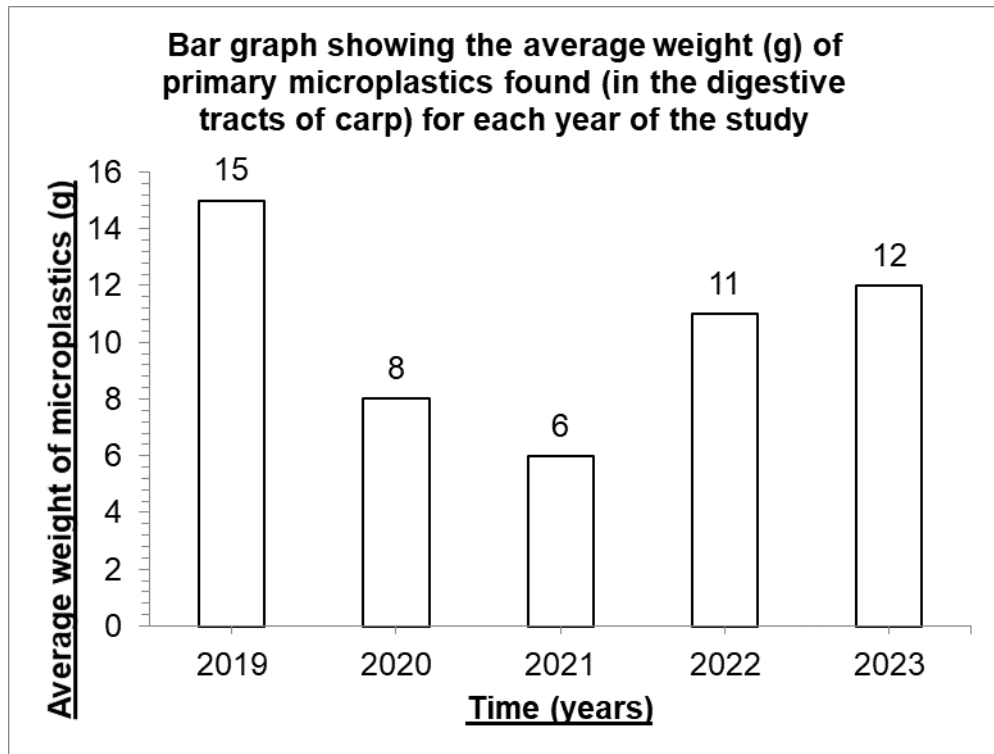
SECTION A**QUESTION 1**

1.1	1.1.1	D ✓✓		
	1.1.2	B ✓✓		
	1.1.3	A ✓✓		
	1.1.4	A ✓✓		
	1.1.5	C ✓✓		
	1.1.6	A ✓✓		
	1.1.7	C ✓✓		
	1.1.8	B ✓✓		
	1.1.9	C ✓✓		
	1.1.10	B ✓✓		
			(10 x 2)	(20)
1.2	1.2.1	Aboral ✓ surface		
	1.2.2	(Tidal) ebb ✓		
	1.2.3	Gill rakers ✓		
	1.2.4	Pedicellariae ✓		
	1.2.5	Otoliths ✓ / ossicles		
	1.2.6	Tapetum ✓		
	1.2.7	Protochordates ✓		
	1.2.8	Heterodontic ✓		
	1.2.9	Oophagy ✓		
	1.2.10	Urogenital ✓ opening		
			(10 x 1)	(10)
1.3	1.3.1	B only ✓✓		
	1.3.2	Both A and B ✓✓		
	1.3.3	A only ✓✓		
	1.3.4	None ✓✓		
	1.3.5	Both A and B ✓✓		
			(5 x 2)	(10)
				[40]
			TOTAL SECTION A:	40

SECTION B

QUESTION 2

2.1 2.1.1



MARKING GUIDELINES	
CRITERIA	MARK ALLOCATION
Descriptive heading (H)	½
Heading includes both variables (Time and (Average) weight of microplastics) (V)	½
Type of graph: Bar graph (T)	½
Independent variable (I) (X-axis: Time)	½
Dependent variable (D) (Y-axis: (Average) weight of microplastics)	½
Label for X-axis (XL)	½
Label for Y-axis (YL)	½
Unit of measurement of X-axis (XM)	½
Unit of measurement of Y-axis (YM)	½
Formatting of bars:	
Bars width equal (BW)	½
Bars spaces equal (BS)	½
Appropriate scale on Y-axis (YS)	½
Plotting (P)	ANY (4 x ½) 2

(8)

- 2.1.2 - The (average) weight of primary microplastics decreased (from 2019 to 2021) ✓
 - Then in 2022 (to 2023), the (average) weight of primary microplastics increased ✓ (2)
- 2.1.3 - Less plastic waste during lockdown in 2020 ✓
 - Increased usage of environmentally-friendly products ✓
 - More awareness of using more biodegradable products ✓
 - Less plastic could be due to higher rainfall that washes plastic away ✓
 - Reasoning related to COVID 19 lockdown ✓
(Any logical relevant substantiating answer, marker discretion for insightful thinking)
(Mark first 1) (1)
- 2.1.4 (a) Greenwashing ✓ (1)
 (b) - Track microplastics to source ✓
 - and fine companies that contribute to microplastics ✓

OR

- Implement policies surrounding quality control ✓ of material
 - (The industry's self-regulating body) can fine companies that do not comply ✓
(Mark reason and explanation. Mark first pair) (2)
(14)

- 2.2 2.2.1 - The increase in fresh water ✓
 - will decrease the salinity ✓ in the rock pools
(Mark cause and effect) (2)
- 2.2.2 - Seaweed holdfasts ✓
 - Needs to anchor them to rocks ✓
 - Broad feet ✓ of limpets
 - needs to hold onto rocks ✓
 - Byssal threads ✓ of mussels
 - needs to hold onto rocks ✓
 - Tube feet ✓ of echinoderms
 - need to be strong enough to hold on ✓
 - Shells ✓ / exoskeleton
 - protects them from heavy wave action ✓ / turbulence
 - Tubes made of calcium carbonate ✓ / strongly glued sand particles
 - protects them from heavy wave action ✓
 - Barnacles secrete cement compound ✓ / retract themselves
 - for protection from heavy wave action ✓
(Mark adaptation and reason. Mark first 2 pairs) (4)
(6)

- 2.3 2.3.1 Upper ✓ shore (1)
- 2.3.2 - Plough snails prefer moderate wave action ✓
- and water with little turbulence ✓ (2)
- 2.3.3 - **Meiofaunal food chain** ✓*
- **As the mollusc is decomposed** ✓* / broken down
- by the bacteria ✓ / protists / worms and
- more / increased amounts of nutrients are released back ✓ into the ocean / sandy substrate / ecosystem
(2 Compulsory marks ✓* + any 1) (3)
(6)
- 2.4 2.4.1 a) Bumpy edge provides extra lift ✓ / reduces drag / hydrodynamic / quieter
(Mark first 1 only) (1)
- b) - Less energy will be used while swimming ✓
- Will not tire (as easily) while swimming ✓
- Journey will be quicker ✓
- Pregnant females will be able to travel in a less strenuous manner ✓
(Any logical relevant substantiating answer, marker discretion for insightful thinking) (1)
- 2.4.2 - By looking at the process in nature ✓
- to find many different ways to be more energy efficient ✓
- OR
- Adaptations that have been developed and tested in nature ✓
- can be used to provide new technological solutions ✓
- OR
- Structures/processes that have been developed in nature ✓
- can be implemented to reduce developmental costs ✓
(Mark any pair)
(Any logical relevant substantiating answer, marker discretion for insightful thinking) (2)
- 2.4.3 - A problem was identified ✓ **(to provide extra lift for the blades to rotate).**
- (Mammal) specialists were called in to explain / investigate how nature has found solutions to similar problem ✓
- The (biological) solutions found in nature are translated into principles ✓ / blueprints / mechanisms / recipes / strategies that can be applied to human designs
- design a nature-inspired solution for their particular challenge ✓
(1 Compulsory ✓* for applying to scenario + any 3 steps) (4)

- 2.4.4
- Make use of abundantly available materials ✓
 - Use recycled materials ✓/ renewable materials / design for a circular economy
 - Use materials that do not require extreme temperatures ✓/ pressure
- (3)

2.4.5 If **YES**

- Could improve fuel efficiency ✓
- Could develop a quieter aircraft ✓

If **NO**

- Research funds should be used to address problems ✓ (such as frictional drag)
- Safety might be questionable as the design has not fully been tested ✓
- We do not need to re-invent helicopters ✓

(Open ended question. Any logical relevant substantiating answer, marker discretion for insightful thinking)
(1 mark for answer and motivation corresponding)
(1 mark for motivation)

(2)
(13)
[39]

QUESTION 3

- 3.1 3.1.1 - Hagfish secrete large amounts of slime ✓ (through slime glands)
 - that could block the gills ✓ (of predators) / making hagfish difficult for predators to grip / that is unpalatable to predators (2)

- 3.1.2 (a) **Open-ended question.**

Do not mark the organism

The Six-gilled Hagfish/ *Eptatretus hexatrema*

- Hagfish are scavengers on the seafloor ✓
- where the baited hooks will be ✓

- Have barbels ✓/ nostrils
- which enable them to sense ✓/ locate / find bait

- Hooks might get stuck into keratin teeth ✓/ rigid tongue
- increasing their chances of being reeled in ✓

- Lack / absence of sight ✓
- which reduces the ability of them seeing the hook ✓

**(Mark statement and reason) (Mark the first 2 pairs)
 (Any logical relevant substantiating answer, marker discretion for insightful thinking)**

OR

The Sea Bass / *Dicentrarchus labrax*

- Olfactory cells ✓
- can detect bait scent ✓

- Good eyesight ✓
- for detecting movement of bait ✓

- Fish are found higher up in the water column ✓
- where they will see the bait first ✓

- Vacuum-like feeding mechanism ✓
- is a rapid movement that can involuntarily suck in bait ✓

**(Mark statement and reason) (Mark the first 2 pairs)
 (Any logical relevant substantiating answer, marker discretion for insightful thinking)**

(4)

(b) The Six-gill Hagfish / *Eptatretus hexatrema*

- Muscular body ✓
- provides forceful movement ✓

- Tail fringe ✓/ Caudal fin
- allows for forward propulsion ✓

- Worm-like body ✓
- allows for easy movement ✓ in the water

**(Mark statement and reason) (Mark the first pair)
(Any logical relevant substantiating answer, marker
discretion for insightful thinking)**

OR

The Sea Bass / *Dicentrarchus labrax*

- Multiple fins ✓
- allow for more precise movement ✓

- Larger mass ✓
- which makes the Sea Bass difficult to reel in ✓

- Bony skeleton ✓
- allows for more attachment of muscles for better
movement ✓

**(Mark statement and reason) (Mark the first pair)
(Any logical relevant substantiating answer, marker
discretion for insightful thinking)**

(2)

(8)

- 3.2 3.2.1 - Blend in / camouflage (with the environment) / Blend in with that which is beneath it ✓
- To sneak up on prey / prevent predation ✓ (2)

- 3.2.2 - Nasal pouches / nostrils would be reduced ✓ / absent
- which allow sharks to detect tiny amounts of substances ✓ (like blood or rotting flesh)
- therefore they are unable to sense body fluids ✓ of prey

OR

- There will be fewer Ampullae of Lorenzini ✓
- which can detect the small electric fields ✓ produced by living animals and
- hence animal movement around them ✓

(Mark first organ only)
(Organ with corresponding function and explanation)

(3)
(5)

- 3.3 3.3.1 Green Turtle ✓ (1)

- 3.3.2 - **Reduces the amount of oxygen** ✓* (in the blood stream) before she starts a dive
- reducing the ability to stay under water ✓ / prevents extended submerged time.
- it will lead to a decrease in respiration ✓ / decrease in metabolic rate
- making diving bradycardia ineffective ✓
(1 Compulsory ✓* for applying to scenario + any 3 steps) (2)

- 3.3.3 - Their flesh is a popular food ✓
- They are heavily exploited for their attractive shells ✓ / shells have ornamental value
- Lower hatchling survival due to human disturbance (light, climate change) ✓
- 4 x 4 vehicles driving on beaches where breeding ✓
- Human activity on the beach/ human disturbance ✓
- Plastic ingestion ✓

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

(2)
(5)

- 3.4 3.4.1 - Feathers trap air between them ✓
 - thus providing (effective) insulation ✓

OR

- waterproofing due to preen glands ✓ / secretion of oil
- feathers to provide insulation ✓

OR

- Counter-current heat exchange ✓ / CCHE systems
- reduces heat loss ✓

OR

- Diving bradycardia ✓
- reduces the rate of heat loss ✓

(Mark first pair) (2)

3.6

Pinnipeds	Cetaceans
Mate/fertilise on land ✓	Mate/fertilise in water ✓
Birth offspring on land ✓	Birth offspring in water ✓
Offspring altricial ✓/ not able to go into the water	Offspring precocial ✓/ can swim after birth
Parents feed in the ocean and bring food to pups on land ✓	Feed in the water ✓
Feeds while lactating ✓	Does not feed while lactating ✓

(Tabulate 1 mark)**(Mark first 2 pairs)****(5)****(5)****[36]****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)	<p>The introduction shows a contextual link that the candidate understands what the question is, by:</p> <p>Correctly stating in their own words what the question is about AND describing the intention/ purpose of the essay.</p>	<p>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.</p> <p>Stated the intention of the essay in their own words.</p>	<p>There is no introduction. Starts with the asked content straight away. Provides randomly arranged facts.</p> <p>Restating the question</p>
USE OF PARAGRAPHS 2 marks (PAR)	<p>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.</p>	<p>Some paragraph division but is unclear (not linked) why content is grouped in these paragraphs.</p>	<p>All content sections written as one paragraph.</p>
RELEVANCE 2 marks (REL)	<p>Sufficient information with many good points made, 50% or more of the content is relevant to the question asked.</p>	<p>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.</p>	<p>25% or less of the content that the learner addressed is relevant to the topic asked.</p>

<p style="text-align: center;">LOGICAL SEQUENCE 2 marks (LSEQ)</p>	<p>Paragraphs show logical sequence and are demonstrably linked to each other.</p>	<p>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.</p>	<p>Very difficult to read the essay as no logical sequence. Many facts with no clear layout. Clearly unplanned.</p>
<p style="text-align: center;">CONCLUSION 2 marks (CONC)</p>	<p>Clearly bringing the aspects discussed in the essay together in a final paragraph in own words.</p>	<p>An attempt to write a conclusion, but closely quotes the words of the question asked. Still shows linkage of the topic to their response.</p>	<p>No conclusion. Learner clearly stopped after the content paragraphs – no attempt to pull the ideas together.</p>

(10)

QUESTION 4**INTRODUCTORY PARAGRAPH**

- Must discuss MPA in relation to the area
- Must NOT include the direct wording of the question.

What is an MPA (M)

- Is an area of the ocean that is given greater protection than surrounding areas, ✓
- Biosphere reserves ✓ / fishery reserve / harvest refuge / marine reserve / marine park / marine sanctuary / no take marine reserve (give one example)
- It is a clearly defined geographical space, ✓
- recognised, dedicated, and managed through legal ✓ / effective means
- to achieve the conservation of nature ✓ / cultural values.
- They restrict human exploitation ✓ / overuse / misuse.
- It protects the environment and the organisms living within it. ✓
- Promoting ecological stability, ✓
- rehabilitation and restoration. ✓

Max (5)

Formulation of MPA (F)***Checklist should be more or less in order (at least 4 steps) ✓*******Applying Pressey's list to INFANTA / WITSAND / BREEDE RIVER MOUTH ✓****

- Identify stakeholders and inform them of the conservation initiative ✓ / idea (e.g. Cape Nature / Resident Conservation Society researching the area).
- Set goals for the (conservation) system ✓
- Inform stakeholders of the state of the plants, animals / species in the area. ✓
- Discuss how the residents could (potentially) benefit from the expansion, with the stakeholders ✓
- Discuss the (potential) pros and cons of the expansion with users (fishers, tourists, divers, game rangers, conservation officials, scientists etc.) ✓
- Data on the features to be represented (and protected such as fish counts) are compiled and evaluated. ✓
- Conservation goals are translated into quantitative targets ✓ / goals, benefits and objectives are communicated to all parties involved (via WhatsApp groups and signage boards).
- Contribution of existing reserves to meeting targets is determined ✓ (like at Stilbaai)
- Algorithms / irreplaceability analyses are used to show how this area will meet conservation goals. ✓
- Conservation action is implemented ✓ / Residents are made aware of final outcomes of the planning process
- An adaptive management approach ✓ / such as closing easy access roads / improved awareness / campaigning
- based on constant monitoring of the conservation system is followed ✓ / residents can be involved in local management of monitoring of the conservation system

2 Compulsory marks ✓* + 6 steps

Max (8)

Successful implementation (S)

- The vulnerability status of the habitat ✓ / organisms is decreasing.
- Biodiversity abundance is increasing. ✓
- Spawner biomass increases. ✓
- Adjacent yield is more abundant ✓ / spill-over effect.
- Successful research can be conducted in the area. ✓
- Monitoring if actual steps are occurring ✓ (not just on paper).
- The human impact on the area is decreasing. ✓
- Environmental Education is taking place in the area ✓ / greater awareness of the conservation status of the area.
- Expression of satisfaction from stakeholders ✓

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

Min 3

Including A (A)

- This area is an estuary, ✓
- which is a breeding ground, ✓
- a nursery / feeding ground for marine species ✓
- Often rich in nutrients (from upstream) ✓
- Estuaries are seen as biodiversity hotspots ✓
- More sustainable tourism practices ✓

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

Min 2

Max (9)

Economic (E)

**Learner gets 1 mark if trend and reasoning correspond.
2 marks for expansion**

Positive

- Ecotourism will increase. ✓
- There will be more income for conservation ✓ / research / awareness programmes.
- Opportunities within the MPA can lead to economic stability for the residents ✓
- Researchers / universities might conduct studies in the area. ✓
- Government / private investment in the area might increase. ✓
- There will be a greater buy-in of stakeholders. ✓

OR

Negative

- The local people will not be able to live off the land as they used to. ✓
- Jobs based on nature tourism might be lost. ✓
- People might move away from the area, leading to a decrease in population. ✓
- New legislations might limit the activities the local people do in the area ✓ (less entrepreneurial freedom).

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

Max (3)

CONCLUDING PARAGRAPH

- Must link MPA in relation to the area.
- Must NOT include the wording of the question.

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

QUESTION 5**INTRODUCTORY PARAGRAPH**

- Must relate overtourism to the ecosystem / rehabilitation
- Must NOT include the direct wording of the question.

Influence of tourists (T)

- Tourists are using the area for their pleasure, leading to unintentional damage to the environment. ✓
- The site's carrying capacity is reached ✓ / overcrowding.
- Increased waste / litter / sewage ✓ (must indicate type of pollution)
- Organisms in the area might be chased away/ trampled upon. ✓
- Sound pollution increases. ✓
- To prevent overharvesting ✓ of resources e.g. too much fishing
- Boating activities place anchor buoys ✓ which drag along the seafloor
- Habitat / breeding site destruction ✓

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

Max (4)

Success of closure (C)

- Monitor that litter decreases. ✓
- Measure plant growth increasing. ✓
- Algae populations becoming more abundant. ✓
- Fish populations size increase. ✓
- (Fish) biodiversity increases. ✓
- Catch yield of fishers increases. ✓
- Bird life returning. ✓
- Animals will use the area as a nesting ✓ / breeding ground.
- Rare / endemic species population increases ✓ / vulnerability levels of organisms improve.
- Ecosystem starts to stabilise. ✓
- Water chemistry returns to normal. ✓
- Decrease in water pollutants. ✓

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

Max (7)

Utilised (U)

- Research ✓
- e.g. Universities can use the area as a real world case study for their students ✓ / An area to compare with other study sites.
- Monitoring ✓ / Observing
- e.g. population size, fish stock, pollutant levels. ✓
- Ecotourism ✓
- e.g. Tourism activities that promote a stable, functioning area. ✓
- Low-impact recreation ✓
- e.g. Have individuals (tourists) using the area in a reasonable manner that does not degrade the environment. ✓
- Education ✓ of visitors / Create awareness
- e.g. This area can be used for school excursions that will promote education ✓ / This area can be used as a training ground for students / Placing sign boards in the area
- Exploitation ✓
- e.g. Once the area has stabilised, sustainable harvesting of the area. ✓

(Any logical description of the term, marker discretion for insightful thinking)

Mark any two uses (use and description)

Max

(4)

Ecotourism promoted (E)

- Prevent overtourism by regulating the amount of people entering the area ✓ / by charging an entrance fee
- Impact assessments can be conducted on a regular basis ✓
- to monitor: the stability of the area ✓ / waste / ecosystem / plants / animals / geology
- Allocate funds to maintain the stable environment. ✓
- Plan for each tourist season in advance to ensure that infrastructure and services can cope with the number of tourists. ✓ / Plan to manage the carrying capacity of the area
- Educate the communities on the fragile nature of the area. ✓
- Employ guides that are properly trained ✓ / briefed / educated / prepared.
- Guides implement and apply ecotourism principles to minimise impact ✓
- Audit tourist operators' practices to assess their environmental impact. ✓
- Interact with the area in an environmentally conscious manner. ✓
- Activities promoting ecological balance is rewarded ✓ / implemented.
- Boards ✓ / signage promoting ecotourism can be erected.
- Law enforcement can impose fines for people who do not act in line. ✓
- Ecotourism income is used to enhance the local community and its infrastructure ✓ (health clinic, transport, education).
- Ecotourism can provide increased employment opportunities ✓
- and increased income ✓ for the local community
- The local traditions ✓
- and local crafts ✓ need to be considered when planning

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

Max

(8)

Sustainable (D)**1 mark if Opinion and motivation correlates****1 mark for motivation*****If “YES”***

- By following the formulated plan, the area can be rehabilitated.
- Less human interaction with the beach resulting in less litter, chemicals, pollutants.

If “NO”

- The area is too close to large developments for rehabilitation to occur. ✓
- The area is so popular that people will keep flocking to it. ✓

Accept any logical/ relevant answer.

Max (2)

CONCLUDING PARAGRAPH

- Must link overtourism to the ecosystem / rehabilitation.
- Must NOT include the wording of the question.

Content	(25)
Synthesis	(10)
	(35)

TOTAL SECTION C:	35
GRAND TOTAL:	150