



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## **NATIONAL SENIOR CERTIFICATE**

**GRADE 12**

**MARINE SCIENCES P2**

**NOVEMBER 2025**

**MARKING GUIDELINES**

**MARKS: 150**

**These marking guidelines consist of 22 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 QUESTION 1.1 of 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 ✓✓	(10 x 2)	(20)
	1.1.2	B ✓✓		
	1.1.3	C ✓✓		
	1.1.4	C ✓✓		
	1.1.5	D ✓✓		
	1.1.6	B ✓✓		
	1.1.7	D ✓✓		
	1.1.8	A ✓✓		
	1.1.9	C ✓✓		
	1.1.10	B ✓✓		
1.2	1.2.1	Echolocation ✓	(10 x 1)	(10)
	1.2.2	Vertebral column ✓		
	1.2.3	Gill filaments ✓		
	1.2.4	Ecosystem services ✓		
	1.2.5	Diving bradycardia ✓		
	1.2.6	Infratidal ✓		
	1.2.7	Preen glands ✓		
	1.2.8	Nature-based tourism ✓		
	1.2.9	Respiratory tree ✓		
	1.2.10	Operculum ✓		
1.3	1.3.1	Both A and B ✓✓	(5 x 2)	(10)
	1.3.2	A only ✓✓		
	1.3.3	None ✓✓		
	1.3.4	None ✓✓		
	1.3.5	B only ✓✓		

**TOTAL SECTION A: 40**

**SECTION B**

**Important notice: more potential responses are given in these marking guidelines than marks allocated per question.**

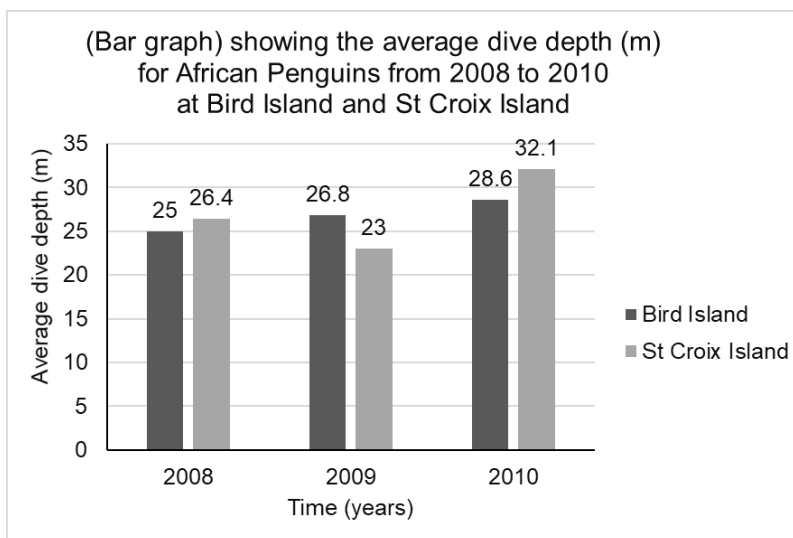
**'/' means either the first or the following phrase provided in these marking guidelines is allocated marks.**

**QUESTION 2**

2.1 2.1.1 Year ✓/Marine Protected Area/No-take zone

(1)

2.1.2



MARKING GUIDELINES	
CRITERIA	MARK ALLOCATION
Descriptive heading above or below graph ( <b>H</b> )	$\frac{1}{2}$
Heading includes all variables: (Average) dive depth (m) and time (years) ( <b>V</b> )	$\frac{1}{2}$
Type of graph (format): Bar graph ( <b>T</b> )	$\frac{1}{2}$
Independent variable ( <b>I</b> ) X-axis: time (years)	$\frac{1}{2}$
Dependent variable Y-axis ( <b>D</b> ): (Average) dive depth (m)	$\frac{1}{2}$
Label for X-axis ( <b>XL</b> )	$\frac{1}{2}$
Label for Y-axis ( <b>YL</b> )	$\frac{1}{2}$
Unit of measurement of X-axis ( <b>XM</b> ) (years)	$\frac{1}{2}$
Unit of measurement of Y-axis ( <b>YM</b> ) (m)	$\frac{1}{2}$
Appropriate scale on Y-axis ( <b>YS</b> ) – must start at zero	$\frac{1}{2}$
Key ( <b>K</b> ) or indicated on x-axis	$\frac{1}{2}$
Formatting of bars: Bars width equal ( <b>BW</b> )	$\frac{1}{2}$
Plotting ( <b>P</b> )	2 x $\frac{1}{2}$ 2 x $\frac{1}{2}$

(8)

- 2.1.3
- Lower survival rate/chicks have lower weight ✓
  - Parents would use more energy when diving deeper ✓
  - requiring more food themselves, thereby less food for the chicks. ✓

**OR**

- Lower survival rate ✓
- Parents are longer away from nests ✓
- Chicks are more exposed to the elements/predators. ✓

**OR**

- Lower survival rate/chicks have lower weight ✓
- Foraging parent is away longer from the nest ✓
- Might result in the partner abandoning the nest. ✓

**(1 mark for survival rate, 2 marks for explanation) (3)**

- 2.1.4
- Penguins employ diving bradycardia ✓/respire anaerobically
  - less energy is used by non-essential organs ✓
  - Insulation ✓/Counter-current heat exchange (CCHE)/Oil from preen glands
  - reduces the amount of energy needed for thermoregulation ✓
  - They are streamlined ✓/hydrodynamically shaped
  - reducing the energy needed to move through the water ✓
  - High amounts of haemoglobin in the blood ✓
  - carries more oxygen for cellular respiration ✓

**(Mark any 2 pairs, mark first 2 pairs) (4)**  
**(16)**

- 2.2      2.2.1      - The kelp provides cover for the male Cape Breams ✓  
                          - protecting them from predators whilst watching over their nests ✓ (2)
- 2.2.2      Predation ✓ (1)
- 2.2.3      (a)      Ovipary ✓/spawning (1)
- (b)      'Is' Advantageous  
                          - Many eggs are fertilised increasing the chances of survival from predation by the Common Brittlestar ✓/ from being washed away  
                          - Eggs are protected by males increasing the chances of survival ✓
- 'Is not' Advantageous  
                          - More energy is used for the production of gametes ✓/ eggs and sperm cells  
                          - Energy/time used for parental care by males protecting nests and therefore less energy/time for finding food ✓  
                          **(1 mark if Opinion and motivation correlates 1 mark for motivation)**  
                          **(Any logical relevant substantiating answer, marker discretion for insightful thinking)** (2)
- 2.2.4      (a)      - Brittlestars have no sense organs ✓  
                          - They have receptors on their arms ✓  
                          - whereby chemicals will be detected. ✓ (3)
- (b)      - Brittlestars move by dragging themselves along with their very flexible arms ✓  
                          - with the tube feet in the arms helping by sticking to the substrate. ✓ (2)
- (c)      If Positive effect  
                          - More of the scent would be carried out to the brittlestars ✓
- If Negative effect  
                          - The scent will dissipate before brittlestars detect it ✓  
                          **(Only award mark for opinion if it is motivated)**  
                          **(Any logical relevant substantiating answer, marker discretion for insightful thinking)** (2)  
                          (13)

- |     |       |   |                                  |
|-----|-------|---|----------------------------------|
| 2.3 | 2.3.1 | Lower balanoid ✓ zone   | (1)                              |
|     | 2.3.2 | <ul style="list-style-type: none"> <li>- Can control population size ✓</li> <li>- to prevent overcrowding ✓/provide more space for juveniles.</li> <li>- More space for growth ✓</li> <li>- decreasing competition for space/food. ✓</li> </ul> <p style="text-align: right;"><b>(Mark first pair, mark any pair)</b></p>   | (2)                              |
|     | 2.3.3 | <ul style="list-style-type: none"> <li>- Competition ✓</li> <li>- The black mussels have to compete for space when they settle ✓/for food.</li> </ul>   | (2)                              |
|     | 2.3.4 | <ul style="list-style-type: none"> <li>- <b>(Decrease in food source) will result in starvation ✓*/less energy</b></li> <li>- Fewer breeding individuals ✓</li> <li>- Reducing breeding success ✓</li> </ul> <p style="text-align: right;"><b>(1 Compulsory ✓* and any 1 effect on bird numbers)</b></p> <p style="text-align: right;"><b>(Any logical relevant substantiating answer, marker discretion for insightful thinking)</b></p> | (2)<br><b>(7)</b><br><b>[36]</b> |



**QUESTION 3**

- 3.1      3.1.1    - Noise pollution caused by the speedboats ✓  
- could disrupt the breeding stages ✓ of animals/disorientate their movements/change behaviour patterns  
- which could potentially cause animals to migrate out of the area thus decreasing the biodiversity in the estuary

**OR**

- Litter from tourists on speedboats could fall into the estuary ✓/  
propellers/speedboat parts might break off  
- could lead to the degradation of the habitat ✓  
- resulting in less space for breeding ✓/settling.

**OR**

- Fuel used in engines leaks ✓/causing oil spills  
- could covering the feathers of marine birds  
- which might result in marine birds feathers not being waterproof ✓/  
not being able to go into the water to feed

**(Mark effect from speedboat, effect it might have on the animal)**  
**(Any logical relevant substantiating answer, marker discretion for insightful thinking)**

**(3)**

- 3.1.2    - Jet ski has a lower number of permits issued compared to the rowing boat ✓  
- more people using the area for rowing in that year. ✓  
- SANParks could reduce the number of permits issued to Jet ski owners ✓/instil expensive fines for those that are caught using areas of this estuary without a permit/have regular patrolling by officials in and around the Knysna estuary to monitor if everyone has their permits.

**OR**

- Rowing boat uses an oar which creates less disturbance ✓/less noise pollution in the water/does not release engine oil  
- in comparison a Jet ski which is engine powered, causing greater water turbulence ✓/possible engine oil leaks  
- SANParks could ban the use of engine types known to release oil in greater quantities e.g. size of outboard motor. ✓

**OR**

- Rowing boat does not release any carbon emissions as it makes use of an oar which is powered by people ✓  
- in comparison to a Jet ski that has an engine that releases carbon emissions ✓ (two stroke oil)  
- SANParks could inspect the crafts' oil emissions before providing permits. ✓

**(Mark any comparing pair and mitigation)**  
**(Any logical relevant substantiating answer, marker discretion for insightful thinking)**

**(3)**

## 3.1.3 If learner said 'YES'

- By reducing the number of permits issued for the area the number of tourists/people in the area can be reduced. ✓
- Only those who have permits will be allowed to make use of the area which limits the effects of overtourism. ✓

## If learner said 'NO'

- People might use the area without a permit/illegally which means that the number of tourists might not be monitored effectively. ✓
- Even though permits are issued, that does not mean that those who have a permit will only keep to one type of activity/might take advantage. ✓
- People with permits might not keep to the permit regulations (for example about noise levels or distance to which wildlife may be approached). ✓
- More permits were given to more disruptive type of vessel/speedboat than for less disruptive vessels such as the rowing boat. ✓
- The impact of the vessel must be considered when determining the number of permits for each type of vessel ✓/electric motors could be prescribed/speed reduction could be greater to prevent large wakes that are created in the water.

**(1 mark if Opinion and motivation correlates 1 mark for motivation)**

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

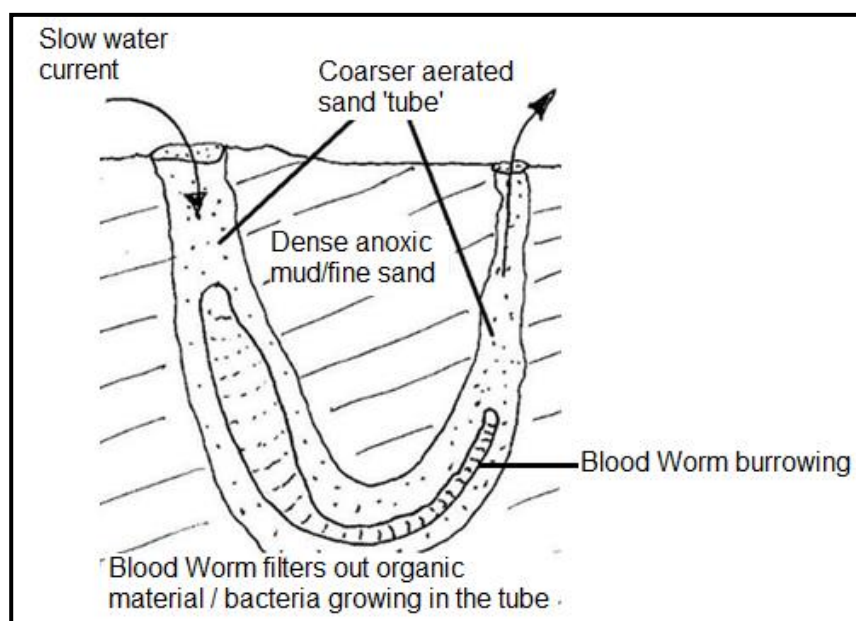
(2)

- 3.1.4 (a) - Influx of finer sediment will cause anoxic conditions ✓/low oxygen in the sediment  
 - causing the burrowing animals that is used as bait to suffocate ✓/die  
 - resulting in less bait to be able to catch fish with ✓/low fishing yield.

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

(3)

- (b) **An annotated diagram showing a Blood Worm in a burrow**



#### MARKING GUIDELINES OF ANNOTATED DIAGRAM

CRITERIA	ELABORATION	MARK
Correct drawing (D)	Blood Worm in a burrow	½
Suitable heading (H)	Descriptive heading (An annotated diagram showing a Blood Worm in a burrow)	½
Drawing technique	- Drawing in pencil (TP) - Drawing solid lines (not more than 45-50% shading – marker's discretion) (TS)	½ ½
Labels (L)	Mark any 3 x ½	1 ½
Process direction (P)	Arrow/s illustrating direction of water current through the burrow	½

(4)  
(15)

- 3.2      3.2.1    -   The seal's whiskers are positioned at the front ✓/anterior end/  
found on the outside  
-   allowing the seal to sense the environment before moving  
forward. ✓ (2)
- 3.2.2    -   The seal will be able to sense the trail left behind by their prey ✓/  
able to identify the size of the prey/direction their prey is going  
-   in order for the seal to either go after the prey and hunt or stay. ✓  
**(Any logical relevant substantiating answer, marker discretion  
for insightful thinking)** (2)
- 3.2.3    (a)    -   The underwater sensors will be able to measure the speed  
of the current ✓/the direction in which the person needing  
rescuing is going  
-   and send the rescue team to the correct vicinity ✓/planning  
the rescue route.  
**(Any logical relevant substantiating answer, marker  
discretion for insightful thinking)** (2)
- (b)    **Adapting to changing/harsh/unpredictable ocean  
conditions ✓\***  
-   Ensure that essential functions are met ✓  
-   in multiple/diverse ways that are distributed ✓ (rather than  
centralised).  
-   Ensure that the functional integrity can be maintained. ✓  
**(Mark compulsory ✓\* and any 1)** (2)
- (c)    -   High energy consumption to operate ✓  
-   making them less cost efficient/potentially more impact on  
the environment. ✓  
-   Sensors might have limited range ✓ due to complex  
underwater environments  
-   causing inaccurate data readings. ✓  
-   Replicating the design of the seal's whiskers is complex ✓  
-   Requiring sophisticated technology/correct materials/high  
maintenance which can become costly/high level of skills  
required to operate. ✓  
**(Mark first 2 pairs, mark any pairs)  
(Any logical relevant substantiating answer, marker  
discretion for insightful thinking)**  
(2 x 2) (4)

- (d) If learner said 'YES'
- Sensors could help monitor underwater ecosystems. ✓
  - This technology could be used to track the movement/migratory patterns of breeding species for better management of those areas. ✓
  - Sensors can be used by scientists to count the number of organisms in the area for conservation efforts/protection based on the biodiversity ✓/abundance.
  - Sensors can detect plastics in the water to inform scientists on areas that needs to be restored. ✓

If learner said 'NO'

- Conservation efforts should be hands on and require a collaborative approach to be effective. ✓
- Sensors might not be able to give accurate data due to human error making it ineffective. ✓

**(1 mark if Opinion and motivation correlates 1 mark for motivation)**

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

(2)  
(14)

- 3.3      3.3.1    - Community members along the Northern Cape coastline ✓/rate payers/organisations
- to ensure that they were informed and made aware of the conservation initiative. ✓
- The local municipality of the area where the Namaqua National Park MPA is located ✓
- to ensure effective long-term management/monitoring. ✓
- Relevant business/fishing industries ✓/subsistence fishers/ restaurant owners/scientist/a research unit at a university
- this allowed them to put measures in place to prevent their business from being potentially negatively affected. ✓

**(Mark first pair, mark any pair)**

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

(2)

- 3.3.2    - Protecting/preserving habitats of fish species that are valuable in fisheries/the Cape Hake nursery areas. ✓
- Allows for the recovery of the West Coast Rock Lobster. ✓
- Providing protection for feeding grounds/breeding grounds ✓ of the dolphins from human impact for generations to come.
- Providing protection for the endemic species such as the Heaviside Dolphin. ✓
- The area can be used for research/educational/recreational purposes. ✓

**(Mark first 2, mark any 2)**

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

(2)

- 3.3.3 - Increased abundance of adjacent yield ✓/spill over effect/  
increased fish stocks from the nursery  
- Assisting with fisheries management to allow for the recovery of  
the fisheries industry in the local community ✓  
- This can provide financial opportunities ✓/generate more income/  
job creation for members of the community  
- which could improve the economic status of the people living in  
the community/more fish to be sold to generate more income. ✓  
**(Any logical relevant substantiating answer, marker discretion  
for insightful thinking)** (4)

- 3.3.4 (a) Data collected such as the population size ✓/distribution/  
behaviour patterns of the Heaviside Dolphin  
  
(b) By recording the frequency of dolphin sightings ✓ their feeding  
behaviours, and social interactions/aerial surveys/sound  
recordings

**OR**

- (a) Monitor the Heaviside Dolphin's health by tracking signs of  
injury ✓/disease.  
  
(b) By collecting tissue samples ✓/marine mammal observations.

**OR**

- (a) Measure the availability of prey species in the area. ✓  
  
(b) By assessing the impact of human activities (like boating and  
fishing) ✓/that can be used in population studies on prey  
species.

**(Mark any pair)**  
**(Mark variable and corresponding collecting method.)**  
**(Any logical relevant substantiating answer, marker discretion  
for insightful thinking)**

**(Data)** (1)  
**(Method)** (1)  
**(10)**  
**[39]**

**TOTAL SECTION B: 75**

**SECTION C****When marking essays:**

- Markers should indicate with the designated letter.
- Compulsory marks per section are indicated with ✓\*.
- The breakdown of the synthesis marks is indicated on the rubric for the essays.
- Credit valid responses which may be provided by the candidate from other sources.
- Markers need to allocate a minimum of four marks per bullet point.
- A maximum of two marks for the opinion.
- Excluding the opinion, the other seven marks may be awarded for any of the bullet points being discussed.

**Important notice: more potential responses are given in these marking guidelines than marks allocated per question.**

'/' means either the first or the following phrase provided in this marking guideline is allocated marks.

**ASSESSING THE PRESENTATION OF THE ESSAY**

<b>MARK ALLOCATION</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>INTRODUCTION 2 marks (INTR)</b>	<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>
<b>USE OF PARAGRAPHS 2 marks (PAR)</b>	<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>

<b>RELEVANCE 2 marks (REL)</b>	Sufficient information with many good points made, 50% or more 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.	25% or less of the content that the learner addressed is relevant to the topic asked.
<b>LOGICAL SEQUENCE 2 marks (LSEQ)</b>	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.
<b>CONCLUSION 2 marks (CONC)</b>	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****INTRODUCTORY PARAGRAPH**

- The introduction must include Goblin Sharks and anglerfish and mention how they can survive dark and cold conditions/predator prey relationships between Goblin Sharks and anglerfish at depth
- Must NOT include the direct wording of the question

**BIOLUMINESCENCE (B)**

- Some fish species have pockets of cells called photophores ✓
- that contain bioluminescent chemicals, ✓
- which can be activated and deactivated by enzymes. ✓
- Other photophores contain symbiotic luminous bacteria. ✓
- Light can be switched on and off ✓
- by unmasking or masking the bacteria with a fold of skin or membrane. ✓

Min 4

**SENSES (S)**

- **Larger area for more Ampullae of Lorenzini ✓\***
- These are small clusters of cells ✓
- joined by jelly-filled canals to pits ✓
- The ampullae of Lorenzini are sensitive to electricity ✓
- and can detect the small electric fields around living animals and movement ✓
- allowing the Goblin sharks to detect anglerfish in the dark ✓

**(1 Compulsory ✓\* + 3 any)**

Min 4

**VENTILATION (V)****Fish**

- Some species will raise and lower the floor of the mouth ✓
- in order to pump water over the gills, ✓
- while others have specialised valves in the mouth ✓
- to draw water in through the mouth ✓
- and expel it backwards over the gills. ✓
- The gill chambers can also be enlarged ✓
- to pull more water into the mouth ✓
- by moving the opercula outwards, ✓
- while the branchiostegal membranes keep the gill slits sealed. ✓

Min 2

**Sharks**

- Water enters the mouth or spiracles ✓
- and exits, across the gills. ✓
- Some of the larger shark species need to keep moving forward to force water across the gills. ✓
- This is referred to as ram ventilation. ✓

Min 2

**(Need both fish and shark)**

**TEMPERATURE REGULATION (T)**

- Sharks are ectothermic, ✓
- losing heat from their body to the ocean. ✓
- When their blood in the blood vessels passes through the gills ✓
- the blood comes into close contact with the colder water flowing over them. ✓
- They are able to regulate their temperatures by generating heat in their muscles ✓
- and maintain it with counter-current heat exchange (CCHE) capillary networks (rete mirabile). ✓
- Veins and arteries are next to each other ✓/close to each other
- The blood in the blood vessels flows in opposite directions ✓
- (warm) blood flows from the inner core of the body exchanging heat with (cold) blood flowing from the gills. ✓
- A continuous temperature gradient is maintained. ✓
- Heat generated is recycled/reused ✓/transferred to allow the body to retain heat/energy.

Min 4  
Max (23)

**INCREASE OF SUBMERSIBLES (I)****Yes**

- More submersibles into the depths of the ocean will give us more information of what is going on in the ocean. ✓
- The number of animals not yet discovered/that we do not have much information about is large; we need more information to be able to protect them better ✓/citizen science can contribute to our scientific knowledge/understanding.
- When tourists see the wonders of the ocean, they might donate money to research projects/research institute ✓/become a citizen scientist and assist researchers
- The citizens involved become more aware of the importance of scientific, substantiated defendable research ✓/became more educated.
- Journeys to the deep sea should be made as affordable as possible to enable more public to get there. ✓

**No**

- More submersibles in the deep ocean can disrupt animals' natural behaviour. ✓
- More submersibles could increase the risk of pollution (light, noise or chemical). ✓
- The light pollution might have an impact on the vision of the deep-sea animals. ✓
- Light produced by the submersible might attract more predators to the area/ confuse animals which rely on producing bioluminescence for mating. ✓
- It should not be made more affordable for many to make these journeys, as it might result in overtourism. ✓
- The ability of submersibles to be reach unexplored areas could potentially degrade this environment due to the influx of submersibles.

**(1 mark if Opinion and motivation correlates 1 mark for motivation)**  
**(Any logical relevant substantiating answer, marker discretion for insightful thinking)**

Max (2)

**CONCLUDING PARAGRAPH**

- Discuss how anglerfish and Goblin Sharks are adapted to live in cold dark environments/modern technology resulting in increased ocean exploration
- Does not repeat/reproduce wording of the question/text

Content	(25)
Synthesis	(10)
	<b>[35]</b>

**QUESTION 5****INTRODUCTORY PARAGRAPH**

- The introduction must include hagfish and Blobfish and refer to survival strategies in harsh conditions/people are more likely to protect 'cute' or charismatic animals
- Must NOT include the direct wording of the question.

**SKELETAL STRUCTURE (S)****Agnatha (SA)**

- (Cartilage skull and skeletal elements)
- Very reduced vertebrae ✓
- Cartilage makes body flexible ✓
- Cartilage is neutrally buoyant ✓
- Hagfish do not need to expend energy to stay in one place in water column ✓
- Wormlike body for less resistance/hydrodynamic ✓
- Flattened fringe around tail to swim by wriggling their body from side to side/ provides forward propulsion. ✓

Min 2

**Osteichthyes (SO)**

- (Bony skeleton)
- Fins can fold to make body streamlined ✓
- Tail/caudal fin is used for forward propulsion ✓
- Dorsal fin provides stability during movement/changing direction ✓
- Anal fin assists with stability ✓
- Paired pectoral fins/pelvic fins are used to change direction/enabling precision swimming when moving slowly. ✓

Min 2

**(Need both Agnatha and Osteichthyes)****WEAKER BONES/NO SWIM BLADDER (B)**

- Weaker bones will not resist pressure from the water ✓
- Weaker bones will be moulded by the water pressure ✓
- keeping the shape of the Blobfish ✓
- The Blobfish does not need a swim bladder at depth, because water pressure will keep the fish from moving up to the surface ✓
- The Blobfish remains close to the bottom of the ocean therefore, does not need to control buoyancy. ✓
- A swim bladder will explode at those depths ✓
- due to the pressure applied to the gas. ✓

Min 4

**FEEDING HAGFISH (F)**

- Hagfish have three or more pairs of touch- and chemical- sensitive tentacles ✓/ barbels
- Hagfish smell the presence of food over fairly long distances. ✓
- Their main source of food is dead animals, ✓
- that have sunk to the sea floor. ✓
- They have two half-rings of keratin teeth ✓
- around a rigid tongue, ✓
- with which they fasten onto the dead animal ✓
- and tear off pieces. ✓
- In order to tear away the flesh, ✓
- they can tie their body into a knot, ✓
- which is then slid to the front of the slimy body/provides traction until it pulls food away from the animal/carcass. ✓

Min 4

**PRODUCTION OF SLIME (P)**

- Hagfish have very glandular skins ✓/glands in the skin produce mucus
- from which they can secrete large amounts of slime when they are distressed. ✓
- This slime is thought to be unpalatable to predators ✓
- and can block their gills, ✓
- forcing them to let go of any hagfish they may have caught. ✓
- Hagfish become difficult to see/obscured when slime is released ✓/the slime camouflages them
- Hagfish prey on weak and dying prey ✓
- They might prey on the other fish in the fishing nets ✓
- resulting in fewer fish that can be sold. ✓
- Hagfish produce large quantities of slime as a defence mechanism when threatened ✓
- Fishers need to clean the nets, that takes time. ✓/equipment is unable to be fixed or is broken beyond repair

Min 4

Max (23)

**Ethics (E)****If YES**

- Competitions will make the public aware of animals that are usually not known by many people, this can lead to more funding and better protection of the animals. ✓
- Competitions can lead to interest in studying one of the 'ugly animals', which can help with research and conservation of similar animals and their deep-water habitats. ✓

**If NO**

- Competitions will give the public a negative perception of the 'ugly' animal. This may lead to people harming/neglecting the animals due to the competition highlighting to their appearance. ✓
- By focusing on appearance of the animals the people will not focus on ecological importance of and environmental impact of the loss of the animal, the focus is misguided. ✓

- The impact of these competitions is not long term and will not translate to long term support and should rather focus on education and research. ✓

**(1 mark if Opinion and motivation correlates 1 mark for motivation)**  
**(Any logical relevant substantiating answer, marker discretion for insightful thinking)**

Max (2)

### CONCLUDING PARAGRAPH

- Discuss how animals are specially adapted to their conditions
- Does not repeat/reproduce wording of the question/text

Content: (25)

Synthesis: (10)

**[35]**

**TOTAL SECTION C: 35**

**GRAND TOTAL: 150**