basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

MARKS: 150

These marking guidelines consist of 17 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 Science 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 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   B ✓✓
        1.1.2   A ✓✓
        1.1.3   B ✓✓
        1.1.4   C ✓✓
        1.1.5   D ✓✓
        1.1.6   A ✓✓
        1.1.7   D ✓✓
        1.1.8   A ✓✓
        1.1.9   C ✓✓
        1.1.10   C ✓✓

(10 x 2)   **(20)**

1.2   1.2.1   Balanoid ✓ zone
        1.2.2   Indicator ✓ species
        1.2.3   Generating ✓ force
        1.2.4   Biosphere reserve ✓
        1.2.5   Crest ✓
        1.2.6   Spilling ✓ wave
        1.2.7   Generator ✓
        1.2.8   Demersal ✓ / bottom trawling
        1.2.9   (Wave-cut) Notch ✓
        1.2.10   Greenwashing ✓

(10 x 1)   **(10)**

1.3   1.3.1   A only ✓✓
        1.3.2   None ✓✓
        1.3.3   Both A and B ✓✓
        1.3.4   B only ✓✓
        1.3.5   Both A and B ✓✓

(10)
[40]

TOTAL SECTION A: 40

SECTION B

QUESTION 2

2.1 2.1.1 - Nature-based tourism can lead to over-tourism ✓*
- which results in pollution ✓ (environmental degradation)
- negatively affect the biodiversity ✓
- distract/will discourage tourists from visiting/give bad press

(✓* Compulsory mark 1 + reasoning mark 2)
(Open-ended. Mark relevant reasoning) (2)

2.1.2 - Control the number of people that visiting the area ✓ / access control
- Reduce the amount of waste produced by tourists ✓
- Reduce the carbon footprint by limiting energy use ✓
- Educate the tourist ✓ (on the sensitivity of the ecosystem)
- Strict rules and regulations ✓
- Apply TIES principles and guidelines ✓
- Develop an economic plan that pays for the environmental improvement of the area ✓
(Open-ended. Mark relevant reasoning) (2)
(4)

2.2 2.2.1 Temperature (°C) ✓ (1)

2.2.2 If the <u>temperature increases</u>, the <u>average oxygen content of sea water will decrease</u>

Both variables present ONE mark✓
Direction of prediction ONE mark ✓
Direction of prediction may vary as it is a hypothesis (2)

2.2.3

The relationship between temperatures and the average oxygen content of the sea water in 10 programmable water baths

½✓YM ½✓H ½✓V ½✓D ½✓O ½✓G ½✓P any 6 ½✓YS ½✓YL ½✓I ½✓XL ½✓XS ½✓XM

Y-axis: Average Oxygen Content (mg/ℓ) with values 0, 2, 4, 6, 8, 10, 12, 14, 16

X-axis: Temperature (°C) with values 0, 5, 10, 15, 20, 25, 30, 35, 40
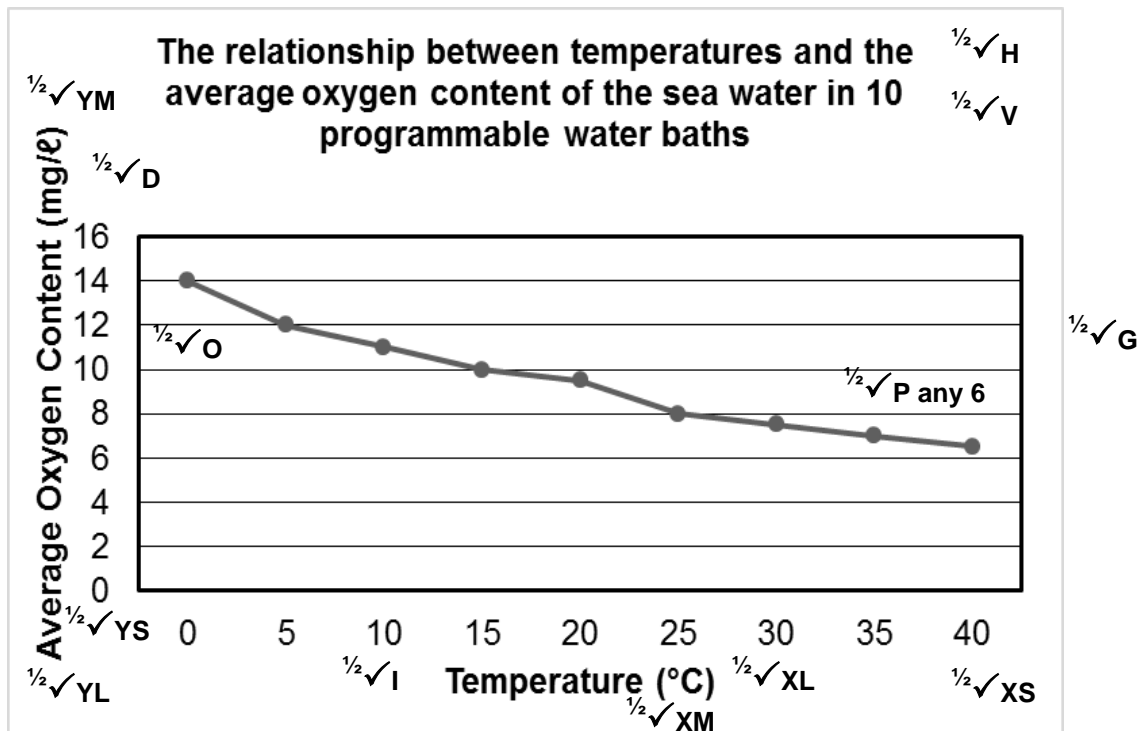
MARKING GUIDELINES	
CRITERIA	**MARK ALLOCATED**
Descriptive heading (**H**)	½
Both variables in caption (**V**)	½
Type of graph: line graph (**T**)	½
Independent variable (X-axis) (**I**)	½
Dependent variable (Y-axis) (**D**)	½
Label for X-axis (**XL**)	½
Label for Y-axis (**YL**)	½
Unit of measurement for X-axis (**XM**)	½
Unit of measurement for Y-axis (**YM**)	½
Appropriate scale for X-axis (**XS**)	½
Appropriate scale for Y-axis (**YS**)	½
Origin of line (**O**)	½
Plotting (**P**)	ANY (6 x ½) 3

(9)

2.2.4   - The higher temperatures ✓ brought about by climate change
        - would result in less oxygen ✓ being available to organisms
        - decreasing the organisms' ability to respire ✓   (3)

(15)

2.3   2.3.1   -   Stone traps ✓
                -   Reed fish traps ✓   **(Mark first 1 only)**   (1)

        2.3.2   -   Overfishing ✓ / Over-exploitation
                -   has reduced the spawner biomass ✓

                -   The destruction of estuarine habitat as nurseries ✓
                -   has reduced the spawner biomass ✓

                -   Climate change ✓ / Global warming
                -   Could affect spawning or reproductive cycles ✓
                            (Mark impact and explanation. Mark first pair)
                                    (Should be applicable to estuaries)   (2)

        2.3.3   -   Both sediment and organic matter are deposited in the estuary ✓
                -   Erosion along the river course provides the sediment load ✓
                -   Sediment can clog gills of fish ✓
                -   Removing spawning habitats ✓
                -   The vegetation all along the banks of the river provides a
                    constant supply of organic plant material ✓
                -   Associated plant/micro-organic matter for feeding ✓**(Mark any 3)**   (3)

        2.3.4   -   Protecting critical habitats for reproduction ✓
                -   Rehabilitation of fish stocks for spill-over into surrounding
                    exploited areas ✓
                -   Assisting fisheries management to allow for recovery of
                    spawning habitats ✓/ food source
                -   Increasing fish catches in surrounding fishing grounds due to
                    spill-over ✓
                            (Mark any 4, should be applicable to estuaries)   (4)
                                                                            (10)

2.4   2.4.1   West coast ✓   (1)

         2.4.2
- Kelp holdfasts provide a haven for invertebrates ✓ such as filter feeders
- promoting increased biodiversity ✓

- Kelp also reduces the effect of wave action ✓
- providing calm inshore environments in which animals can thrive ✓

- Kelp particles, decomposition bacteria and phytoplankton blooms ✓
- are capitalised on by herbivores and filter feeders ✓

- Carnivores and omnivores feed ✓ on the filter feeders
- which thrive in kelp forests ✓

(Mark statement and reason. Mark first 3 only)   (6)

(7)

[36]

QUESTION 3

3.1   3.1.1   Wind energy ✓ / subsea oceanic pressure   (1)

       3.1.2   -   Corrosion✓
                  -    Biofouling ✓
                          (Do not accept force and cost as an answer)   (2)

       3.1.3   **If answer is YES**
                  -    South Africa is the third best location for solar power ✓
                  -    weather conditions experienced in South Africa is ideal for renewable energy ✓
                  -    over-exploitation of fossil fuels which is currently our main source of energy ✓
                  -    trying to keep up with first world countries ✓
                  -    Environmental costs considered in a business plan make renewable energies competitive to fossil fuel generation. ✓

                 If answer is NO
                  -    Too expensive to install ✓
                  -    high cost of equipment ✓
                  -    technology in South African is not advanced for installation and maintenance ✓
                  -    questionable governance of resources ✓ (corruption)
                        (Mark any logical relevant substantiating answer)
                                        (Reasoning mark 2)   (2)

       3.1.4   -   Building mechanisms in the ocean is expensive ✓
                  -    mechanisms have to withstand currents ✓/ wave action/ high winds / corrosion

                  -    Generation costs of electricity from ocean energy sources cannot compete with fossil fuel ✓
                  -    which is cheaper ✓   (4)
                                                               (9)

3.2   3.2.1   Longshore drift ✓   (1)

       3.2.2   A - Swash ✓   (1)
                  B - Backwash ✓   (1)

       3.2.3   -   The movement of sediment along the beach ✓
                  -    when prevailing wind blows from the side (obliquely), along the shoreline ✓
                  -    The wind forms oblique swash ✓
                  -    which drives sediment diagonally up the beach ✓
                  -    Gravity moves the backwash water and sediment back to the sea ✓
                  -    The longshore drift movement of sediment <u>travels in a zigzag pattern</u> ✓   **(Mark any 4)**   (4)
                                                                   (7)

3.3   3.3.1   Upper shore ✓   (1)

       3.3.2   - Sand hoppers ✓
                    - Giant pill bugs ✓   (2)

       3.3.3   Predation ✓
                    Competition ✓
                    Feeding habits ✓
                    Habitats (for example humans removing organic content from
                    beaches) ✓
                    Adaptation (animals will be in sand grain size where adapted
                    to be) ✓   **(Mark first 1 only)**   (1)

       3.3.4   (a)   - To avoid predators ✓
                              - that are active during the day✓   (2)

                (b)   -   Protection ✓
                          -   the burrows act as sheltered environments ✓

                          -   Wave action (when tide is high in the day) ✓
                          -   When the frequency of waves is high, the crabs might be
                             washed away ✓   **(Mark factor and description)**   (4)

       3.3.5   -   Organic material is trapped within the sand ✓ and
                    -   broken down by anoxic bacteria ✓
                    -   This releases hydrogen sulphide ✓ beneath the surface
                    -   which is harmful ✓ to the ghost crabs.   (4)
                                                                    (14)

3.4   3.4.1

$$\frac{1000}{6000} \checkmark \text{ x } 100 \checkmark = 16,67 \checkmark \%$$

(3)

3.4.2   -   Act as a gelling agent $\checkmark$ / thickener / stabiliser
        -   in foodstuffs $\checkmark$ such as sauces and ice-cream

        -   They are used in the medical field $\checkmark$
        -   for dental moulds $\checkmark$ / wound dressings / controlled released
            tablets / blood pressure and cholesterol control

        -   They are used in the textile industry $\checkmark$
        -   for the production of dyes $\checkmark$ / adhesives / high quality paper /
            explosives / welding flux / mould release agents
                    (Mark use and explanation. Mark first pair)   **(2)**
                                                                      (5)

3.5   -   Design for a circular economy $\checkmark$
        -   Design products, processes and systems so that the
            materials used can cycle continuously in a circular
            economy $\checkmark$

        -   Avoid extremes of temperature and pressure $\checkmark$
        -   to make it more energy efficient $\checkmark$

        -   Use life-friendly chemistry $\checkmark$
        -   Make use of a safe subset of elements, use water-based
            chemistry, and ensure materials break down into benign
            constituents $\checkmark$ (4)
                    (Mark principle and explanation. Mark first 2 pairs)   **(4)**
                                                                      [39]

                                    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 is clearly planned. One main aspect / idea is 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 the 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 26% to 49% of the content discussed in the essay is irrelevant to the question asked.	Less than 25% of content that the learner addressed is not on the topic asked.
LOGICAL SEQUENCE 2 marks (LSEQ)	Paragraphs show logical sequence and are demonstrably linked to each other.	Generally clear sequence but some facts are 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.
			Synthesis **(10)**

QUESTION 4

INTRODUCTION GUIDELINE

- Incorporates both tourism and aquaculture
- Does not repeat / reproduce wording of the question

CLIMATE (C)
- The area experiences a Mediterranean climate ✓
- with warm, dry summers and winter rainfall ✓ (Need BOTH summer and winter description)
- The ocean keeps the temperatures mild ✓
- Prevailing winds are NW in winter ✓
- Prevailing winds are SE in summer ✓
- The strongest winds occur on mid-summer afternoons ✓
- It receives the least daily variation in temperature of all the coastal regions ✓
- The Köppen–Geiger classification for the region is Csb ✓   Max 6   (6)

COASTAL GEOGRAPHY AND GEOLOGY (G)
- The SW Cape coastline includes estuaries at the mouths of the Olifants, Berg and Breede Rivers ✓
- False Bay is also fed by estuaries (in the form of Sandvlei, Botrivervlei and Hermanus lagoon) ✓
- The SW coastline is made up of wide coastal plains ✓
- The shores include world famous sandy beaches such as Muizenberg ✓
- interspersed with some rocky shores ✓
- There are some exceptions where sheer sandstone and granite cliffs plunge straight into the sea. ✓
- On some beaches large, weathered granite boulders can be seen ✓   Max 6   (6)

EXAMPLES OF AQUACULTURE IN THE AREA (E)
- Abalone farms ✓
- in Hermanus and Gansbaai ✓

- Oysters farms ✓
- farmed in Saldanha Bay ✓

- Wild mussels ✓
- farmed on wave platforms in Saldanha Bay ✓

- Seawater trout ✓
- grown in sea cages in Saldanha Bay ✓   **(Mark first TWO pairs)**   **(**4)

MITIGATION (M)
- As a mitigation measure against eutrophication ✓
- sea cages should be placed where currents can disperse the nutrients ✓
- Some aquaculture farmers have designed multi-layered cages ✓
- The upper layer consists of sea cages containing the fish species ✓
- The lower layer consists of sea pens containing seaweed and bivalves, such as oysters or mussels ✓
- These absorb and clean the waste products that settle down from the cages above ✓
- Oxygen levels are normally maintained by algal photosynthesis ✓
- or aerators ✓
- waste is managed by the water movement through the cage allowing the waste to drop to the seabed ✓   Max 7   (7)

NEGATIVE EFFECT (N)
- Eutrophication of the surrounding water resulting in a decrease in the biodiversity ✓
- Destruction of coastal habitats due to the development of infrastructure ✓
- An increase in nature-based tourism that could cause harm to the environment ✓

POSITIVE EFFECT (P)
- Job creation / strengthen the economy / lower poverty ✓
- can contribute to conservation of species ✓
- increase food security / production of more seafood ✓
                              (Any logical relevant substantiating answer)
                                                                          Max 2   (2)

CONCLUSION GUIDELINE
- Link the suitability of the South West Coast to tourism and aquaculture
- Does not repeat / reproduce wording of the question

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

QUESTION 5

INTRODUCTION GUIDELINE

- Incorporates the history of the South Coast and climate change
- Does not repeat / reproduce wording of the question

HUMAN INDIGENOUS CONTENT (I)
- At <u>Blombos Cave</u> near Stilbaai ✓
- <u>artifacts dated to 77 000 years ago</u> have been discovered ✓
- which include marine shell beads ✓ / engraved ochre / stone tools and bone tools
- Artifacts are decorated with engraved lines and patterns and are <u>some of the oldest human engravings</u> ever found ✓
- They are so significant that the Southern African Archaeological Bulletin (SAAB) has one of these engravings pictured on its journal's cover ✓

- South of Mossel Bay is <u>Pinnacle Point</u> ✓
- where archaeological <u>excavations reveal that</u> <u>Middle Stone Age people</u> ✓
- who lived in the area <u>170 000 to 40 000 years ago</u> ✓
- The cave provides evidence of <u>earliest consumption of shellfish by humans</u> ✓
- Consumption is considered significant to the <u>development of the human brain</u> ✓
- due to the <u>rich content of Omega-3 fatty acids</u> found in all shellfish, especially oysters ✓
- The oldest evidence for the use of heat treatment on rock for ✓
- <u>"manufacturing" stone tools</u> has also been <u>uncovered</u> in this area ✓

- Stone Age tools have been discovered at caves on both of the Knysna Heads ✓

Max 12   (12)

ENERGY BUDGET (B)
- Human industrial activities ✓
- have increased the amount of greenhouse gases in the atmosphere ✓
- the more greenhouse gases ✓
- the greater the degree of heat insulation ✓ and
- the lower the amount of heat reradiated from Earth's atmosphere back out into space ✓
- which will result in higher global temperatures ✓   Max 4   (4)

EFFECTS ON COASTAL REGIONS (E)
- Coastal cities and towns will need to plan for sea level rise ✓
- during spring high tides and when there is a storm surge ✓
- Estuaries and mangroves are vulnerable and likely to be impacted ✓
- The excess of CO_2 being absorbed by the ocean ✓
- decreases its pH and increases ocean acidification ✓
- impacts animals requiring calcium carbonate / aragonite for their development ✓
- Impacts the life cycles of many marine organisms ✓
- such as sex-determination / abandonment of eggs / coral bleaching ✓   Max 7   (7)

CIVIL ENGINEERING ISSUES (C)
- Coastline would be reclaimed by the sea ✓
- Building could be washed away by waves ✓
- Design buildings that are stable ✓
- Structural foundations could be compromised ✓
- Sea water could corrode (concrete structures / metal) ✓
   (Any logical relevant substantiating answer. Open-ended question)
                                                                      Max   (2)

CONCLUSION GUIDELINE
- Link the human content of the South Coast to climate change
- Does not repeat / reproduce wording of the question

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

                                          TOTAL SECTION C: 35
                                          GRAND TOTAL: 150