



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONALE SENIOR SERTIFIKAAT

GRAAD 12

MARIENE WETENSKAPPE V1

NOVEMBER 2023

NASIENRIGLYNE

PUNTE: 150

Hierdie nasienriglyne bestaan uit 17 bladsye.

BEGINSELS MET BETREKKING TOT NASIEN VAN MARIENE WETENSKAPPE

1. **Indien meer inligting as die punttoekenning gegee word**
Hou op nasien nadat die Maximum punte verkry is en trek 'n kronkellyn en dui 'Max' punte in die regterkantse kantlyn aan.
2. **Indien, byvoorbeeld, drie redes vereis en vyf word gegee**
Sien net die eerste drie na, ongeag daarvan of almal of sommige korrek/nie korrek is nie.
3. **Indien die hele proses beskryf word terwyl slegs 'n deel vereis word**
Lees die hele proses gegee en krediteer die relevante dele.
4. **Indien vergelykings vereis, maar beskrywings gegee word**
Aanvaar die beskrywing indien die verskille/ooreenkomste duidelik is.
5. **As geannoteerde diagramme aangebied word in plaas van beskrywings wat vereis word**
Sien die beskrywing na.
6. **Indien vloiediagramme i.p.v. beskrywings aangebied word**
Sien slegs die beskrywing na.
7. **Indien die volgorde van 'n beskrywing vaag is en skakels nie sin maak nie**
Waar volgorde en skakels korrek is, word punte gegee. As 'n logiese volgorde voortgaan, word punte gegee.
8. **Nie-erkende afkortings**
Aanvaar die afkorting indien dit aan begin van antwoord omskryf is. Indien dit nie omskryf is nie, moenie die nie-erkende afkorting krediteer nie, maar krediteer die res van die antwoord indien dit korrek is.
9. **Verkeerd genommer**
Indien die antwoord in die regte volgorde van die vrae pas, maar die verkeerde nommer word gegee, word punte gegee indien die antwoord in die korrekte volgorde is.
10. **Indien die taal wat gebruik word, die bedoelde betekenis verander**
Moenie die antwoord aanvaar nie.
11. **Spelfoute**
Indien 'n woord herkenbaar is (indien dit hardop gelees word), aanvaar die antwoord, met die voorbehoud dat dit nie iets anders in die terminologie van Mariene Wetenskappe beteken nie of as dit buite konteks is.
12. **In AFDELING A, aanvaar en krediteer slegs die korrekte letter.**
13. **Wees sensitief vir die betekenis van 'n antwoord, wat op 'n ander manier aangebied kan word.**
14. **Opskrif**
Alle illustrasies (bv. diagramme, grafieke en tabelle) moet 'n opskrif hê wat boaan of onderaan geskryf staan.

15. Vermenging van amptelike tale (terme/konsepte)

'n Term of konsep in enige amptelike taal anders as die leerder se assesseringstaal waarin sy/haar antwoorde aangebied word, moet gekrediteer word, indien dit korrek is. 'n Nasiener wat in die inhoud van Mariene Wetenskappe en die amptelike taal vaardig is, behoort geraadpleeg te word. Dit geld vir alle amptelike tale.

16. Veranderinge aan die nasienriglyne

Geen veranderinge mag aan die nasienriglyne aangebring word nie. Die provinsiale interne moderator behoort geraadpleeg te word, wat met die nasionale interne moderator moet beraadslaag (en die Umalusi moderator).

17. Amptelike nasienriglyne

Slegs nasienriglyne wat die handtekening van die nasionale interne moderator en Umalusi-moderatore bevat en deur die Nasionale Departement van Basiese Onderwys via die provinsies versprei word, mag gebruik word.

AFDELING A**VRAAG 1**

1.1	1.1.1	B ✓✓		
	1.1.2	C ✓✓		
	1.1.3	D ✓✓		
	1.1.4	A ✓✓		
	1.1.5	D ✓✓		
	1.1.6	B ✓✓		
	1.1.7	D ✓✓		
	1.1.8	C ✓✓		
	1.1.9	D ✓✓		
	1.1.10	C ✓✓		
			(10 x 2)	(20)
1.2	1.2.1	Culture media ✓		
	1.2.2	Hatcheries ✓		
	1.2.3	Albedo ✓		
	1.2.4	Interglacial ✓ periods		
	1.2.5	Calcifiers ✓		
	1.2.6	Zenolith ✓		
	1.2.7	Ekman transport ✓/Ekman spiral		
	1.2.8	Spit ✓		
	1.2.9	Headland ✓		
	1.2.10	Eddies ✓		
			(10 x 1)	(10)
1.3	1.3.1	Both A and B ✓✓		
	1.3.2	A only ✓✓		
	1.3.3	None ✓✓		
	1.3.4	B only ✓✓		
	1.3.5	None ✓✓		
				(10)
				[40]

TOTAAL AFDELING A: 40

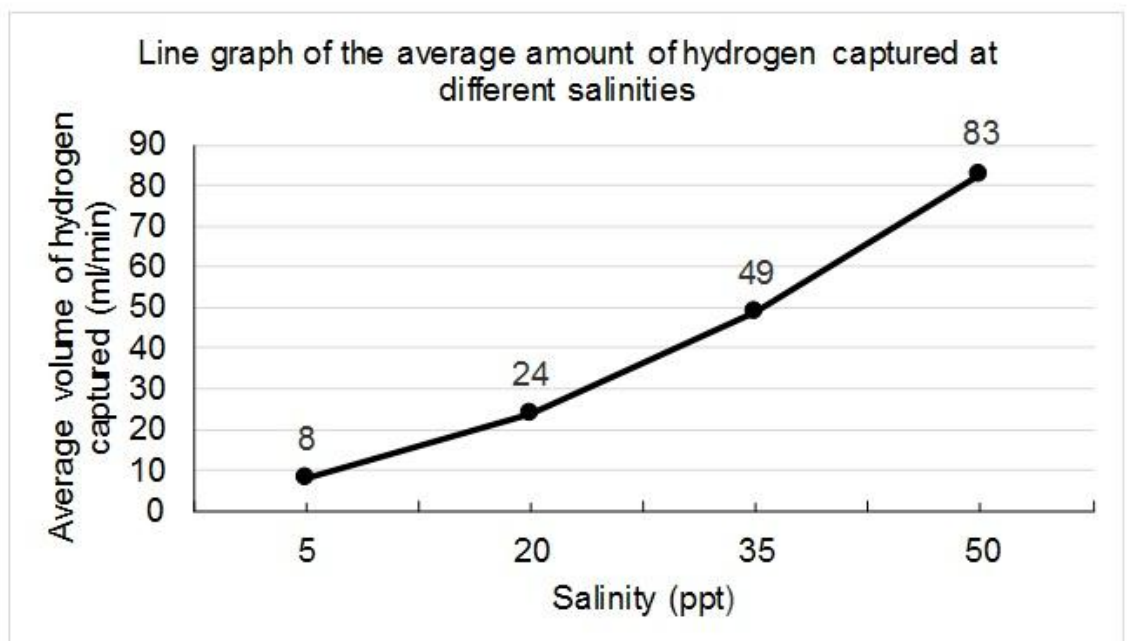
AFDELING B

VRAAG 2

- 2.1 2.1.1 Average volume of hydrogen captured ✓ (1)
- 2.1.2 As the salinity increased the (average) volume of hydrogen production / captured increased.

Both variables present 1 mark ✓
 Direction of prediction 1 mark ✓
 Direction of prediction might vary as it is a hypothesis (2)

2.1.3



MARKING GUIDELINES	
CRITERIA	MARK ALLOCATED
Appropriately descriptive heading, above or below the graph (H)	½
Heading is appropriately descriptive (needs to have both variables: salinity and average volume of hydrogen captured) (V)	½
Type of graph. Line graph (T)	½
X-axis variable correct (I)	½
Y-axis variable correct (D)	½
X-axis label correct (XL)	½
Y-axis label correct (YL)	½
X-axis scale (XS)	½
Y-axis scale (YS)	½
Origin of line (O)	½
Plotting: for each correct plot (P)	4 x ½

(7)

2.1.4 An increase in salinity ✓ will lead to a greater / higher / increased amount of hydrogen being produced ✓ / captured. (2)

2.1.5

- A water molecule is composed of two hydrogen atoms and one oxygen atom. ✓
- The atoms are covalently bonded ✓ / hydrogen atoms shares its electrons with oxygen
- Forms a dipole ✓ / polar molecule / bipolar
- with the oxygen side being slightly / partially negative and hydrogen side being slightly positive. ✓
- Resulting in a bent (-shaped) molecule ✓
- Hydrogen and oxygen bond at an angle of 105° ✓

(Mark any 4) (4)

2.1.6

- More hydrogen produced with sea water than fresh water ✓
- Sea water is abundant (about 70 % of earth is covered by sea water) ✓
- Depletion of fossil fuels and a need to seek alternative energy sources ✓
- Cleaner sources of energy are being sought and the ocean provides opportunities for renewable energy sources ✓

(Accept any other logical relevant answer) (1)

2.1.7 **If answer is YES**

- It is a cleaner source of energy ✓
- Less greenhouse gasses will be released into the atmosphere ✓

If answer is NO

- When electricity is used to produce energy, it is counter productive ✓
- Salinity of sea water can be influenced by electrolysis ✓
- Using fossil fuels is detrimental to the planet as more carbon dioxide is released resulting in increased global warming ✓ / climate change
- Hydrogen is not a pollutant ✓

(Opinion and reasoning correlate 1 mark)

(Reasoning mark first 2)

(3)
(20)

2.2 2.2.1 Spilling ✓ wave (1)

2.2.2 The photograph ✓ / satellite image indicates a set of spilling waves illustrated by the large amounts of foam. ✓

OR

The area has a gradual gradient ✓ resulting in waves moving slower towards the shore and spilling ✓ over themselves.

(Mark first answer) (2)

- 2.2.3
- (As a wave approaches the shore)
 - the bottom part of the wave will be in contact with the sea floor ✓
 - resulting in friction ✓ / refraction occurring
 - which slows the wave down and decreases the wavelength. ✓

(Mark any 2) (2)

2.2.4 (a) Rip current ✓ (1)

- (b)
- Waves accumulating on the shore ✓
 - Results in water circulating around the surf zone (due to sand bars forming a channel) to areas where fewer waves break. ✓
 - The water then returns out to sea, beyond the surf zone, ✓
 - in a series of eddies ✓
 - following the channel of least resistance. ✓

(Mark any 4) (4)

- (c) **YES** ✓*
- Students can practise safe surfing rules. ✓
 - Waves are not very big. ✓
 - Easier to reach the surf backline / rip currents take one beyond the breakers. ✓

OR

NO ✓*

- The water moving outward / seaward can sweep surfers / snorkelers out to sea. ✓
- No surfable waves. ✓
- At **B** the water will have a lot of sediment in it resulting in visibility not being good. ✓

(Compulsory mark ✓* and accept any other logical relevant answer) (2)

2.2.5 $P_1 = 1 \text{ bar}$
 $V_1 = 500 \text{ ml} / 0.5 \text{ l}$

$P_2 = 2.1 \text{ bar}$
 $V_2 = X$

$P_1V_1 = P_2V_2 \checkmark$ **OR** $\frac{P_1V_1}{T_1} = \frac{P_1V_2}{T_2}$ **OR** $V_2 = \frac{P_1V_1}{P_2}$

$= \frac{(1 \text{ bar})(500 \text{ ml OR } 0.5 \text{ l})}{(2.1 \text{ bar})}$ (\checkmark substitution)

$= 238,10 \text{ ml OR } 0.24 \text{ l}$ (\checkmark for correct answer and \checkmark unit) (4)

- 2.2.6 (a) - Nitrogen build-up in the tissue \checkmark
 - Nitrogen will not have enough time to diffuse out of the tissue \checkmark
 - resulting in the development of bubbles in the tissue that collects at joints \checkmark
 - causing severe pain \checkmark
 - and they bend over (due to pain) \checkmark
 - This is also called decompression sickness. \checkmark

(Mark any 3) (3)

- (b) - When less-experienced divers dive too deep for too long they may not allow enough time to slowly resurface \checkmark / do not allow time for decompression stops as they swim up to the surface.
 - Less-experienced divers have a tendency to ascend rapidly \checkmark

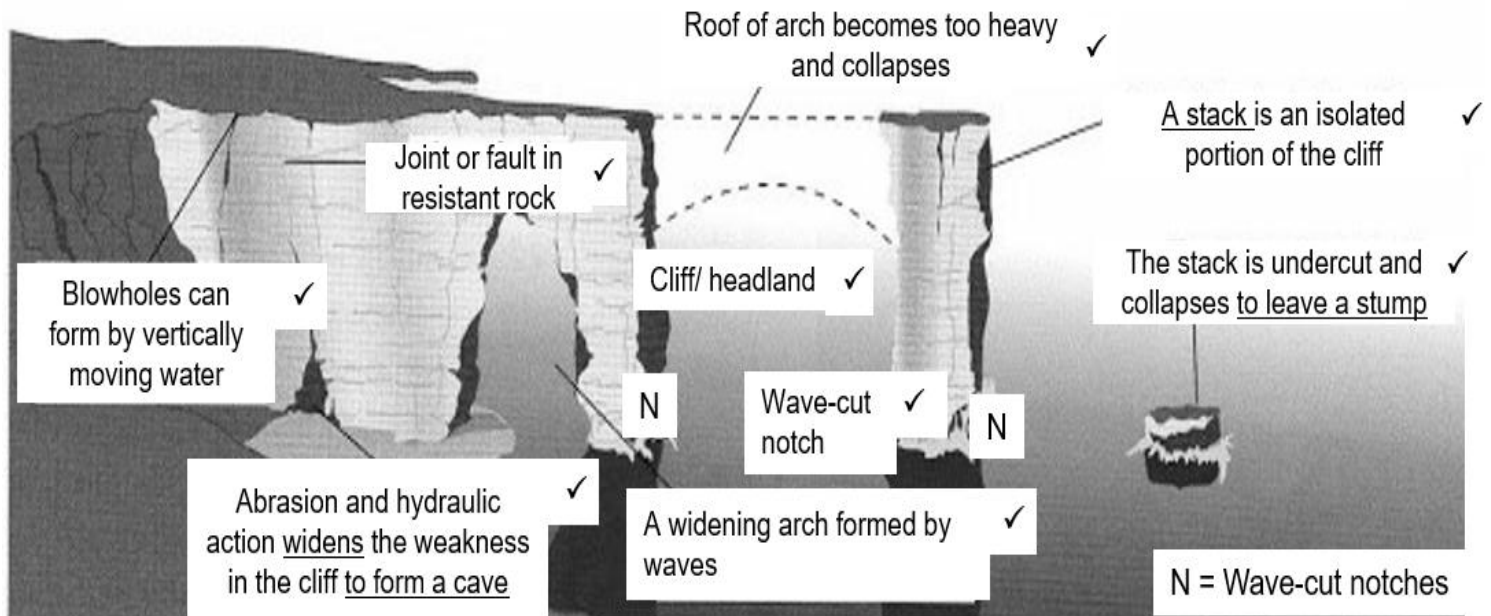
(Accept any other logical relevant answer) (1)
(20)
[40]

VRAAG 3

- 3.1 3.1.1 - Abundance of sediment ✓
 - Onshore wind ✓
 - Low-lying area to which sediment can be blown ✓
 - Enough time for the beach sand to dry between tides ✓
 - Obstacles promote accumulation of sand to form a dune ✓
(Mark first 2) (2)
- 3.1.2 (a) **1. Surface creep ✓***
 - the movement of sand along the ground ✓
- 2. Suspension ✓***
 - the movement of sand that is light enough to float in the air ✓
- 3. Saltation ✓***
 - a process that lifts the particles a short distance into the air before gravity forces them down. ✓
- 4. Longshore drift ✓***
 - The movement of sediment due to the dominant / prevailing winds ✓
(Compulsory mark ✓* and description) (2 x 2) (4)
- (b) - Sand will be blown away / washed away / going onto the road (movement of the sand) ✓
 - Therefore, dunes will not form ✓ / sand on road / damage infrastructure
- (Movement of the sand 1 mark)
 (Impact of sand movement 1 mark) (2)**
- 3.1.3 (a) Soft engineering ✓ (1)
- (b) - Reinstating dune profile with bulldozing ✓
 - Wind nets ✓
 - (dune-specific) plants / vegetation ✓
(Mark any 2) (2)
- 3.1.4 **If answer is GOOD**
 - It will allow the buildings / human built features to be protected from deteriorating ✓
- If answer is POOR**
 - Humans should not interfere with nature as it might result in disturbing the ecological balance ✓
- Answer and reason correlating 1 mark ✓
 (Open-ended. Mark relevant reasoning 1 mark) (2)
 (13)**

3.2

The step-wise process whereby a cliff is eroded to a stump/ step-wise erosion of cliffs



MARKING GUIDELINES		
CRITERIA	ELABORATION	MARK ALLOCATION
Correct drawing (D)	All features present	1
Suitable heading (H)	Descriptive heading	1
Drawing Technique (T)	Drawing in pencil	½
	Drawing neat	½
Annotations (A)	Mark any 5	5
Annotations linked (L)	Annotations linked to corresponding structure / Key system used	1
Process direction (D)	Directional flow easy to follow	1

(10)

- 3.3 3.3.1 (a) - Walker circulation ✓ / cell (1)
- (b) - Warm moist air rises ✓
 - on the western side of the Pacific Ocean basin ✓ and
 - cooler drier air sinks ✓
 - on the eastern side of the Pacific ✓
- (Mark any 2)** (2)
- 3.3.2 **1.The SE trade winds weaken ✓***
 - pushing cooler surface water towards the western Pacific ✓
 - and causing less / weakened upwelling at the South American coast. ✓
- 2.Warmer surface waters ✓***
 - Lower amounts of cold water upwelled / moving to the surface ✓
 - Less upwelling. ✓
- 3.Lower amount of nutrients available ✓***
 - Less upwelling ✓
 - Less transport of nutrients ✓
- 4.Overlying low pressure storm (LPS) system over the South American coast ✓***
 - as a result of the surges of warmer water ✓
 - Reducing the temperature difference across the Pacific ✓
- (Mark condition ✓* and 2 descriptions. Mark first 2)** (6)
- 3.3.3 (a) Water temperature will decrease ✓ (1)
- (b) - Increase in rainfall ✓ / wetter climate
 - Colder environment ✓ / decrease in temperature (2)
- (12)**
[35]

TOTAAL AFDELING B: 75

AFDELING 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>

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<p>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>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)

VRAAG 4

INTRODUCTION GUIDELINE

- Refers to renewable energy / tidal energy / smart cities
- Does not repeat / reproduce wording of the question

TIDAL ENERGY (T)

- Harvesting of tidal flows is only effective if there is an average tidal difference greater than 5 m ✓
- South Africa has a tidal range of 1.8 m ✓ / approximately 2 m at spring tide
- therefore, only using tides is not going to work ✓ / be effective
- The dam needs to trap the water at high tide and then trap the incoming water at low tide ✓
- The volume of the water flow is increased ✓
- resulting in a greater generating force ✓ / more energy extraction
- And therefore more cost effective ✓

Max (4)

HARVESTING: SALINITY GRADIENT POWER (S) ✓*

- This is generation of electricity using the natural difference between high and low water salinity. ✓
- At the mouth of the river there is discharging fresh river water ✓
- and deep saline ocean water ✓
- The two concentrations of water are separated by a semi-permeable membrane ✓ in the generator
- Sea water is pumped into a pressure chamber ✓
- where the salinity pressure is greater than in the fresh water chamber. ✓
- As a result of the osmotic pressure difference between the two solutions, ✓
- fresh water molecules diffuse through the membrane and dilute the sea water solution, increasing its volume. ✓
- Pressure is then reduced by the release of brackish water from the chamber through a turbine, ✓
- causing the turbine to spin ✓

1 ✓* compulsory + minimum 2

HARVESTING: WIND (W) ✓*

- The strong winds that are associated with parts of the coast ✓ / some areas are ideal for driving wind turbines ✓
- In order for the system to be cost effective the winds have to be consistent ✓
- The winds turn the (propeller) blades ✓
- which turns the generator. ✓
- The blades are made of lightweight ✓ / sturdy materials
- Wind is the most effective renewable producer of electricity associated with the ocean ✓
- The gearing needs to slow the blades, to prevent bird kills ✓

1 ✓* compulsory + minimum 2

Max (13)

ACT (A)

- Managing our electricity supply ✓ / electricity footprint
- Lobbying politicians to include environmental costs ✓ in their decisions
- Stop tax relief ✓ for industries whose practices have long-term harmful environmental impact (such as coal fired power stations)
- (Urgently) develop renewable electricity generation equipment ✓ / fund research
- Putting more effort into making renewable energy sources cheaper ✓ / making it more affordable for the general public / provide tax incentives
- Using the real costs of fossil fuel ✓ / include environmental impact when making comparisons between renewable energy generators and generation from coal, oil, gas or nuclear
- Electricity generation needs to operate efficiently (work properly) ✓ / generate enough electricity / connect reliably to the national electricity grid

(Accept any other logical relevant answer)

Max (6)

PRIVATE INVESTMENT (I)

Learner receives a mark for stating for or against private investment, only if substantiated.

FOR PRIVATE INVESTMENT

- The costs are too great for government to bare on its own ✓
- The city will get built faster ✓
- International collaboration ✓ / exchange in international expertise of new technology or knowledge
- More job opportunities ✓

AGAINST PRIVATE INVESTMENT

- Corruption / bribery might take place ✓
- Corporations will have control over the smart city ✓
- Only the rich will benefit from the smart city ✓
- More foreigners will benefit from opportunities offered by international businesses rather than local businesses ✓

(Any logical relevant substantiating answer)

Max (2)

CONCLUSION GUIDELINE

- Discusses the need for renewable energy in smart cities
- Does not repeat / reproduce wording of the question

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

VRAAG 5**INTRODUCTION GUIDELINE**

- Refers to aquaculture / poverty alleviation / food security in the town/
reference to the town
- Does not repeat / reproduce wording of the question

AQUACULTURE (A)

- Aquaculture is the farming of fresh water and salt water organisms ✓
- in controlled or semi-controlled environments ✓
- called holding systems ✓
- The farmers manage the breeding ✓ / rearing / feeding / growing / harvesting of the organisms
- Through controlling the life cycles ✓
- and managing the nutrients ✓ / water quality (temperature / pH / salinity)

Max (4)

SOCIO-ECONOMIC PRINCIPLES (P)**1. Improve nutrition ✓***

- Especially in rural areas where poverty / malnutrition are relatively common ✓
- In under-resourced regions ✓
- aquaculture produces the main source of protein to address malnutrition ✓
- The nutritious value of seafood is that it is rich in Vitamins A, B and D as well as Omega-3 fatty acids ✓
- Fish is rich in minerals ✓ (such as Calcium / Phosphorus / Iron / Zinc / Iodine / Magnesium / Selenium / Potassium)
- all important for a balanced diet ✓

(1 ✓* compulsory + minimum 3)**2. Increase employment ✓***

- The aquaculture industry has the potential to provide employment / income for residents, ✓
- Employment opportunities such as farmers ✓ / labourers / management / transport / processing / sales (an example of a job opportunity)
- as food for the growing human population is always in demand. ✓
- The town's residents can get shares in the aquaculture facility ✓
- Adjacent residents can also benefit (income or employment opportunities) ✓
- For example materials needed for construction and maintenance of the infrastructure. ✓
- This is particularly applicable in rural areas ✓
- where it is less expensive to rent land to house aquaculture and processing facilities. ✓

(1 ✓* compulsory + minimum 3)

Max (12)

IMPACT ON FISH STOCK (I)

- Inbreeding ✓
- could impact the genetic integrity ✓ / genetic stock of species.
- This could seriously compromise the wild stock if such individuals were to escape into the wild. ✓
- Which would result in some progeny with deformed body structures ✓
- and compromised resistance to disease. ✓
- Removal of large numbers of fertile species to use as broodstock ✓
- could lead to a reduction in the wild seedstock ✓
- Carnivorous fish require high volumes of feed ✓
- this can lead to increased harvesting of wild-caught small fish to feed the larger fish ✓ / increase the costs of the production
- Releasing alien invasive species ✓ / their fertilised eggs, into the wild
- could significantly impact the biodiversity of a natural stock ✓ / outcompete indigenous species.
- Overstocking brings a higher chance of disease, ✓
- which could spread to wild stocks ✓

Max (7)

OPINION (O)

Learner receives a mark for agreeing with the statement, only if substantiated.

AGREE

- There would be more food available ✓
- and therefore more access to this food ✓

DISAGREE

- Companies need to make profit resulting the products being expensive ✓ / not affordable to the town
- Most of the products would be exported ✓

(Any logical relevant substantiating answer)

Max (2)

CONCLUSION GUIDELINE

IF YES

- It will ensure economic stability ✓
- The town will have food security ✓ / nutrition

IF NO

- It will have a negative impact on the already strained fisheries ✓
- The town will not receive the food ✓

(Any logical relevant substantiating answer)

Max (2)

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

TOTAAL AFDELING C: 35
GROOTTOTAAL: 150