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3

91426



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Level 3 Geography 2022

91426 Demonstrate understanding of how interacting natural processes shape a New Zealand geographic environment

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of how interacting natural processes shape a New Zealand geographic environment.	Demonstrate in-depth understanding of how interacting natural processes shape a New Zealand geographic environment.	Demonstrate comprehensive understanding of how interacting natural processes shape a New Zealand geographic environment.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

Check that this booklet has pages 2–8 in the correct order and that none of these pages is blank.

Do not write in any cross-hatched area (XXXX). This area may be cut off when the booklet is marked.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

Excellence

TOTAL

08

ASSESSOR'S USE ONLY

INSTRUCTIONS

Identify a **New Zealand geographic environment** and the **interacting natural processes** that shape it, in the space below.

New Zealand geographic environment: South Muriwai Coastal

Environment (SMCE)

Interacting natural processes that shape this environment: Wave Deposition.

Aeolian Transportation, Vegetation Growth.

You may use the space below to plan your response. Begin your answer on page 3.

PLANNING

500m N of Headland

Less than 500m N

Dune height 4-6m

upto 10m

gradient ~~20°~~

45°

Spinifex

Marram = up to 300m

2000 km fetch

58% SW onshore tidal

42% winds exceed 16 km/h (minimum fluid threshold velocity.)

How do wave deposition, aeolian transportation and vegetation growth interact to create variation between dunes ~~at~~ 500m N of headland and less than 500m of headland

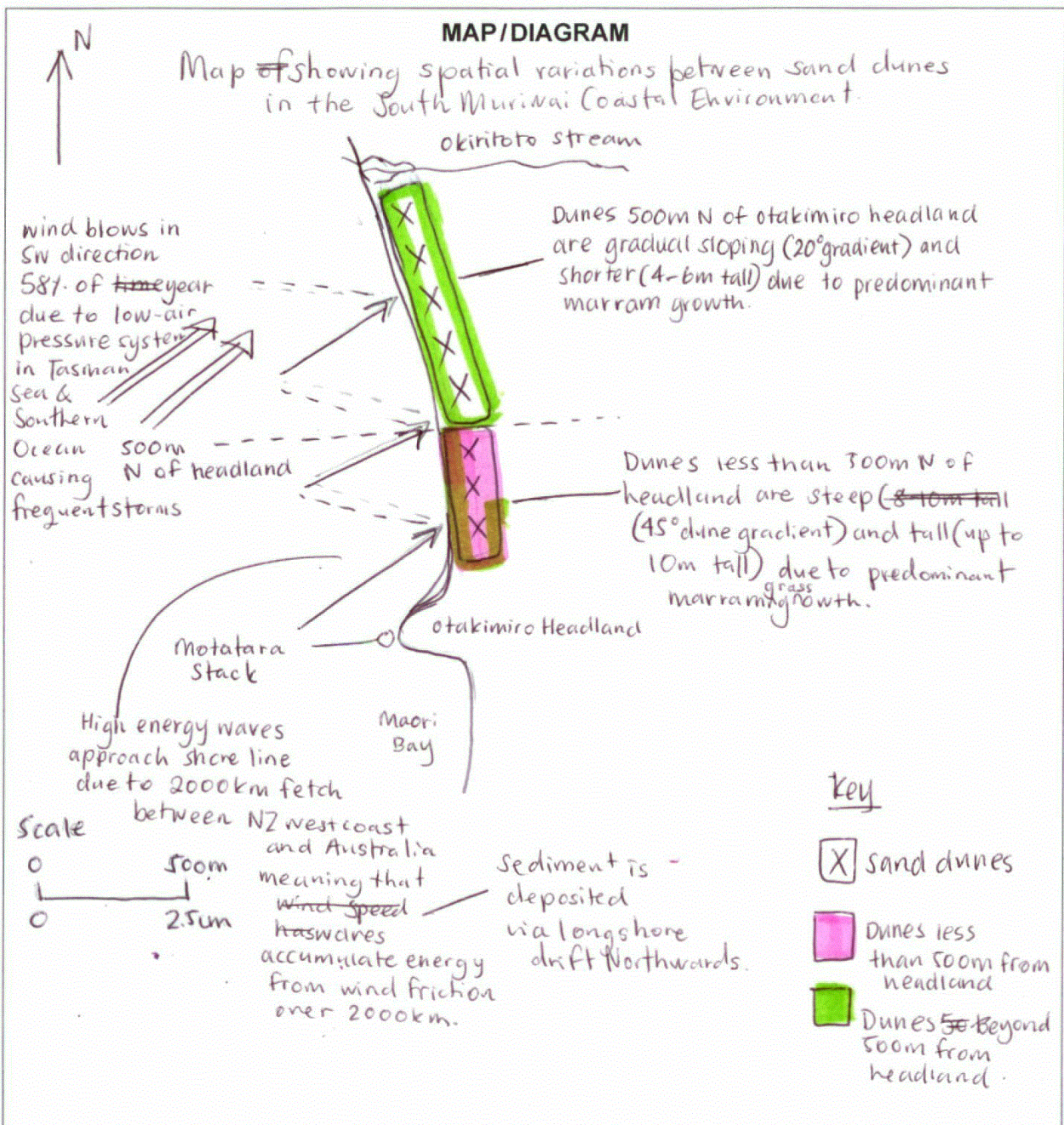
QUESTION

Analyse how different processes operate and interact to create spatial variations in your chosen geographic environment.

Your analysis should include:

- what the spatial variations are in your geographic environment
- why different processes operate in different places in the environment — dif in characteristics
- how the interactions cause spatial variations in features, elements, or processes — dunes
- integrated comprehensive supporting case study evidence.

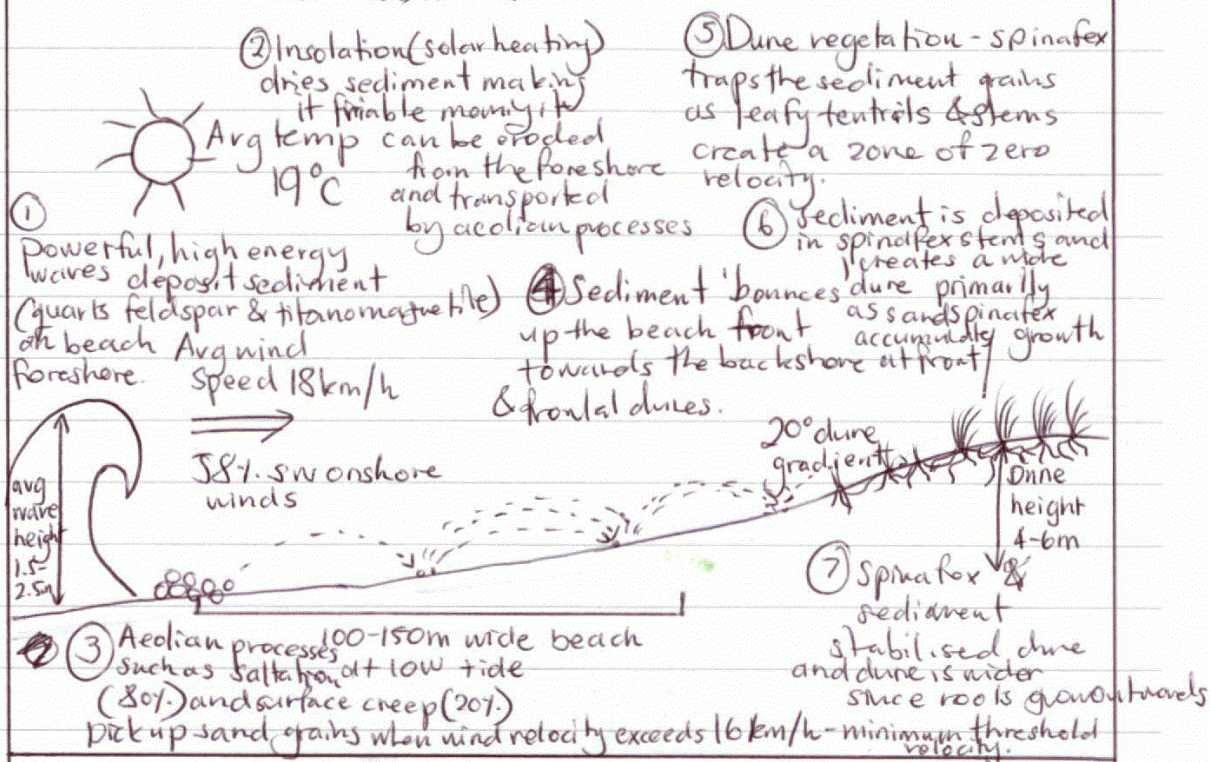
Use the space below to construct a map or diagram to support your written response. You may also include additional diagrams and maps in your response.



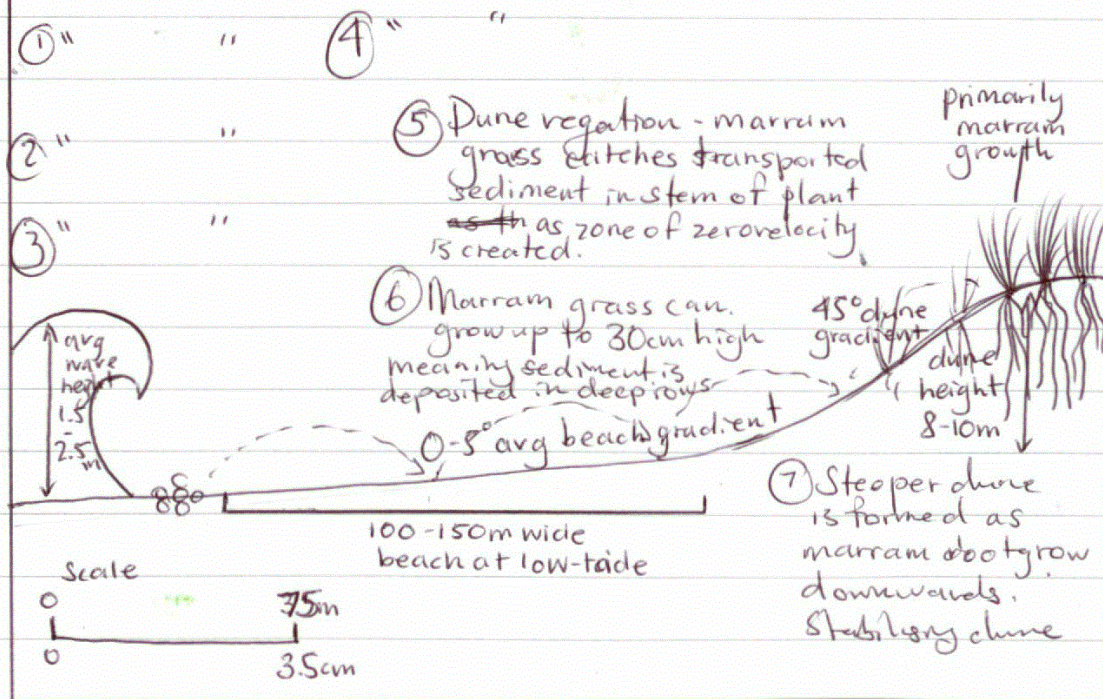
4
variations between

Cross Sections showing the process of dune formation at South Muriwai Coastal Environment

cross section showing dunes less than 500m away from Otakamiro Headland, ~~how dune~~



cross section of dunes ~~less~~ more than 500m away from Otakamiro Headland.



Interachy

The ^{of} processes of wave deposition, aeolian ~~pr~~transportation and vegetation growth are 3 processes ~~interact~~ ^{interact} operating in the South Muriwai Coastal Environment ^{to create spatial} variations between sand dunes 500m N of Otakamiro Headland and less than 500m ~~to~~ north of the headland.

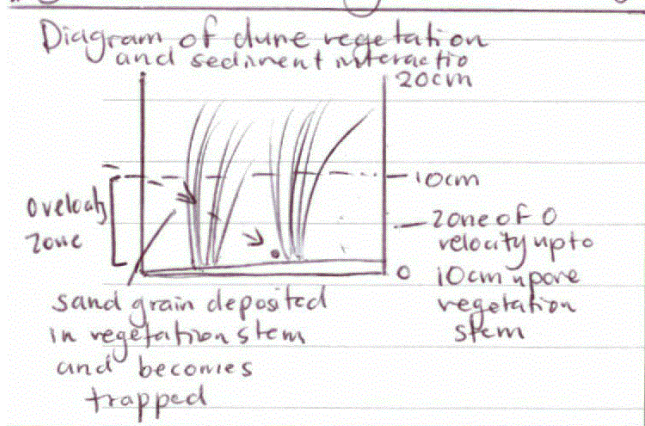
The South Muriwai Coastal Environment (SMCE) is located 40km NW of Auckland CBD, on the west coast of the North Island. The SMCE ^{extends 2.5km south from Okiritoto stream to Maori Bay cliffs.} is a high energy coastline, this is ~~targetly~~ due to the 2000km fetch between the NZ west coast and Australia. ~~as~~ Frequent storms in the Tasman Sea and Southern Ocean caused by low air-pressure systems create high velocity winds which blow ~~along~~ in a SW direction. ~~causing~~ ^{Frictional drag of} the winds and the sea form high energy waves as they accumulate energy over the 2000km fetch. forming plunging, ^{destructive} waves (around 300,000 joules m³ avg).

~~These waves transport sediment~~

These waves ~~de~~ transport and deposit sediment on the foreshore of Muriwai Beach. Once sediment has been deposited on the foreshore Insolation (solar heating) evaporates moisture from the sediment, making it drier and friable. ~~meaning that it can easily be~~ ^{Since Muriwai} This process occurs at a ~~fast~~ rate at low tide as 100-150m of beachfront is exposed meaning more sediment can be dried and become friable. Once sediment becomes friable, it can easily be transported by aeolian processes such as saltation (occurs ^{around} 80% of year) or surface creep (occurs 20% of year) when wind velocity exceeds the fluid threshold velocity.

16 km/h. At Marirai onshore winds ~~above~~ exceed 16 km/h 42% of the time, meaning that aeolian processes can operate. Friable sediment is eroded from the foreshore and picked up by wind turbulence. The sand grains are transported up the beach face as they are suspended in the air for a short period, when they return to the ground by gravity they ~~can~~ bounce other sand grains up and ~~the~~ they are picked up by wind - this chain reaction occurs until sand grains meet an area of 0 velocity or wind velocity drops below 16 km/h. Sediment is transported up the beach front towards the backshore & frontal dunes. Dune vegetation on the frontal dunes trap

diagram
#3



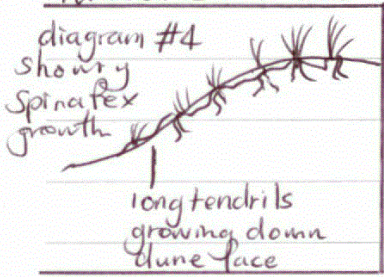
vegetation disrupts wind velocity creating a zone of 0 velocity ~~below~~ up to 10cm above the plant stem. This causes sediment to be deposited in the dune vegetation. Stabilising and growing the dune.

The process of vegetation growth causes spatial variations at the sand dunes in the SMET. ~~as~~ This is because ~~spin 2 different~~ there is different species of dune vegetation growing at each

The process of dune formation operates differently at 500m N of Otakamiro Headland and less than 500m N of headland due to the different species of vegetation growth at these dune sites.

Beyond 500m^N of the headland, the dunes have primarily spinifex growth. Whereas less than 500m N of headland, the dunes have primarily marram growth. This causes significant ^{spatial} differences in the height and gradient of these dunes.

Spinifex is a native dune vegetation that is found ^{on the dunes} along many ~~NZ coastlines~~ ^{500m N of headland}. Spinifex plants have long tendrils that grow along the surface of the dune, down the face of the frontal dunes - this causes the dunes to be more gradual sloped & wide. Since the spinifex tendrils grow outwards and send out leafy runners, sediment is accumulated in the vegetation at the front of the dune ~~by aeolia~~ ^{when aeolian transportation occurs}. Spinifex ^{is a "sand-binder"} ~~binds sand~~ meaning that deposited sediment is accumulated in the roots of the plant which gradually builds up the dunes and stabilised them - making them less prone to erosion and wave undercutting during winter. Predominant Spinifex growth on the dunes 500m N of headland are a main reason for the variation between the dunes as these dunes are significantly shorter ^(4-6m) and wider ^(20° gradient) than the dunes closer to the headland.



Marram grass is a European introduced dune vegetation found on the dunes less than 500m away from Otakimiro Headland. ~~Marram grass~~ Opposed to spinifex that grows outwards, down the ^{frontal} dune; Marram grass roots grow downwards (up to 5m) creating a steeper ~~statter~~ dune (45° dune gradient) and taller (8-10m dune height) dune. ~~Since~~ Marram grass grows up to 30cm in height, this means sediment transported via aeolian processes can

Extra space if required.
Write the question number(s) if applicable.

QUESTION
NUMBER

91426

be easily caught in the stems of the grass - trapping more sediment. opposed to spinatex which is a "ground-hugging" plant dune vegetation. Marram grass binds sand in its roots by trapping sand, this creates a steep dune as sediment accumulates in the roots in a downwards direction. These taller dunes are also more more to more erosion (undercutting & blow-outs) as ~~they~~ the steep dunes ~~have~~ don't have ~~a~~ sprawling roots holding them together. Marram grass ~~is~~ predominantly grows on the dunes closer to the headland as well as other more complex vegetation such as pohutukawa trees - this also creates steeper dunes ~~at~~ compared to 500m N where spinatex is primary vegetation.

The differences in dune vegetation growth processes is a key factor in spatial variations between dune characteristics found ~~at~~ 500m N of headland and less than 500m N of headland (closer). Processes such as wave deposition and aeolian transportation also interact with these ~~processes~~ process of vegetation growth to form ^{the} machines, but arguably vegetation growth is the main ~~at~~ process that causes the variation in the dunes at SMCE.

Excellence Exemplar 2022

Subject	Geography	Standard	91426	Total score	08
Q	Grade score	Annotation			
1	E8	Candidate has drawn excellent diagrams that are clearly annotated with comprehensive supporting case study evidence. Answer clearly shows insight that interacting processes operate to form different features creating distinct spatial variations within the chosen geographical environment.			