See back cover for an English translation of this cover

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90938M

909385

SUPERVISOR'S USE ONLY

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Ahupūngao, Kaupae 1, 2014

90938M Te whakaatu māramatanga ki ētahi āhuatanga o te ngaru

2.00 i te ahiahi Rātū 25 Whiringa-ā-rangi 2014
Whiwhinga: Whā

Paetae	Kaiaka	Kairangi
Te whakaatu māramatanga ki ētahi āhuatanga o te ngaru.	Te whakaatu māramatanga hōhonu ki ētahi āhuatanga o te ngaru.	Te whakaatu māramatanga matawhānui ki ētahi āhuatanga o te ngaru.

Tirohia mehemea e ōrite ana te Tau Ākonga ā-Motu (NSN) kei tō pepa whakauru ki te tau kei runga ake nei.

Me whakautu e koe ngā pātai KATOA kei roto i te pukapuka nei.

Tirohia mēnā kei a koe te Rau Rauemi L1–PHYSMR.

Ki roto i ō whakautu, whakamahia ngā whiriwhiringa tohutau mārama, ngā kupu, ngā hoahoa hoki / rānei ki hea hiahiatia ai.

Me hoatu te wae tika o te Pūnaha o te Ao (SI) ki ngā whakautu tohutau.

Ki te hiahia koe ki ētahi atu wāhi hei tuhituhi whakautu, whakamahia te (ngā) whārangi kei muri i te pukapuka nei, ka āta tohu ai i ngā tau pātai.

Tirohia mehemea kei roto nei ngā whārangi 2–23 e raupapa tika ana, ā, kāore hoki he whārangi wātea.

HOATU TE PUKAPUKA NEI KI TE KAIWHAKAHAERE HEI TE MUTUNGA O TE WHAKAMĀTAUTAU.

TAPEKE

MĀ TE KAIMĀKA ANAKE

PĀTAI TUATAHI: RANGAHAU AROWHENUA

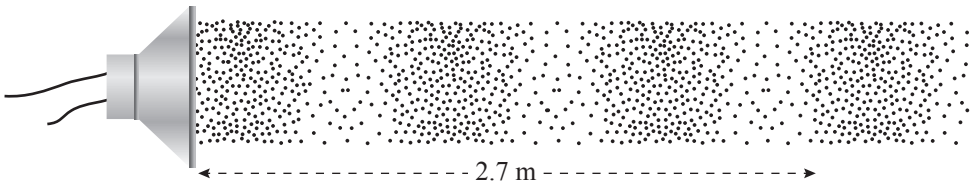
MĀ TE KAIMĀKA ANAKE

Ka puta he ngaru oro i tētahi tukuoro.

(a) (i) Whakaahuatia he aha te ngaru.

(ii) Mā te whakamahi i tētahi ariā ahupūngao, whakaahuahia te mahi a te ngaru.

(b) Ina puta i te tukuoro tētahi tūmomo auau o te oro, ka puta i ngā korakora hau i mua o te tukuoro tētahi tauira e ai ki tērā e whakaaturia ana i te hoahoa i raro.



(i) Ki te hoahoa i runga, tātuhia he pere hei whakaatu i te ahunga o te nekenga o tētahi korakora hau e pā ana ki te oro ka puta i te tukuoro.

(ii) Mai i ngā kōrero i tukuna e te hoahoa, tātaihia te roangaru o te ngaru oro kei te hau ka puta i te tukuoro.

Roangaru = _____

QUESTION ONE: GEOLOGICAL SURVEY

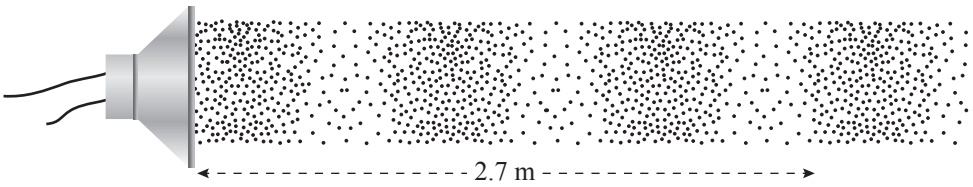
ASSESSOR'S USE ONLY

A speaker produces a sound wave.

(a) (i) Describe what a wave is.

(ii) Using a physics idea, describe the function of a wave.

(b) When a speaker produces a particular frequency of sound, the air particles in front of the speaker produce a pattern as shown in the diagram below.

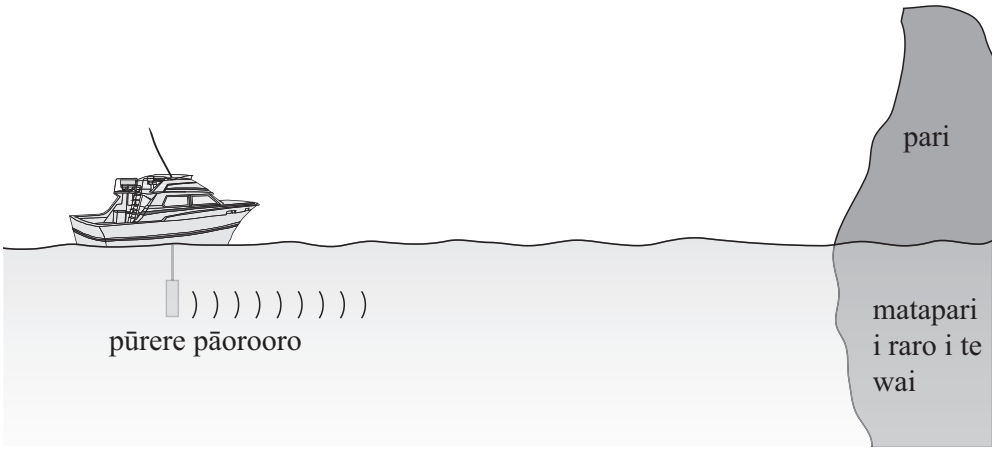


(i) On the diagram above, draw arrow(s) to show the direction of movement of an air particle associated with the sound produced by the speaker.

(ii) From the information given in the diagram, calculate the wavelength of the sound wave in air produced by the speaker.

Wavelength = _____

Ka whakatūhia e tētahi mātanga pūtaiao he pūrere pāorooro hei rangahau i te wai tūtata ki tētahi pari. Kei raro tētahi wāhanga o te pari i te wai, e ai ki te hoahoa. Ka tukuna e te tukupāho i roto i te pūrere pāorooro tētahi tōiriiri ki te matapari kei raro i te wai. Ka rongo te pūhopu i roto i te pūrere pāorooro i te tōiriiri e whakaatahia ana mai i te matapari i raro i te wai i ngā hēkona 0.54 i muri mai. Ko te auau o te tōiriiri pāorooro he 10 kHz, ā, ko tōna roangaru he 0.153 m.

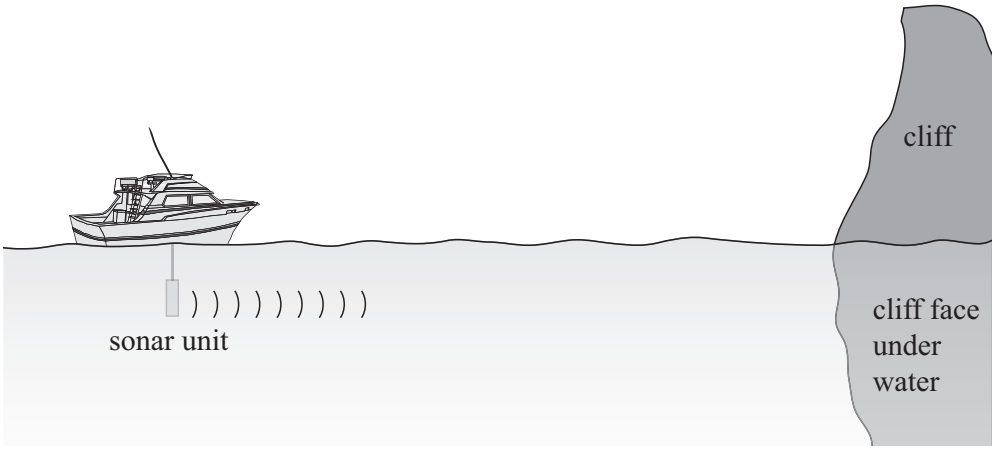


(c) Tātaihia te tawhiti i waenga i te tukupāho pāorooro me te matapari i raro i te wai.

Tawhiti = _____

ASSESSOR'S USE ONLY

A scientist sets up a sonar unit to survey the water near a cliff. Part of the cliff face is submerged in water, as shown in the diagram. The transmitter in the sonar unit sends a pulse towards the submerged cliff face. The receiver in the sonar unit picks up the reflected pulse from the submerged cliff face 0.54 s later. The frequency of the sonar pulse is 10 kHz and its wavelength is 0.153 m.



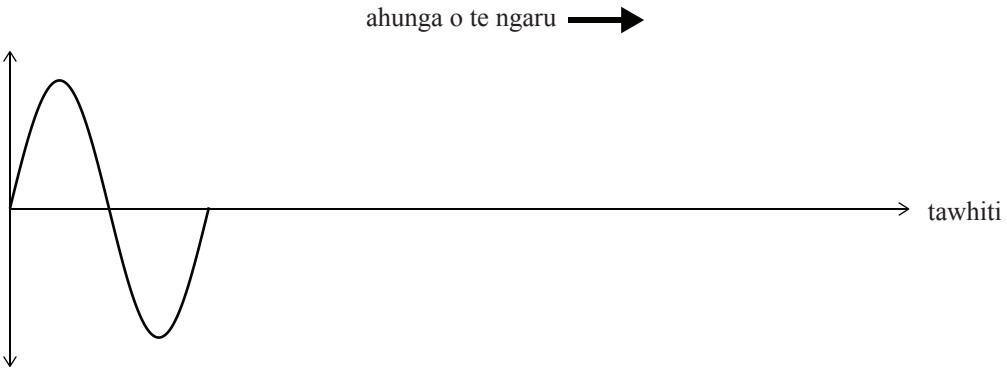
(c) Calculate the distance between the sonar transmitter and the cliff face under water.

Distance = _____

Ina whiua he mea ki roto i te wai, ka puta he ngaru ki te mata o te wai. Ka heke te teitei o ngā ngaru ina haere whakawaho. E whakaatu ana te hoahoa i raro i te teitei ki te tawhiti mō te ngaru tuatahi.

MĀ TE KAIMĀKA ANAKE

(d) (i) Whakaotihia te hoahoa mā te tātuhi i ngā hurihanga katoa e rua ka whai ake o te ngaru i te wā e puta whakawaho ana.

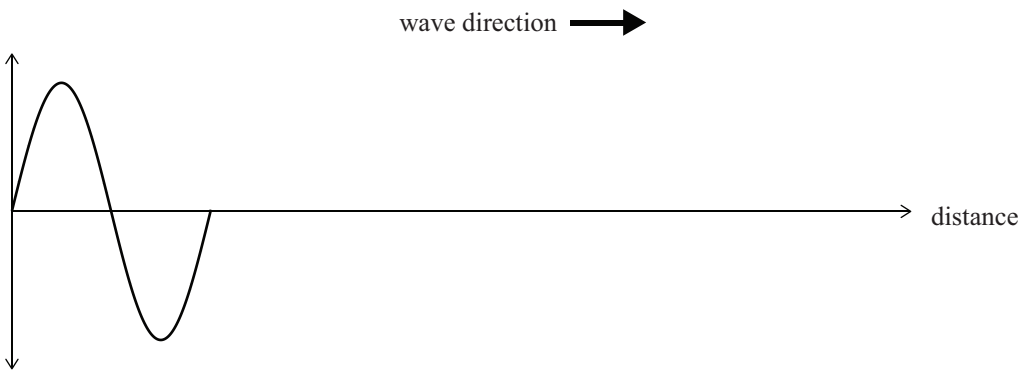


(ii) Mā te whakamahi i ngā ariā ahupūngao, whakamāramahia he aha te teitei o te ngaru i iti haere ai i te wā e puta whakawaho ana.

When an object is thrown into water, it creates waves on the surface of the water. The amplitude of the waves decreases as they travel outwards. The sketch below shows the amplitude against distance for the first wave.

ASSESSOR'S USE ONLY

(d) (i) Complete the diagram by drawing the next two complete cycles of the wave as it travels outwards.

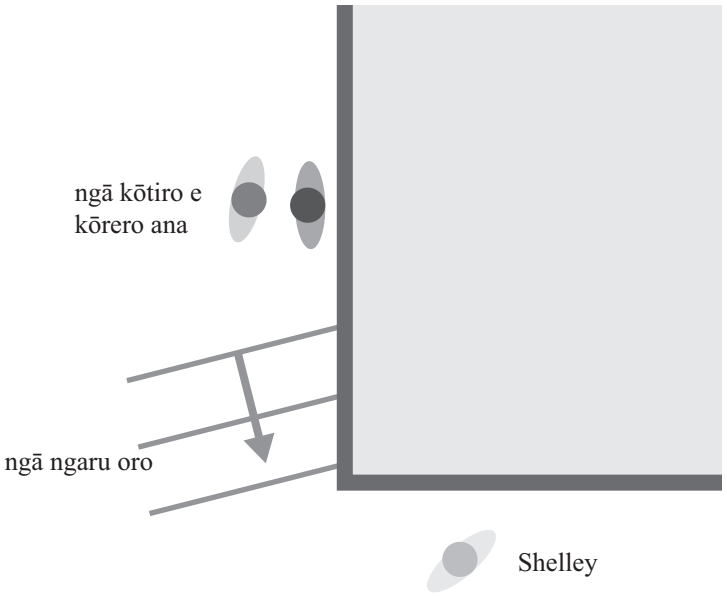


(ii) Using physics ideas, explain why the amplitude of the wave decreases as it travels outwards.

PĀTAI TUARUA: TE ĀHUATANGA O TE NGARU ORO

MĀ TE KAIMĀKA ANAKE

E whakaatu ana te hoahoa i raro i ngā hoa e rua e kōrero tahi ana tētahi ki tētahi i te taha o te pātū whare hākinakina. Kei te tū a Shelley i te taha o te kokonga o te whare hākinakina. Kei te rongo ia i ōna hoa kei tua o te kokonga, ahakoa kāore ia i te kite i a rāua.



(a) Whakaotihia ngā hoahoa hei whakaatu he pēhea te rorahanga o ngā ngaru oro ki tua o te kokonga kia tae atu ai ki te taringa o Shelley.

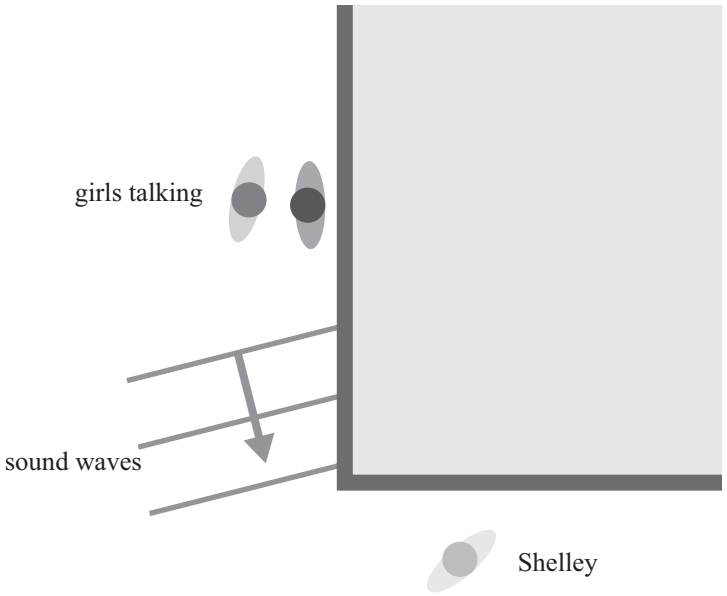
(b) Ka pā mai te mōhio ki a Shelley he mārama ake tana rongo i ngā oro auau pāpaku mai i ngā kōrero a ngā kōtiro tēnā i ngā oro auau teitei.

Whakamāramahia he aha i kaha ake ai te rongo i ngā oro auau pāpaku mai i ngā kōtiro tēnā i ngā oro auau teitei.

QUESTION TWO: BEHAVIOUR OF SOUND WAVE

ASSESSOR'S USE ONLY

The diagram below shows two friends talking to each other next to a gymnasium wall. Shelley is standing near the corner of the gymnasium building. She can hear her friends around the corner, even though she cannot see them.



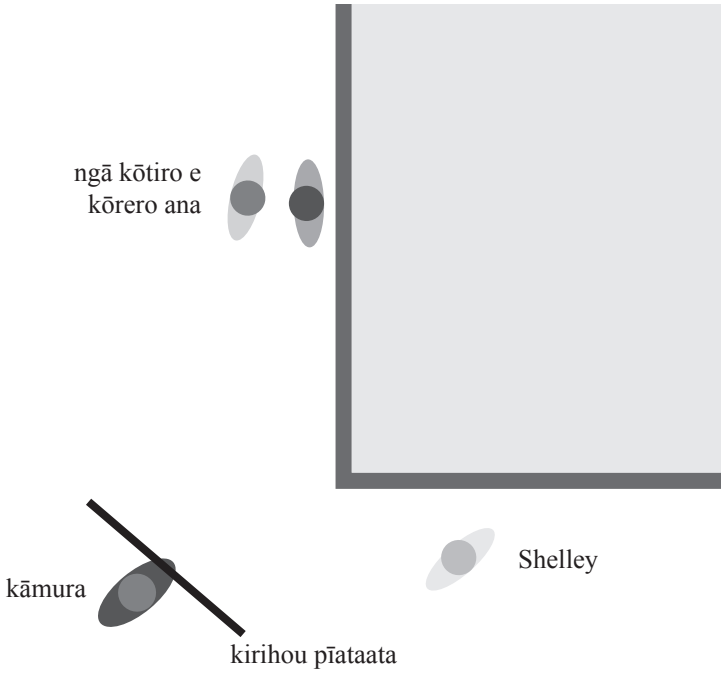
(a) Complete the diagrams to show how the sound waves diffract around the corner to reach Shelley's ear.

(b) Shelley notices that she is able to hear low frequency sounds from the girls' chat more loudly than high frequency sounds.

Explain why the low frequency sounds from the girls' chat are heard more loudly than the high frequency sounds.

MĀ TE KAIMĀKA ANAKE

(c) Ina hipa i tētahi kāmura te kokonga o te whare hākinakina me te kawe i tētahi **papa kirihou pītataata** nui e whakaaturia ana ki te hoahoa, ka whakaatahia ngā ngaru oro i te papa kia anga atu ki a Shelley.



Whakamāramahia he pēhea te rerekē o te oro i rongo a Shelley i te āhuatanga o runga ki te oro ka rongo nā te rorahanga i te āhuatanga o mua ake.

(d) Whakamāramahia he pēhea te pānga o te rorahanga me te whakaatanga ki te teitei me te ahunga o ngā ngaru oro.

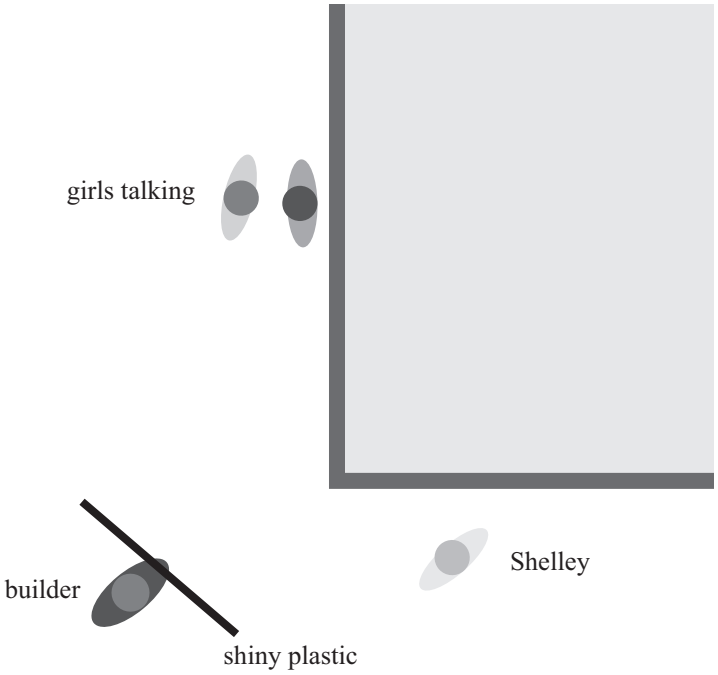
(i) te teitei o ngā ngaru

(ii) te ahunga o ngā ngaru

MĀ TE KAIMĀKA ANAKE

ASSESSOR'S USE ONLY

(c) When a builder carrying a large **shiny plastic board** passes by the corner of the gymnasium building, as shown in the diagram, the sound waves are reflected off the board towards Shelley.



Explain how the sound heard by Shelley in the above situation is different from the sound heard due to diffraction in the previous situation.

(d) Explain how the phenomena diffraction and reflection, affect the amplitude and direction of the sound waves.

(i) the amplitude of the waves

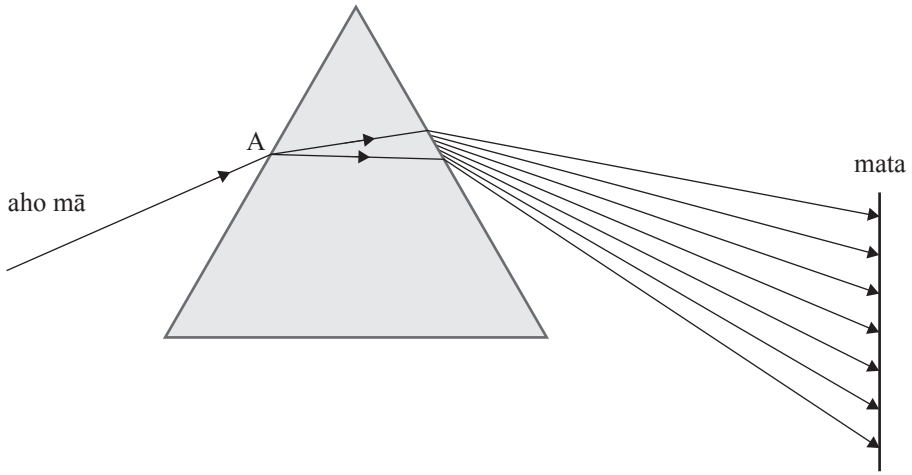
(ii) the direction of the waves

ASSESSOR'S USE ONLY

PĀTAI TUATORU: NGĀ NGARU AUTŌHIKO

MĀ TE KAIMĀKA ANAKE

E whakaatu ana te hoahoa i raro i tētahi hihi aho[1] mā e tomo atu ana ki te poro i te pūwāhi A.



(a) Tuhia ngā āhuatanga e RUA ka pā mai i te wā e **tomo** atu ana te hihi whakapā ki te poro i te pūwāhi A.

(b) (i) Ki te hoahoa i runga ake, tapaina te pūwāhi o ngā hihi whero me te kākariki kei te mata.

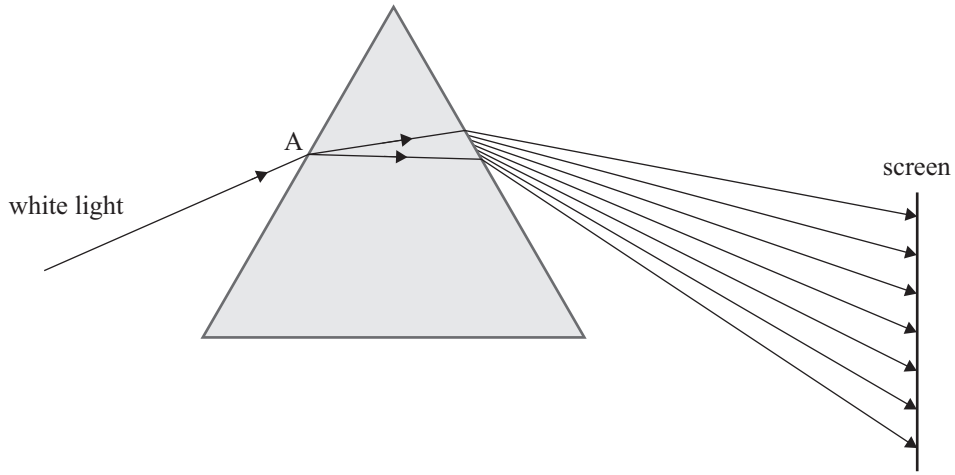
(ii) Whakamāramahia he aha te aho i wehea pēneitia ai.

[1] tūrama

QUESTION THREE: ELECTROMAGNETIC WAVES

ASSESSOR'S USE ONLY

The diagram below shows a ray of white light entering a prism at point A.

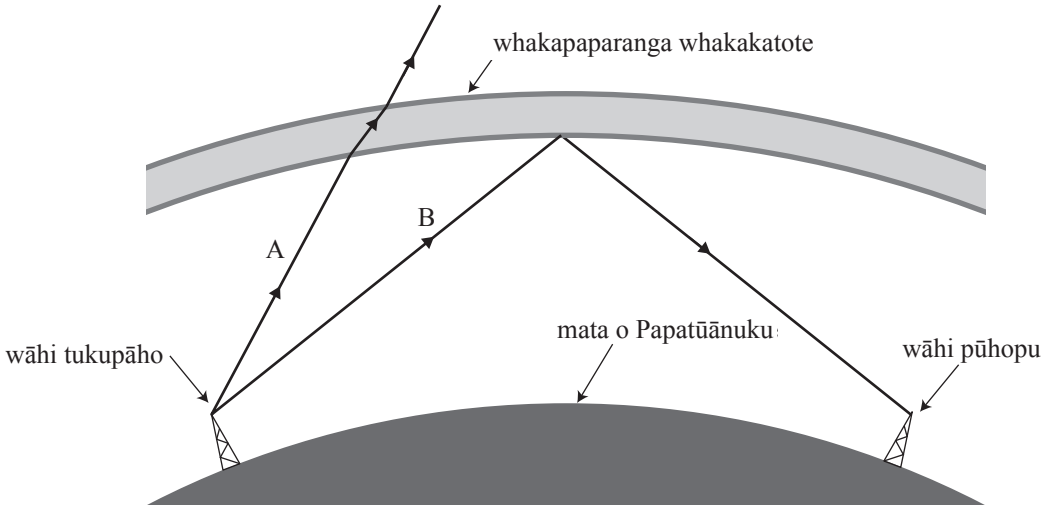


(a) State the TWO phenomena that take place as the incident ray **enters** the prism at point A.

(b) (i) On the diagram above, label the position of the red and green rays on the screen.

(ii) Explain why the light splits up in this way.

Torotika ana te rere o ngā ngaru ririrangi. Ka taea ngā whitiwhititanga ririrangi tawhiti roa i waenga i ngā wāhi pāmamao i te mata o Papatūānuku nā te whakapaparanga whakakatote o te kōhauhau[2] o Papatūānuku. Ka whakapāhotia atu ngā ngaru ririrangi e rua, A me B, i te mata o Papatūānuku. Ina tae atu ngā ngaru ririrangi ki te whakapaparanga whakakatote o te kōhauhau o Papatūānuku, ka rere te hihi A ki tuarangi, ā, ka turapa[3] mai anō te hihi B ki te mata o Papatūānuku, e ai ki te hoahoa.



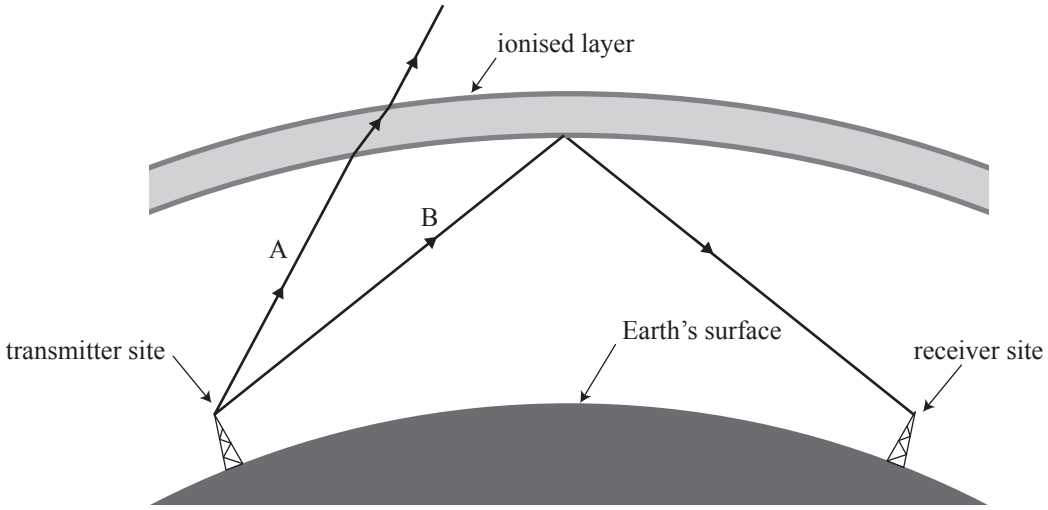
(c) (i) Whakaingoatia te āhuatanga e turapa mai anō ai te hihi B ki te mata o Papatūānuku.

(ii) E ai ki ngā āhuatanga ā-aho o te whakapaparanga whakakatote, matapakitia te take e turapa mai anō te hihi B ki te mata o Papatūānuku, engari ka puta tonu atu te hihi A.

[2] hau takiwā
[3] tāwhana

ASSESSOR'S USE ONLY

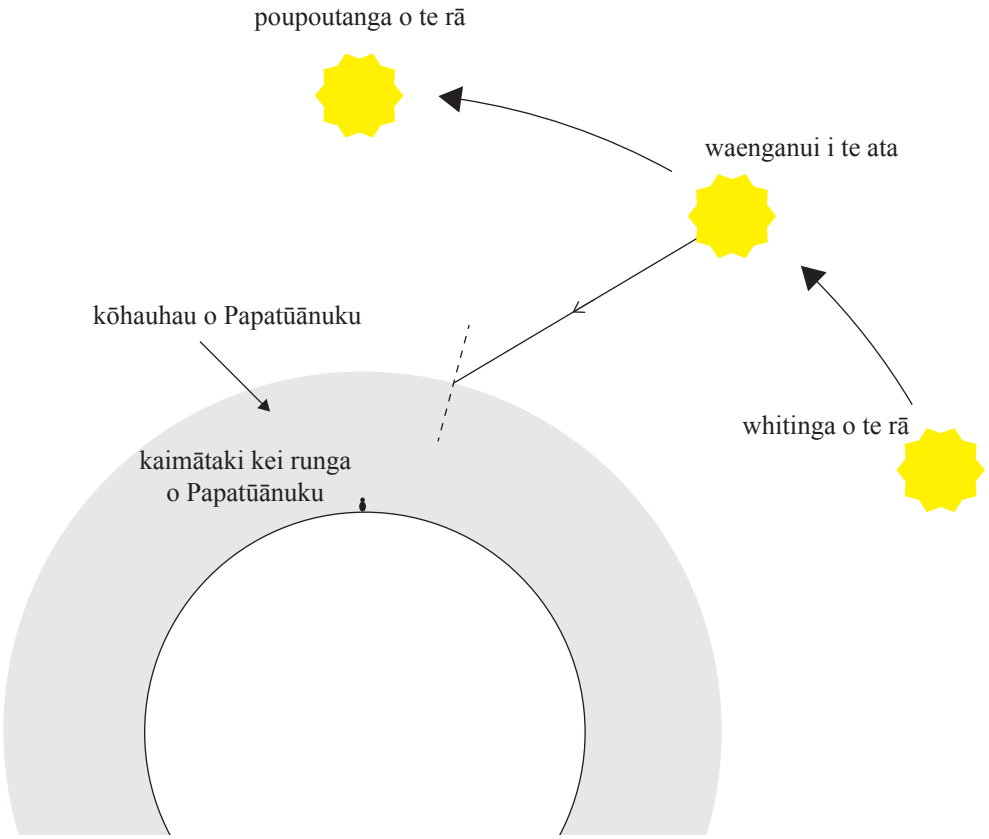
Radio waves travel in straight lines. Long-distance radio communication between distant locations on the Earth's surface is possible due to the existence of the ionised layer of the Earth's atmosphere. Two radio waves, A and B, are broadcast from the surface of the Earth. When the radio waves reach the ionised layer of the Earth's atmosphere, ray A travels into space and ray B bounces back towards the Earth's surface, as shown in the diagram.



(c) (i) Name the phenomenon that causes ray B to bounce back towards the Earth's surface.

(ii) In terms of the optical properties of the ionised layer, discuss why ray B bounces back towards the Earth's surface, while ray A is transmitted.

(d) E whakaatu ana te hoahoa i raro i ngā pūwāhi tūturu o te Rā mai i te whitinga ki te poupoutanga o te rā. Ka whakawhiti mā te kōhauhau o Papatūānuku te aho ka tae ki Papatūānuku mai i te Rā. He **kiato ake ā-aho** te kōhauhau i te ātea[4] i waho o te kōhauhau.



(i) Whakaotihia te hoahoa e whakaatu ana i te ara hihi mai i te Rā i waenganui o te ata i muri i te tomokanga i te kōhauhau.

(ii) Ki te hoahoa, tātuhia te **pūwāhi ā-karu** o te Rā o waenganui i te ata, e ai ki tērā i kitea e te kaimātaki kei runga o Papatūānuku.

[4] tuarangi

(iii) Ka heke te koki whakapā o te aho e tuki ana ki te kōhauhau mai i te whitinga o te rā ki te poupoutanga o te rā.

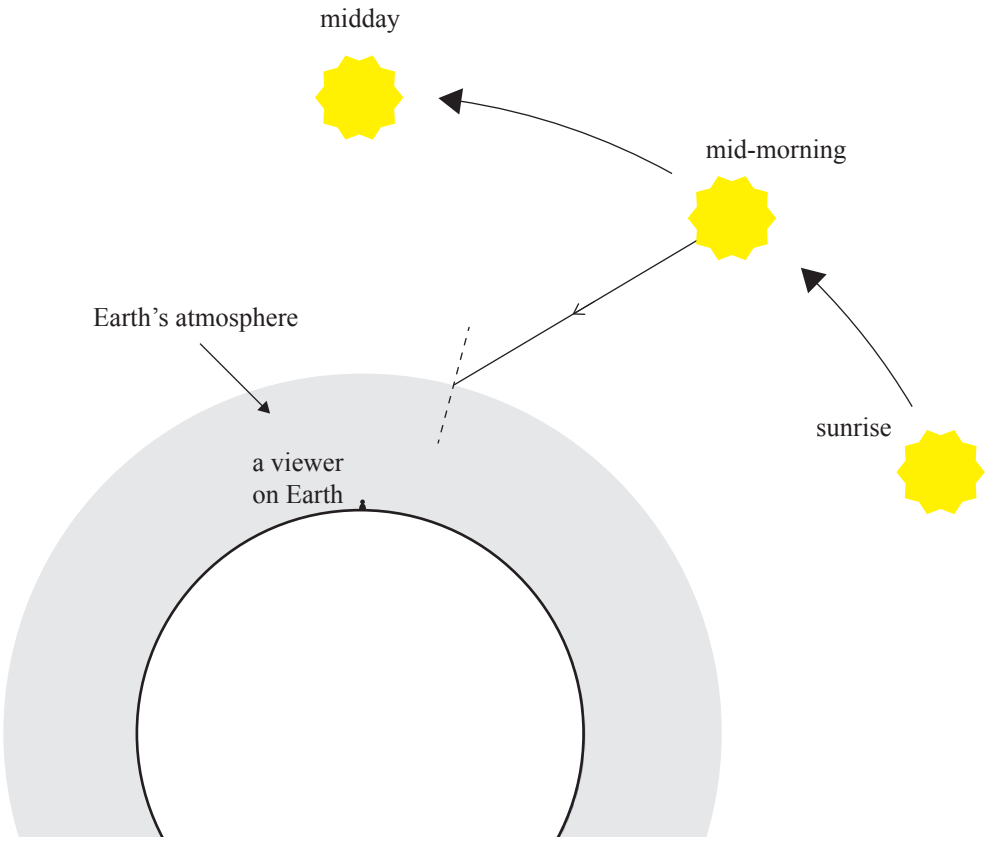
MĀ TE KAIMĀKA ANAKE

Whakamāramahia he pēhea te huri o te **pūwāhi ā-karu** o te Rā ina kitea i Papatūānuku mai i te whitinga o te rā ki te poupoutanga ina whakatairitea ki tōna pūwāhi tūturu.

Ka āhei koe ki te tuhi hoahoa hei tautoko i ō whakautu.

ASSESSOR'S USE ONLY

(d) The diagram below shows the true positions of the Sun from sunrise to midday. Light reaching the Earth from the Sun has to pass through the Earth's atmosphere. The atmosphere is **optically denser** than the space outside the atmosphere.



Adapted from: http://jeweell.com/data_images/out/75/1134759-earth.jpg

(i) Complete the diagram showing the path of the ray from the mid-morning sun after it enters the atmosphere.

(ii) On the diagram, draw the **apparent position** of the mid-morning sun, as seen by the viewer on Earth.

(iii) The angle of incidence of the light hitting the atmosphere decreases from sunrise to midday.

Explain how the **apparent position** of the Sun as seen from the Earth changes between sunrise and midday compared to its true position.

You may make sketches on the diagram to aid your answers.

ASSESSOR'S USE ONLY

He puka anō mēnā ka hiahiatia.
Tuhia te (ngā) tāu pātai mēnā e hāngai ana.

TAU PĀTAI

MĀ TE KAIMĀKA ANAKE

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

QUESTION NUMBER

ASSESSOR'S USE ONLY

English translation of the wording on the front cover

Level 1 Physics, 2014

90938 Demonstrate understanding of aspects of wave behaviour

2.00 pm Tuesday 25 November 2014
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of aspects of wave behaviour.	Demonstrate in-depth understanding of aspects of wave behaviour.	Demonstrate comprehensive understanding of aspects of wave behaviour.

90938M

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

You should attempt ALL the questions in this booklet.

Make sure that you have Resource Sheet L1–PHYSMR.

In your answers use clear numerical working, words and / or diagrams as required.

Numerical answers should be given with an appropriate SI unit.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–23 in the correct order and that none of these pages is blank.

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

ASSESSOR'S USE ONLY