

See back cover for an English
translation of this cover

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90938M



909385



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

SUPERVISOR'S USE ONLY

Ahupūngao, Kaupae 1, 2013

90938M Te whakaatu māramatanga ki ētahi āhuatanga o te ngaru

2.00 i te ahiahi Rāhina 25 Whiringa-ā-rangi 2013
Whiwhinga: Whā

| Paetae | Paetae Kaiaka | Paetae 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 tohutu 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 tohutu.

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

Tirohia mehemea kei roto nei ngā whārangi 2–22 e raupapa tika ana, ā, kāore hoki he whārangi wātea.

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

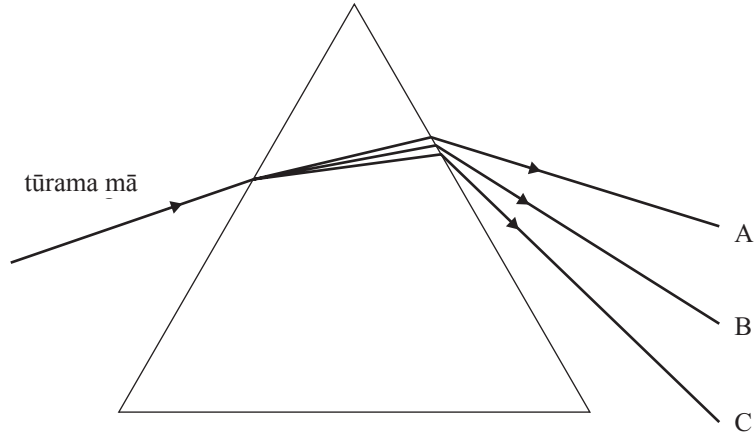
TAPEKE

MĀ TE KAIMĀKA ANAKE

Kia 60 meneti hei whakautu i ngā pātai o tēnei pukapuka.

PĀTAI TUATAHI: TŪRAMA ME NGĀ PORO

Ina kōwatawatatia he hihi tūrama mā ki roto i tētahi poro-tapatoru, ka puta mai he hihinga o ngā tae ki tērā taha o te poro. I te hoahoa i raro, ka kitea te tae B i waenga o te hihinga.



- (a) Whakaingoatia ngā tae kua tapaina A, B me C, i roto i te hoahoa.

A = _____

B = _____

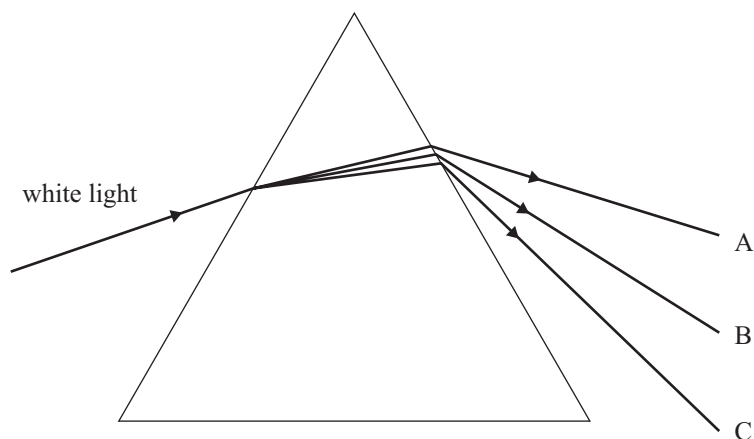
C = _____

- (b) Whakamāramahia mai he aha te whakaaturanga o tēnei pānga mai ki te āhuatanga o te tūrama mā.

You are advised to spend 60 minutes answering the questions in this booklet.

QUESTION ONE: LIGHT AND PRISMS

When a ray of white light is shone into a prism, a spectrum of colours emerges on the other side of the prism. In the diagram below, the colour B is seen in the middle of the spectrum.



- (a) Name the colours labelled A, B and C, in the diagram.

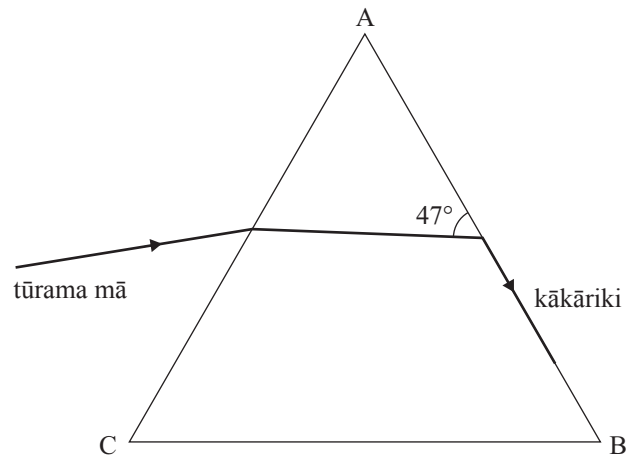
A = _____

B = _____

C = _____

- (b) Explain what this effect shows about the nature of white light.

Kua whakatikahia te aronga o te pānga tūrama mā kia puta mai ai te āhuatanga kākāriki o te tūrama mā ki te mata AB o te poro, e ai ki te hoahoa i raro. Ka puta i te tūrama kākāriki he koki o te 47° ki te taha o te karāhe i roto i te poro.



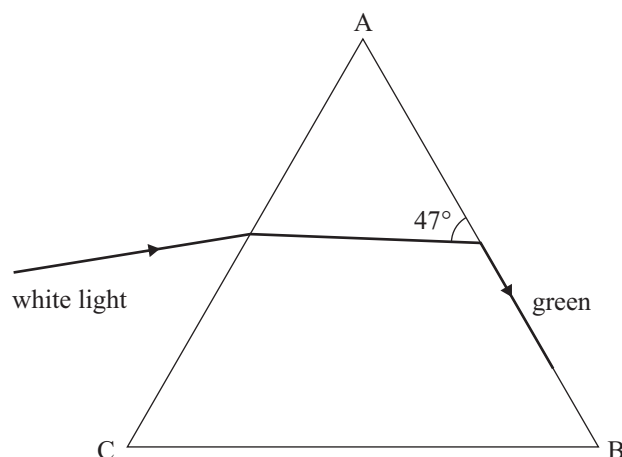
- (c) (i) Tātaihia te tino koki mō te tūrama kākāriki i roto i te poro.

Koki _____

- (ii) Tuhi me te whakamārama mai he aha ka kitea mēnā i **whakapikihia** iti nei te koki o te tūrama kākāriki me te mata AB o te poro mai i te 47° .

- (d) Whakamāramahia mai tētahi **ōritetanga** kōtahi me tētahi **rerekētanga** kotahi i waenga i te tūrama karaka me te tūrama kikorangi.

The direction of the incident white ray is now adjusted so that the green component of the white light emerges along the face AB of the prism, as shown in the diagram below. The green light makes an angle of 47° to the side of the glass inside the prism.



- (c) (i) Calculate the critical angle for green light in the prism.

Angle

- (ii) State and explain what will be seen if the angle of the green light with the face AB of the prism was slightly **increased** from 47° .

- (d) Explain one **similarity** and one **difference** between orange light and blue light.

PĀTAI TUARUA: NGĀ NGARU WAI

E tere ana tētahi poti takawairore e whakahaere irirangitia ana i tētahi roto. I a ia e tere ana, ka puta he ngaru i muri o te poti. I tētahi wāhi o te haere, ka puta i te poti ngā ngaru 10 i roto i te 5.0 hēkona.

- (a) (i) Tautuhia te tikanga o ngā kupu ‘roanga wā’.

- (ii) Tātaihia te roanga wā i puta ai ngā ngaru.

Roanga wā _____

- (b) Ka whakaputahia e te hoe o tētahi waka ngā ngaru e 9 i roto i te 15 s. He 4.8 m te tawhiti o te haere o ia ngaru i roto i te 12 s.

Tātaihia te roangaru o ngā ngaru ka puta i te hoe.

Roangaru _____

QUESTION TWO: WATER WAVESASSESSOR'S
USE ONLY

A radio-controlled toy boat is sailing in a lake. As it sails, waves are produced behind the boat. At one point of travel, the boat produces 10 waves in 5.0 seconds.

- (a) (i) Define the term 'period'.

- (ii) Calculate the period of the waves produced.

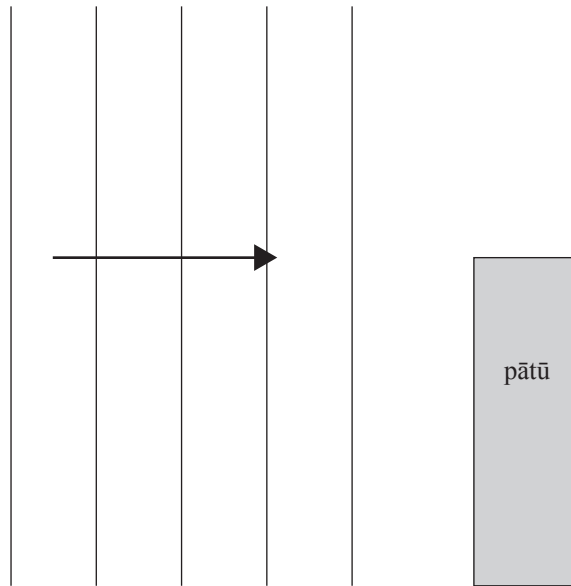
Period _____

- (b) A paddle from a canoe produces 9 waves in 15 s. Each wave travels 4.8 m in 12 s.

Calculate the wavelength of waves produced by the paddle.

Wavelength _____

Ka puta i te hau angiangi ngā ngaru torotika i te mata o te roto. E whakaatu ana te hoahoa i ngā ngaru e whakatata ana ki te taha o tētahi pātū¹. He ōrite te hōhonu o te wai i ngā taha e rua o te pātū.



- (c) Whakaahuahia mai me te whakamārama ka ahatia ngā ngaru ina hipa i te taha o te pātū. Tērā pea ka hiahia koe ki te tuhi ngaru ki te hoahoa hei āwhina i tō whakamārama.

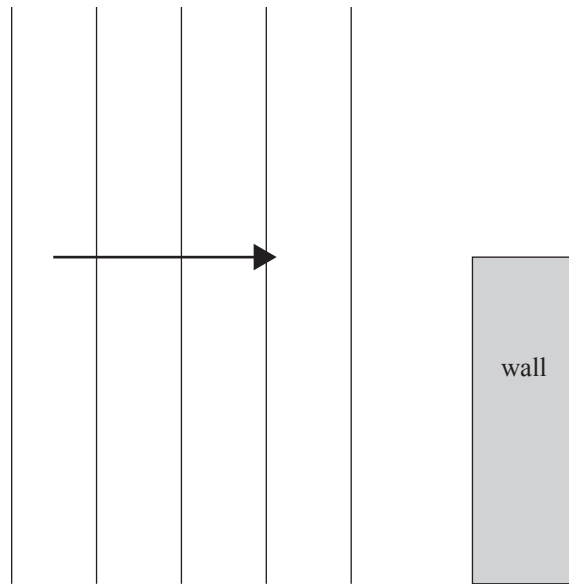
- (d) Kāore i roa i muri mai, ka whakaputahia e te hau ngā ngaru ki te auautanga **teitei ake**.

Whakamāramahia mai he pēhea te rerekē o ngā tauira ngaru ki ērā i whakaputahia i (c) ina hipa ngā ngaru i te taha o te pātū.

¹ pakitara

A gentle wind causes straight waves on the lake surface. The diagram shows waves approaching the edge of a wall. The depth of the water is the same on either side of the wall.

ASSESSOR'S
USE ONLY



- (c) Describe and explain what happens to the waves when they pass the edge of the wall.
You may draw waves on the diagram to aid your explanation.

- (d) A short time later, a wind produces waves of **higher** frequency.

Explain how the pattern of waves would be different to those produced in (c) when the waves pass the edge of the wall.

PĀTAI TUATORU: POTI E WHAKAHAERE IRIRANGITIA ANA

He whakapū paku whakaputa oro kei runga i te poti takawairore e whakahaere irirangitia ana. Ka taea te whakatangi i te whakapū mā te tuku ngaru irirangi mai i tētahi pūmamao.

- (a) Tuhia ngā rerekētanga e RUA i waenga i ngā ngaru irirangi me ngā ngaru oro.

- (b) Ko te auautanga ka whakaputahia e te whakapū he 800 Hz, ā, ko te roangaru o ngā ngaru oro i te hau takiwā he 41 cm.

Whakaaturia ko te tere o te oro i te hau takiwā he 328 m s^{-1} .

QUESTION THREE: RADIO-CONTROLLED BOATASSESSOR'S
USE ONLY

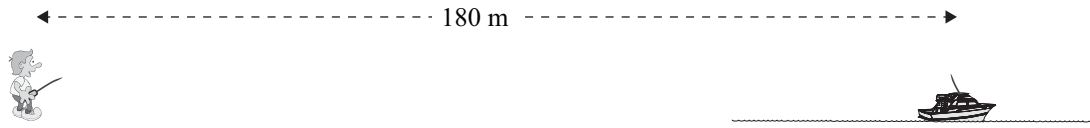
A radio-controlled toy boat has a small siren that produces a sound. The siren can be turned on by sending radio waves from a remote control.

- (a) State TWO differences between the radio waves and the sound waves.

- (b) The siren produces a frequency of 800 Hz, and the wavelength of the sound waves in air is 41 cm.

Show that the speed of sound in air is 328 m s^{-1} .

- (c) He 180 m te tawhiti o te poti mai i te pūmamao. Ka tukuna he ngaru irirangi ki te whakatangi i te whakapū. He tangata kei te tū me te pūmamao.



Tātaihia te wā mai i te tukutanga o te pūmamao i te ngaru irirangi ki te wā ka rongu te tangata i te oro.

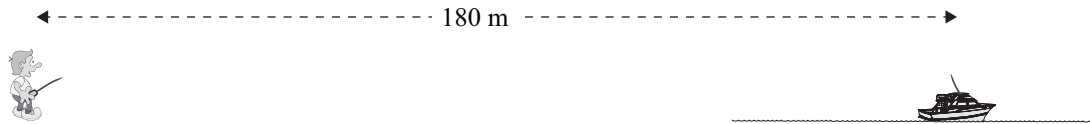
Whakamāramahia ngā whakapae ka puta i a koe.

Ko te tere o te oro i te hau takiwā he 328 m s^{-1} .

Wā _____

- (d) Whakamāramahia mai he pēhea te whakawhiti o te pūngao oro mai i te whakapū ki te tangata e pupuri ana i te pūmamao, ahakoa kāore i neke he korakora hau mai i te whakapū ki te tangata.

- (c) The boat is 180 m from the remote control. A radio wave is sent to turn on the siren. A person is standing with the remote control.



Calculate the time from when the remote control sends the radio wave to when the person hears the sound.

Explain any assumptions you make.

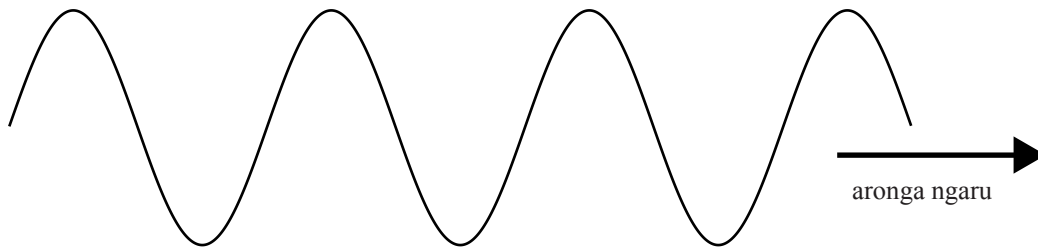
The speed of sound in air is 328 m s^{-1} .

Time _____

- (d) Explain how sound energy is transferred from the siren to the person holding the remote control, even though no air particles move from the siren to the person.

PĀTAI TUAWHĀ: WHAKAATANGA KEI TĒTAHI MATAPIHI

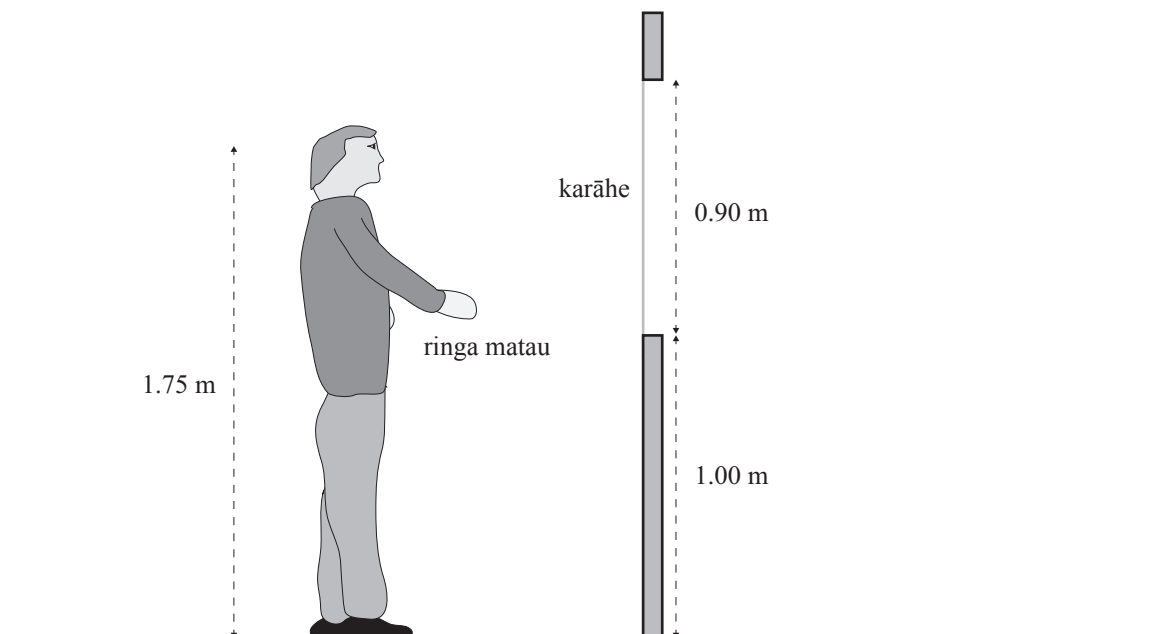
E whakaatu ana i te hoahoa i raro tētahi ngaru e haere whakatematau.



- (i) Ki te hoahoa i runga, tapaina te pūrahi ngaru me te roangaru o te ngaru.
- (ii) Whakamāramahia te nekehanga o ngā korakora i roto i tēnei ngaru.

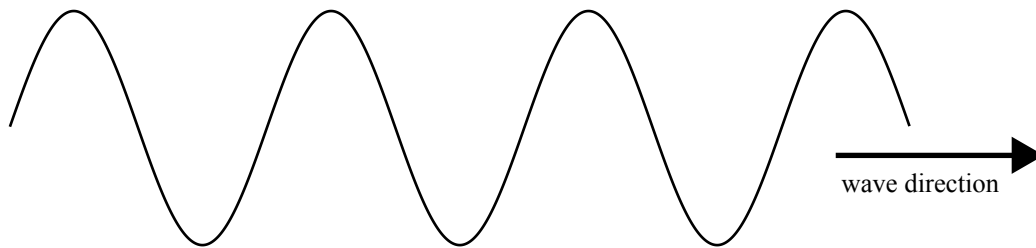
Ka titiro atu a Tom mā tētahi matapihi karāhe ka kite ia i tōna ake whakaatanga i roto i te karāhe.

- (b) Ki te hoahoa i raro, tuhia kia RUA ngā hihi hei whakaatu he pēhea te kite a Tom i tōna ringa matau i roto i te karāhe. Tohua mai ka tapa i te atahanga o tōna ringa matau.



QUESTION FOUR: REFLECTION IN A WINDOWASSESSOR'S
USE ONLY

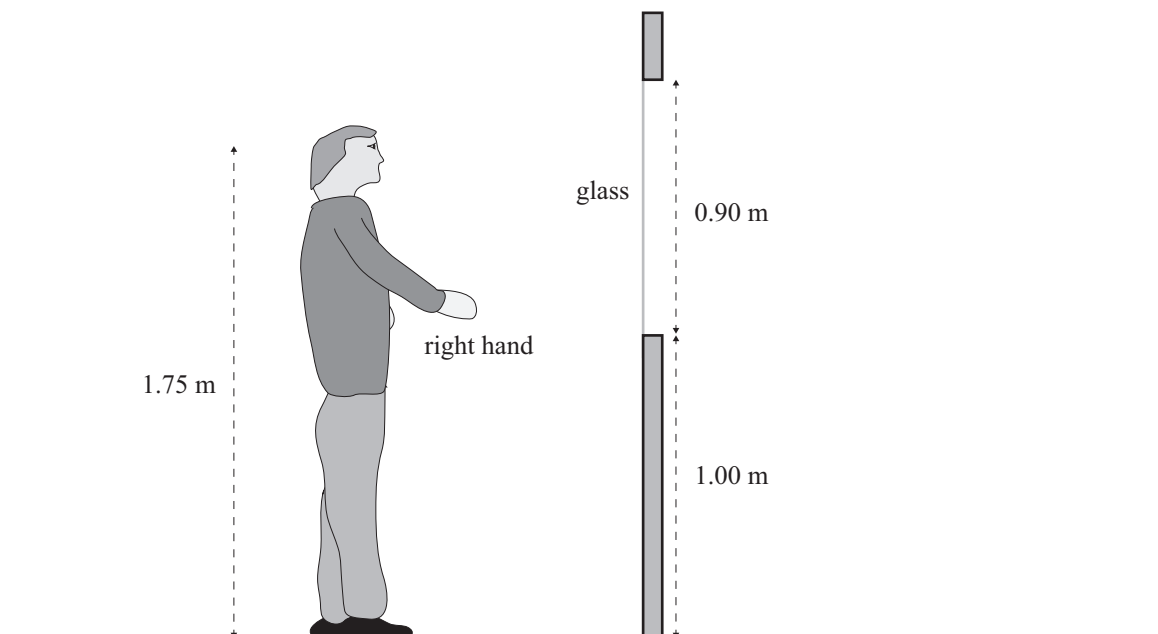
The diagram below shows a wave travelling to the right.



- (i) On the diagram above, label the amplitude and the wavelength of the wave.
- (ii) Describe the motion of the particles in this wave.

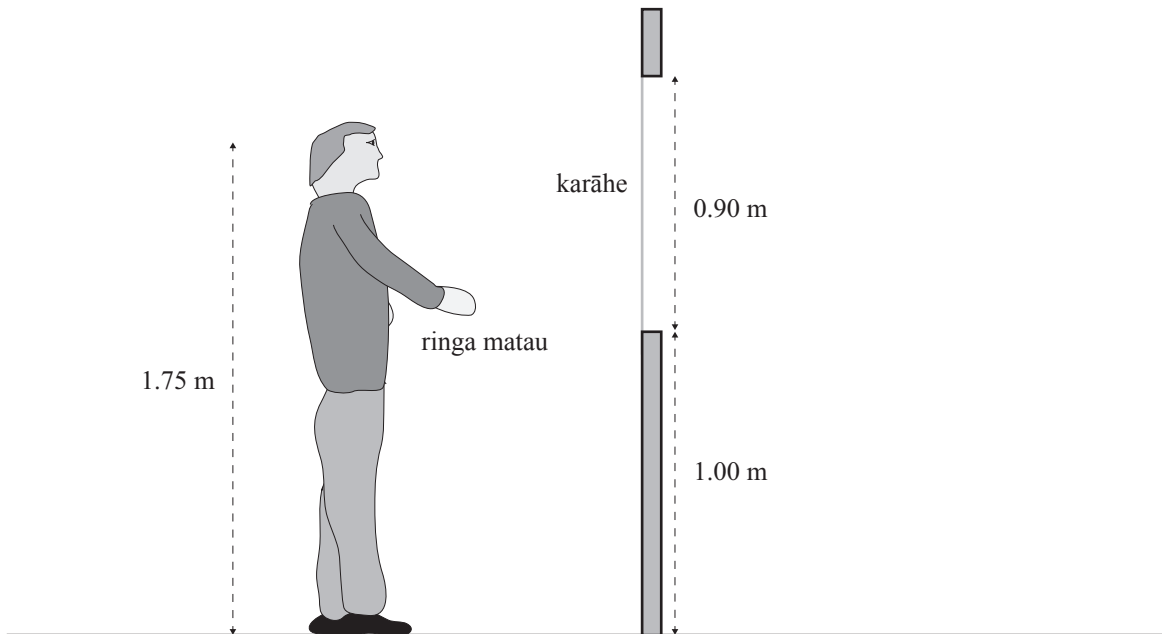
Tom looks through a glass window and sees his own reflection in the glass.

- (b) On the diagram below, draw TWO rays to show how Tom can see his right hand in the glass. Locate and label the image of his right hand.



- (c) Whakamāramahia mai mēnā ka kitea e Tom ōna waewae i roto i te karāhe ina tū ia e ai ki te whakaaturanga o te hoahoa.

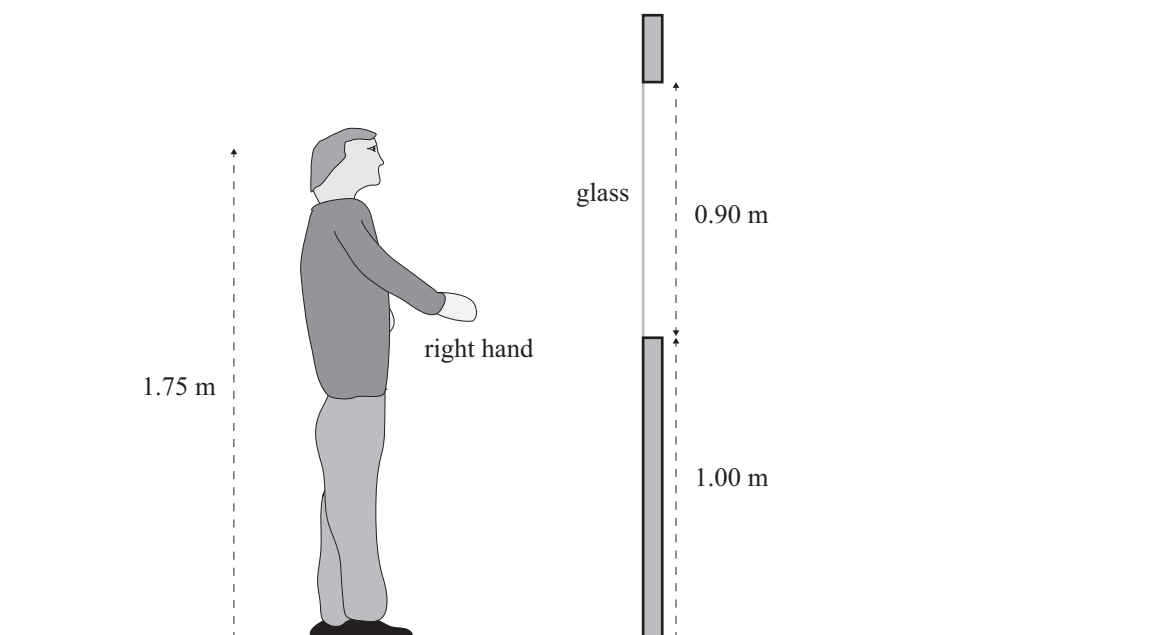
Ka taea e koe te tuhi ki te hoahoa i raro hei āwhina i tō whakautu.



**Ka haere tonu te
Pātai Tuawhā (d)
i te whārangi 18.**

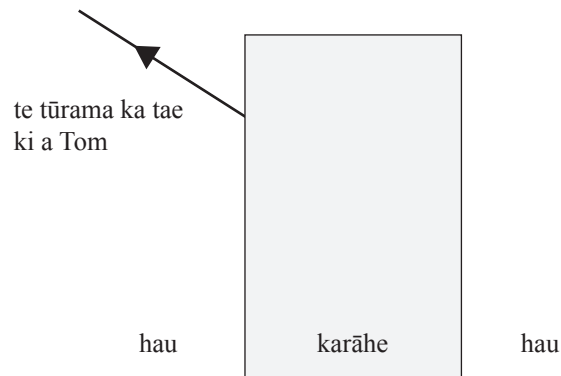
- (c) Explain whether Tom will be able to see his feet in the glass when he stands as shown in the diagram.

You may draw on the diagram below to aid your answer.



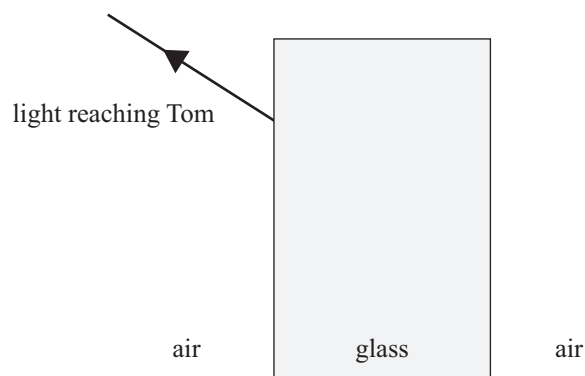
**Question Four
(d) continues
on page 19.**

- (d) E whakaatu ana te hoahoa i raro i tētahi hihi mai i waho o te matapihi e tae atu ana ki a Tom i muri i te whitinga mā te karāhe.



- (i) Whakaotihia te hoahoa hei tohu i te ara o te hihi:
- ina haere mā te karāhe, ā,
 - ina tūpono atu ki tērā atu taha o te karāhe.
- (ii) Whakaingoahia te pānga ka puta ina whiti te tūrama ki te karāhe, ā, ka hoatu he pūtake he aha i puta ai tēnei.

- (d) The diagram below shows a ray of light from outside the window reaching Tom after it has travelled through the glass.



- (i) Complete the diagram to show the path of the ray:
- when it travels through the glass, and
 - when it is incident on the opposite side of the glass.
- (ii) Name the effect that occurs when light passes into the glass, and give a reason why this occurs.

He puka anō mēnā ka hiahiatia.
Tuhia te (ngā) tau 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, 2013

90938 Demonstrate understanding of aspects of wave behaviour

2.00 pm Monday 25 November 2013
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. |

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–PHYSR.

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 2–22 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.

90938M