See back cover for an English translation of this cover

1

90937M

909375

NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

SUPERVISOR'S USE ONLY

Ahupūngao, Kaupae 1, 2014

90937M Te whakaatu māramatanga ki ētahi āhuatanga o te hiko me te autō

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

Paetae	Kaiaka	Kairangi
Te whakaatu māramatanga ki ētahi āhuatanga o te hiko me te autō.	Te whakaatu māramatanga hōhonu ki ētahi āhuatanga o te hiko me te autō.	Te whakaatu māramatanga matawhānui ki ētahi āhuatanga o te hiko me te autō.

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 2–17 e raupapa tika ana, ā, kāore hoki he whārangi wātea.

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

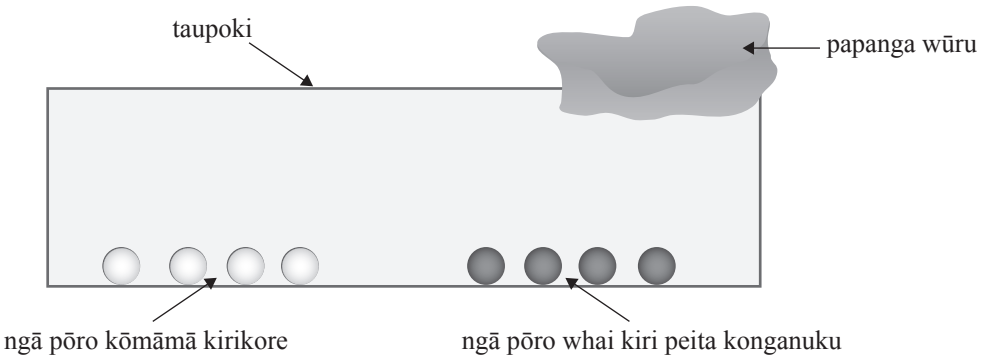
TAPEKE

MĀ TE KAIMĀKA ANAKE

PĀTAI TUATAHI: TAONGA TĀKARO HAKI HŪPEKE

MĀ TE KAIMĀKA ANAKE

Kei roto i te taonga tākaro ko ngā pōro kōmāmā iti i roto i tētahi ipu kirihou haupuru. Kua whai kiri peita konganuku ētahi o ngā pōro kōmāmā, ā, kāore he kiri konganuku ō ētahi. Kei te hiko-kore katoa ngā pōro ka mutu kei te ōrite katoa te papatipu.



Ina mukua e tētahi tamaiti te taupoki[1] o te ipu ki te papanga wūru, whakawhana tōrarotia[2] te taupoki. Kua pekepeke ngā pōroināianei me te piri ki te taupoki o te ipu.

(a) Whakamāramahia mai ka pēhea te taupoki o te ipu e whakawhana tōrarotia ai.

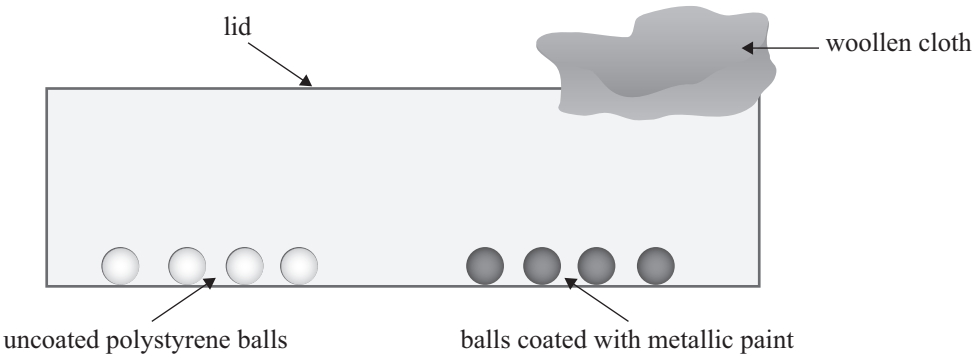
(b) Whakamāramahia mai he aha ngā pōro i pekepeke ai me te piri ki te taupoki o te ipu.

[1] kāwara
[2] hihiko tōraro

QUESTION ONE: JUMPING JACK TOY

ASSESSOR'S USE ONLY

A toy consists of small polystyrene balls inside a sealed plastic container. Some of the polystyrene balls are uncoated and others are coated with metallic paint. All the balls are uncharged and they have the same mass.



When a child rubs the lid of the container with a woollen cloth, the lid becomes negatively charged. The balls now jump up and stick to the lid of the container.

(a) Explain how the lid of the container becomes negatively charged.

(b) Explain why the balls jump up and stick to the lid of the container.

(c) Kāore i roa i muri ka takataka haere mai ētahi o ngā pōro.

MĀ TE KAIMĀKA ANAKE

(i) Tuhia mai ko ēhea ngā momo pōro – ngā mea kōmāmā kirikore, ngā mea kōmāmā whai kiri peita konganuku rānei – ka taka tuatahi.

(ii) Whakamāramahia tō whakautu.

(d) Kei te piri tonu ētahi o ngā pōro ki te taupoki o te ipu.

Whakamāramahia ka ahatia ngā pōro e piri tonu ana ki te taupoki ina pā te ringa o te tamaiti ki te taupoki o te ipu.

ASSESSOR'S USE ONLY

(c) After a short time some of the balls begin to fall down.

(i) State which type of balls – uncoated polystyrene, or polystyrene coated with metallic paint – will fall first.

(ii) Explain your answer.

(d) Some balls are still stuck to the lid of the container.

Explain what happens to the balls that are still stuck to the lid when a child touches the lid of the container with his bare hand.

PĀTAI TUARUA: NGĀ WHAKAMAHANA ME NGĀ WHAKATŌHI

MĀ TE KAIMĀKA ANAKE

Kua tapaina tētahi tārahu[3] whakamahana i roto i tētahi wakamoe he "200 W; 12 V", ā, kua tūhonoa ki tētahi pūhiko wae ngaohiko 12.

(a) Tātaitia te parenga iahiko o te tārahu whakamahana.

Parenga iahiko: _____

(b) Kua tūhono hātepetiaināianei e whā o ēnei tārahu whakamahana, me te tapa i ia tārahu ki te "200 W; 12 V", ki te pana[4] me te pūhiko wae ngaohiko 12.

(i) Ki te wāhi wātea i raro, tātuhia te hoahoa ara iahiko mō ngā tārahu whakamahana e whā e hono hātepetia ana ki tētahi pana me te pūhiko wae ngaohiko 12.

Whakamahia te tohu mō tētahi parenga iahiko[5] hei whakaatu i ngā tārahu whakamahana i roto i tō hoahoa ara iahiko.

(ii) Whakamāramahia he aha taua iahiko ōrite i rere ai puta noa i ngā tārahu whakamahana katoa i te wā e kā ana te pana.

[3] whakapōkākā
[4] panahiko
[5] parehiko

QUESTION TWO: HEATERS AND TOASTERS

ASSESSOR'S USE ONLY

A heating element inside a heater in a camper van is labelled as "200 W; 12 V", and it is connected across a 12 volt battery.

(a) Calculate the resistance of the heating element.

Resistance: _____

(b) Four of these heating elements, each labelled as "200 W; 12 V", are now connected together in series with a switch and a 12 volt battery.

(i) In the space given below, draw the circuit diagram for the four heating elements in series with a switch and the 12 volt battery.

Use the symbol for a resistor to represent heating elements in your circuit diagram.

(ii) Explain why the same current flows through all heating elements when the switch is turned on.

MĀ TE KAIMĀKA ANAKE

(c) Ahakoa ko te whakatauranga hiko mō ia tārahu ko te 200 W, ko te katoa o te hiko mō ngā tārahu whakamahana e whā e hono **hātepetia** ana ehara i te 800 W, ina tūhonoa ki te pūhiko 12 V.

Whakamahia ngā ariā ahupūngao hei whakamārama he aha te hiko tōpū o ngā tārahu e whā e hono hātepetia ana i kore ai e eke ki te 800 W.

(d) Kei roto i te whakatōhi ā-whare ngā tārahu whakamahana e whā e tūhono **whakararatia** ana. E honoa ana te whakatōhi ki tētahi putunga pūhiko 240 V. Ina whakakāhia te whakatōhi, ka tangohia he iahiko o te 2.5 A mai i te putunga pūhiko.

Tātaihia te pūngao hiko ka whakamahia e te tārahu whakamahana **kotahi** i roto i te whakatōhi ina whakakāhia mō te 2 meneti.

He tapu tēnei rauemi. E kore taea te tuku atu. Aata tirohia ki ngā kupu kei raro iho i te pouaka nei.

http://www.ohgizmo.com/wp-content/uploads/2010/05/kenwood_toaster.jpg

Pūngao: _____

ASSESSOR'S USE ONLY

(c) Even though the power rating for each element is 200 W, the combined power of the four heating elements in **series** is not 800 W, when connected to a 12 V battery.

Use physics concepts to explain why the combined power of the four elements in series is not 800 W.

(d) A household toaster consists of four heating elements that are connected in **parallel**. The toaster is connected to the 240 V mains supply. When the toaster is switched on, a current of 2.5 A is drawn from the mains supply.

Calculate the electrical energy used by a **single** heating element in the toaster when it is turned on for 2 minutes.

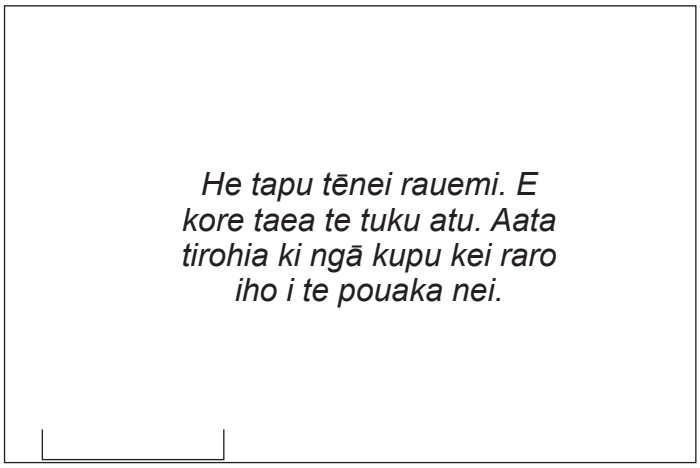
For copyright reasons, this resource cannot be reproduced here.

http://www.ohgizmo.com/wp-content/uploads/2010/05/kenwood_toaster.jpg

Energy: _____

PĀTAI TUATORU: TE PERE HIKO

MĀ TE KAIMĀKA ANAKE



He mea urutau mai i: http://upload.wikimedia.org/wikipedia/commons/c/c1/DoorBell_001.jpg

E whakaatu ana te whakaahua i ngā wāhanga i roto o tētahi pere hiko. Ina whakakāhia te pere, ka rere he iahiko 0.16 A i roto i te waea X e tūhono ana i te pere ki te putunga hiko.

(a) Tātaitia te torokaha o te papa[6] autō nā te iahiko, ki te 1.0 cm te tawhiti mai i te waea X.

Te torokaha papa autō: _____

(b) E rua ngā pōkai waea o te pere hiko, A me B, e tūhono hātepetia ana. Ina whakakāhia te pere, he 0.16 A te iahiko ka rere mā ngā pōkai, ā, ko te katoa o te hiko ka whakamahia e ngā pōkai e rua he 1.92 W. Ko te parenga iahiko o te pōkai A ko 32 Ω.

Tātaihia te parenga iahiko o te pōkai B.

Parenga iahiko: _____

[6] whaitua

QUESTION THREE: ELECTRIC BELL

ASSESSOR'S USE ONLY

Adapted from: http://upload.wikimedia.org/wikipedia/commons/c/c1/DoorBell_001.jpg

The photo shows the internal parts of an electric bell. When the bell is turned on, a current of 0.16 A flows through the wire X that connects the bell to the power supply.

(a) Calculate the magnetic field strength due to the current, at a distance of 1.0 cm from the wire X.

Magnetic field strength: _____

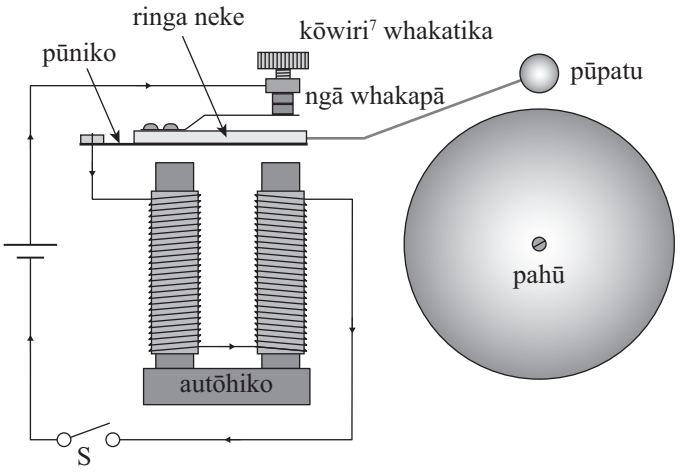
(b) The electric bell has two coils of wire, A and B, connected in series. When the bell is turned on, a current of 0.16 A flows through the coils, and the total power used by both coils is 1.92 W. Coil A has a resistance of 32 Ω.

Calculate the resistance of coil B.

Resistance: _____

(c) E whakaatu ana te hoahoa i te ara iahiko mō tētahi pere hiko. He konganuku te ringa neke, ā, e hono ana ki tētahi pūniko. Ina katia tonutia te pana, ka rere te iahiko mā te ara iahiko ki te ahunga e whakaaturia ana i roto i te hoahoa.

Whakamāramahia taipitopitotia te tukanga e tangitangi ai te pere mai i te wā tonu e katia ana te pana.



He mea urutau mai i: www.schoolphysics.co.uk/age11-14/glance/Electricity%20and%20magnetism/Electric_bell/index.html

MĀ TE KAIMĀKA ANAKE

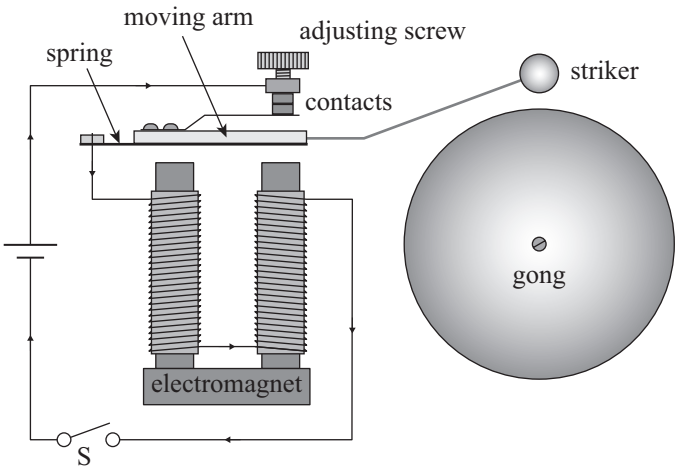
Ka haere tonu te Pātai Tuatoru i te whārangi 14.

[7] tīwiri

ASSESSOR'S USE ONLY

(c) The diagram shows the circuit for an electric bell. The moving arm is made from metal and is attached to a spring. At the instant the switch is closed, the current flows through the circuit in the direction as shown in the diagram.

Explain in detail the process that causes the bell to sound repeatedly from the instant when the switch is closed.

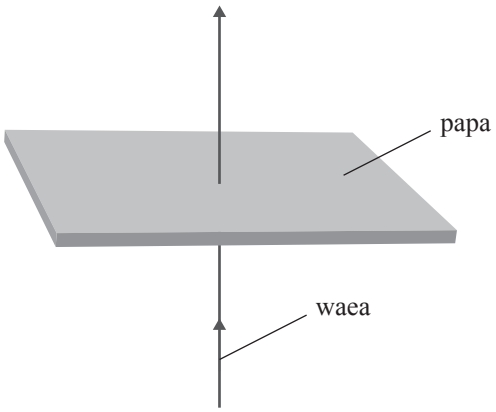


Adapted from: www.schoolphysics.co.uk/age11-14/glance/Electricity%20and%20magnetism/Electric_bell/index.html

Question Three continues on page 15.

(d) Ka rere whakaterunga tētahi waea torotika e kawe ana i tētahi iahiko nui mā tētahi papa huapae, e ai ki te hoahoa i raro.

MĀ TE KAIMĀKA ANAKE

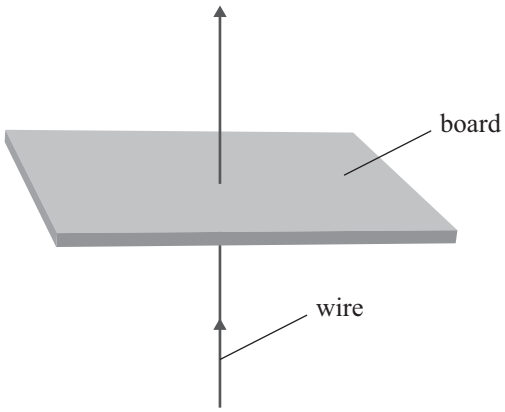


(i) Ki te hoahoa i runga, tātuhia te **āhua** me te **ahunga** o te papa autō e whakanaohia ana e te waea kawe iahiko.

(ii) Whakaahuahia mai ka pēhea tō tirotiro ā-whakamātautau i tēnei ahunga.

ASSESSOR'S USE ONLY

(d) A straight wire that carries a large current in the upward direction passes through a horizontal board, as shown in the diagram below.



(i) On the diagram above, draw the **shape** and **direction** of the magnetic field produced by the current-carrying wire.

(ii) Describe how you would check this direction experimentally.

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

90937 Demonstrate understanding of aspects of electricity and magnetism

2.00 pm Tuesday 25 November 2014
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of aspects of electricity and magnetism.	Demonstrate in-depth understanding of aspects of electricity and magnetism.	Demonstrate comprehensive understanding of aspects of electricity and magnetism.

90937M

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 2–17 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.