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, 2013

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

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 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 ngā whārangi kei muri i te pukapuka nei, ka āta tohu ai i ngā tau pātai.

Tirohia mehemea kei roto nei ngā whārangi 2–19 e raupapa tika ana, ā, kāore hoki he whārangi wātea.

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

TAPEKE

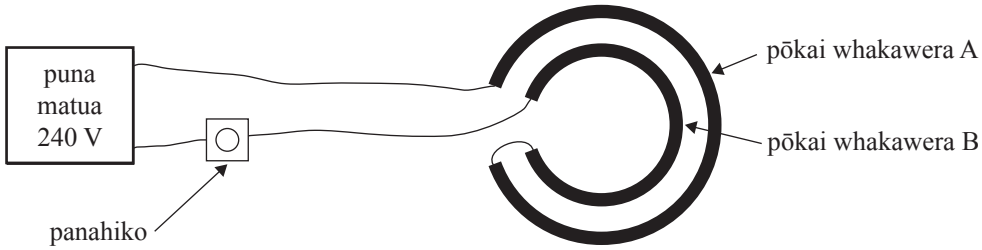
MĀ TE KAIMĀKA ANAKE

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

MĀ TE KAIMĀKA ANAKE

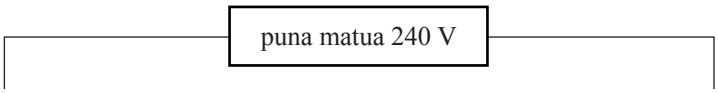
PĀTAI TUATAHI: TĀRAHU HIKO

E whakaatu ana te hoahoa i ngā hono waea o tētahi pātunu tārahu hiko. E rua ngā pōkai whakawera kei te pātunu e tūhonoa ana mā tētahi pana ki tētahi puna hiko 240 V, e ai ki te hoahoa i raro.



(a) Ko ngā pōkai whakawera me kī he pare-iahiko e rua e tūhonoa hātepetia ana ki te pana me te puna hiko. Kei te tūnga **weto** te pana.

Ki te wāhi i raro, whakamahia ngā tohu ara iahiko tōtika hei whakaoti i te hoahoa ara iahiko.



(b) Kei te kā te ara iahikoināianei.

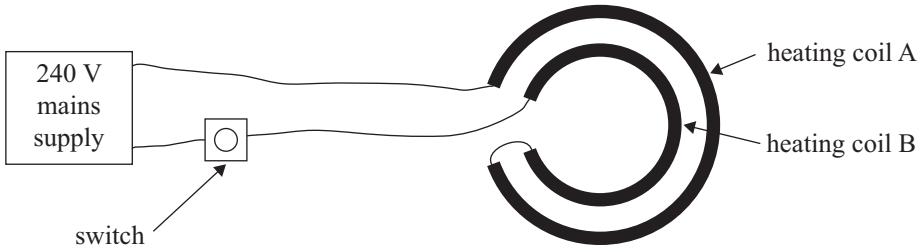
Whakamāramahia te take e rere ana te iahiko ōrite ki ngā pōkai whakawera e rua.

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

ASSESSOR'S USE ONLY

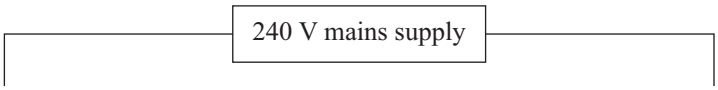
QUESTION ONE: ELECTRIC STOVE TOP

The diagram shows the wiring of an electric stove heating element. The element consists of two heating coils connected through a switch to a 240 V power supply, as shown in the diagram below.



(a) The heating coils can be considered as two resistors connected in series with the switch and the power supply. The switch is in the **off** position.

In the space below, use appropriate circuit symbols to complete the circuit diagram.



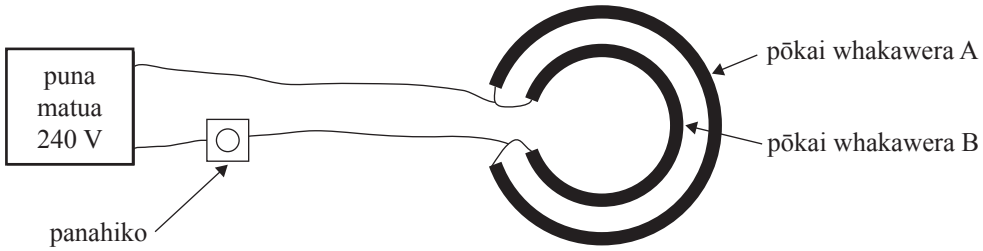
(b) The circuit is now switched on.

Explain why the same current flows through both heating coils.

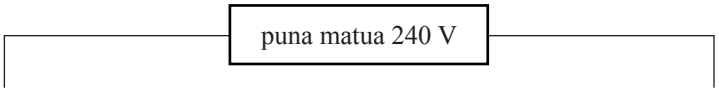
(c) He 50 Ω te parenga o te pōkai whakawera A, ā, ko te parenga o te pōkai whakawera B he 40 Ω.

Tātaihia te nui o te whakaputanga ngoi ina tūhono te ara iahiko ki tētahi puna matua 240 V.

Ka whakamahia anō e tētahi pātunu tuarua aua pōkai whakawera anō i whakamahia i roto i te pātunu tuatahi, engari he tūhononga kē e ai ki te hoahoa i raro.



(d) Kei te kā te pātunu. Ki te wāhi i raro, whakamahia ngā tohu ara iahiko tōtika hei whakaoti i te hoahoa ara iahiko.



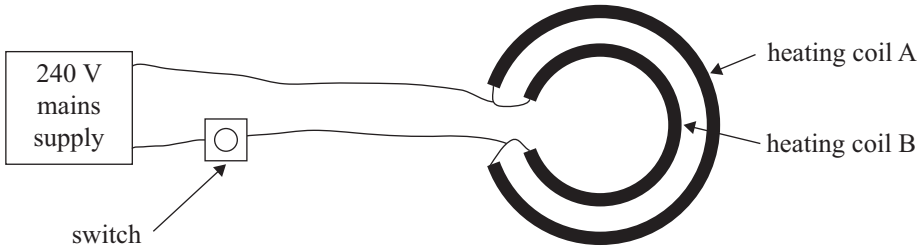
(e) Tuhi me te whakamārama mai he pēhea te rerekē o te whakaputanga ngoi o te pātunu i runga ake ki te pātunu tuatahi o te Pātai Tuatahi (a), ina tūhonoa ngā pātunu e rua ki tētahi puna matua 240 V.

ASSESSOR'S USE ONLY

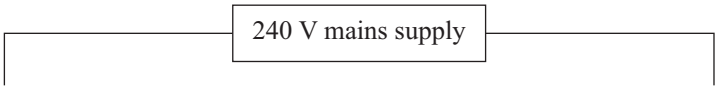
(c) Heating coil A has a resistance of 50 Ω, and heating coil B has a resistance of 40 Ω.

Calculate the amount of power output when the circuit is connected to a 240 V mains supply.

A second element uses the same heating coils as the one used in the first element, but they are connected as shown in the diagram below.



(d) The element is switched on. In the space below, use appropriate circuit symbols to complete the circuit diagram.



(e) State and explain how the power output of the above element differs from that in the first element in Question One (a), when both elements are connected to a 240 V mains supply.

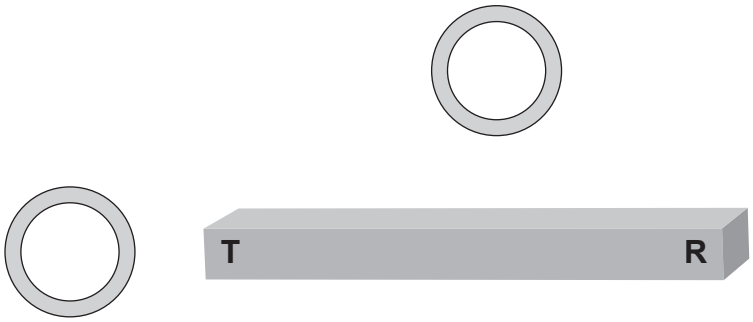
PĀTAI TUARUA: NGĀ PĀNGA AUTŌ

MĀ TE KAIMĀKA ANAKE

(a) (i) Whakamāramahia te tikanga o te kīanga '**papa autō**'.

(ii) E rua ngā kāpehu ka whakatakotohia tata ki tētahi autō pae, e ai ki te hoahoa i raro.

Tuhia he pere ki roto i ia porohita hei whakaatu i te ahunga o te ngira kāpehu.



(b) Whakamāramahia te take e kukume ai te autō i tētahi nēra maitai engari kaua tētahi matā pene.

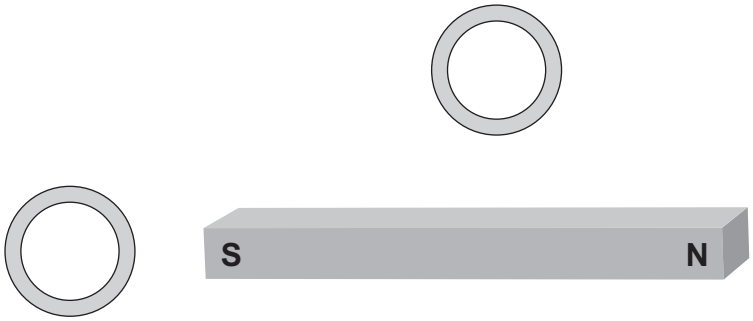
QUESTION TWO: MAGNETIC EFFECTS

ASSESSOR'S USE ONLY

(a) (i) Describe what is meant by the term **magnetic field**.

(ii) Two compasses are placed near a bar magnet, as shown in the diagram below.

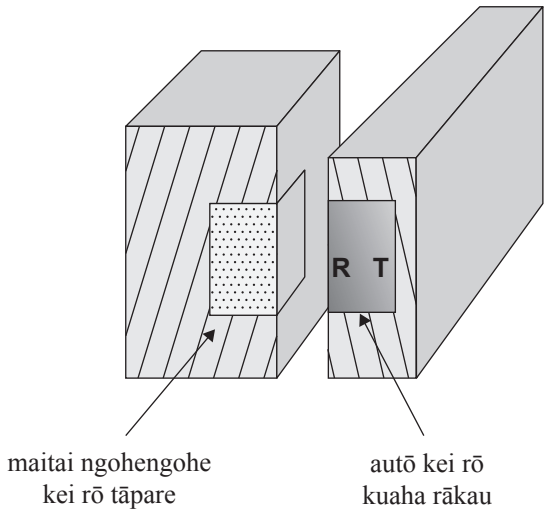
Draw an arrow inside each circle to show the direction in which the compass needle will point.



(b) Explain why a magnet attracts an iron nail but not a pencil lead.

E whakaatu ana te hoahoa i raro i te whakanahatanga o tētahi whakamau autō kei tētahi kūaha rākau o tētahi kāpata kīhini. E whakaatu ana i tētahi autō kua mau i roto i te kūaha rākau me tētahi maitai ngohengohe e mau ana ki te tāpare rākau.

MĀ TE KAIMĀKA ANAKE



(c) Whakamahia te whakaaro o ngā pito autō whakaputa hei whakamārama ka aha ina pātata haere te autō i rō te kūaha ki te maitai ngohengohe i roto i te tāpare, ā, he aha te take e kaha mau ana te kūaha ki te tāpare ina kati.

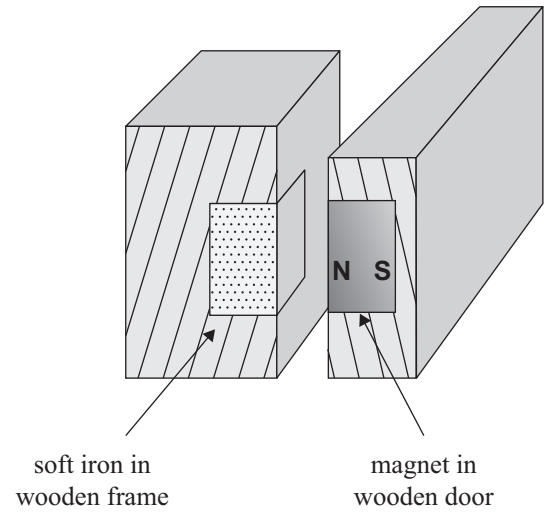
Ka taea e koe te tuhi ki te hoahoa hei āwhina i tō whakamārama.

(d) Ka whakawhiwhia koe ki tētahi autō me tētahi pae maitai. He matai ngohengohe, autō rānei te pae maitai.

Whakamāramahia me pēhea tō whiwhi mōhio mēnā he autō te pae maitai, kāore rānei.

ASSESSOR'S USE ONLY

The diagram below shows the arrangement of a magnetic catch on the wooden door of a kitchen cupboard. It consists of a magnet set in the wooden door and a piece of soft iron set in the wooden frame.



(c) Use the idea of induced magnetic poles to explain what takes place as the magnet in the door approaches the soft iron in the frame, and why the door is firmly held against the frame when it is shut.

You may draw on the diagram to aid your explanation.

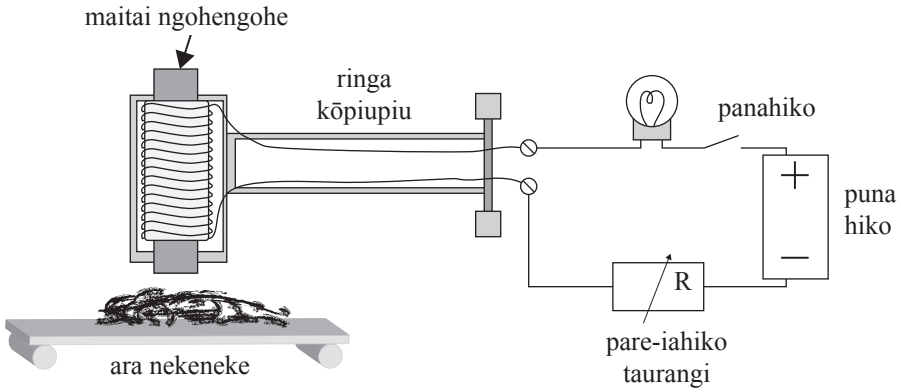
(d) You are given a magnet and a metal bar. The metal bar is either a soft iron or a magnet.

Explain how you could find out if the metal bar is a magnet or not.

PĀTAI TUATORU: HE PĀNGA AUTŌ ATU ANŌ

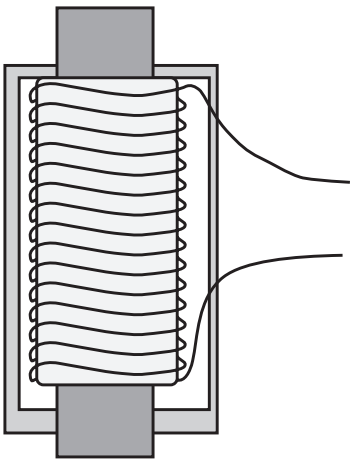
MĀ TE KAIMĀKA ANAKE

E whakaatu ana te hoahoa i raro i ngā āhuatanga o tētahi whakawehe autō e whakamahia ana i roto i tētahi teihana tukurua hei hīkaro maitai mai i tētahi ranunga i runga ara nekeneke. Kei roto tētahi autōhiko whai iho maitai ngohengohe e tūhono ana ki tētahi puna hiko. Ka piupiu haere te ringa i runga ake o te ara nekeneke, ā, kei te kati te pana. Kātahi ka piu haere atu te ringa ki tētahi paepae, ā, ka huakina mai te pana hei tuku i ngā matū ki roto i te paepae.



(a) Ki te hoahoa i raro, whakamahia ngā reta '**R**' me '**T**' hei tohu i te pito raki me te pito tonga o te autōhiko.

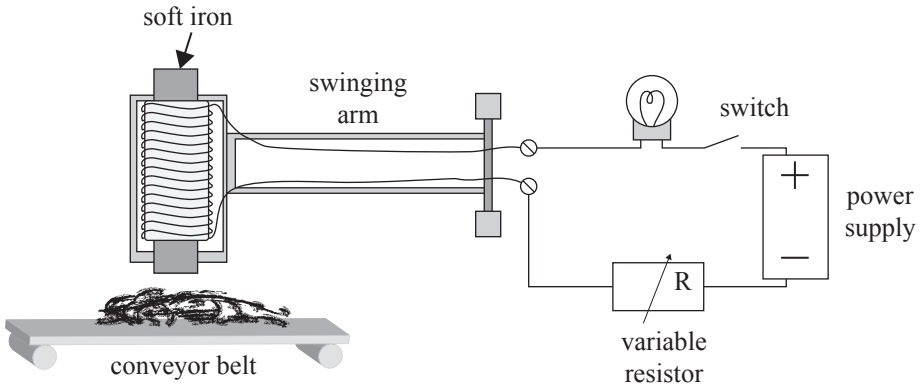
(b) Ki taua hoahoa anō, tuhia te hanga me te ahunga o te papa autō **i roto** i te iho maitai.



QUESTION THREE: MORE MAGNETIC EFFECTS

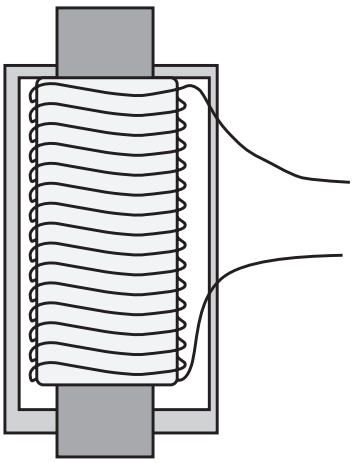
ASSESSOR'S USE ONLY

The diagram below shows the features of a magnetic separator used in a recycling station to extract iron from a mixture on a conveyor belt. It consists of an electromagnet with a soft iron core connected to a power supply. The arm swings above the conveyor belt and the switch is closed. The arm then swings over to a container and the switch is opened to release the material into the container.



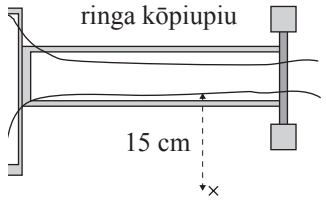
(a) On the diagram below, use the letters '**N**' and '**S**' to label the north and the south poles of the electromagnet.

(b) On the same diagram, draw the shape and the direction of the magnetic field **inside** the iron core.



Ka hono ngā taura waea i roto i te ringa kōpiupiu i te autōhiko ki te puna hiko. Ina whiti te iahiko mā te taura waea, ka karapotia mai e tētahi papa autō.

Ko te uara o k he 2.0×10^{-7} T m A^{-1}.



(c) Ka whakaritea te puna hiko ki te 150 V, ā, ko te parenga iahiko tapeke o te ara iahiko he 25 Ω, tae atu ki te pare-iahiko taurangi.

Tātaihia te kaha o te papa autō nā te **taura waea o raro** i tētahi pūwāhi 15 cm te tawhiti mai.

Kaha _____

(d) (i) Whakamāramahia te take i whakaurua te pare-iahiko taurangi ki te ara iahiko.

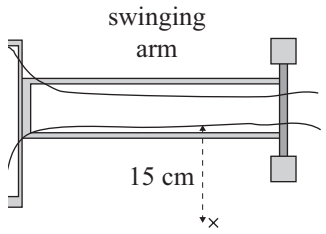
(ii) Whakamāramahia te take ka mahi tonu te pūrere mēnā ka takahuritia te pitoruatanga o te puna hiko.

MĀ TE KAIMĀKA ANAKE

ASSESSOR'S USE ONLY

The cables inside the swinging arm connect the electromagnet to the power supply. When the current passes through the cable, a magnetic field is set up around it.

The value of k is 2.0×10^{-7} T m A^{-1}.



(c) The power supply is set at 150 V, and the total resistance of the circuit is 25 Ω, including the variable resistor.

Calculate the strength of the magnetic field due to the **lower cable** at a point 15 cm away from it.

Strength _____

(d) (i) Explain why the variable resistor is included in the circuit.

(ii) Explain why the device would still work if the polarity of the power supply is reversed.

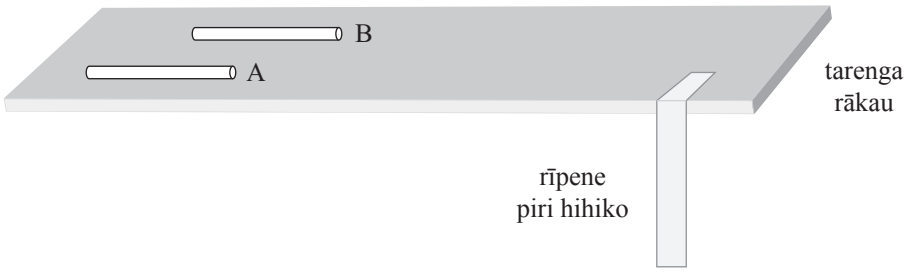
PĀTAI TUAWHĀ: NGA PĀHEKOHEKOTANGA HIHIKO

MĀ TE KAIMĀKA ANAKE

(a) Ina herua ngā makawe mā tētahi heru kirihou, ka whana tōrarotia te heru.

Tuhia te momo hihiko kei ngā makawe, ka whakamāramahia he aha i whana pēneitia ai ngā makawe.

(b) E whakaatu ana te hoahoa i tētahi rīpene piri **hihiko** e iri ana i tētahi tarenga rākau. E rua ngā toko hihiko kei runga i te tarenga rākau. Kei te whana tōrungatia te toko A, ā, kei te whana tōrarotia te toko B.



Whakamāramahia ka pēhea tō kimi i te momo hihiko kei te rīpene mā te whakamahi i ngā toko.

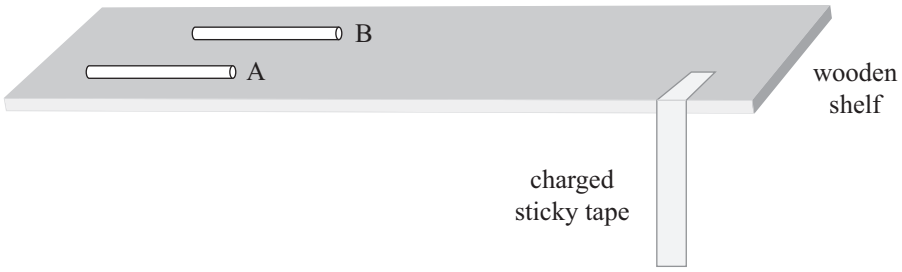
QUESTION FOUR: CHARGE INTERACTIONS

ASSESSOR'S USE ONLY

(a) When hair is combed with a plastic comb, the comb becomes negatively charged.

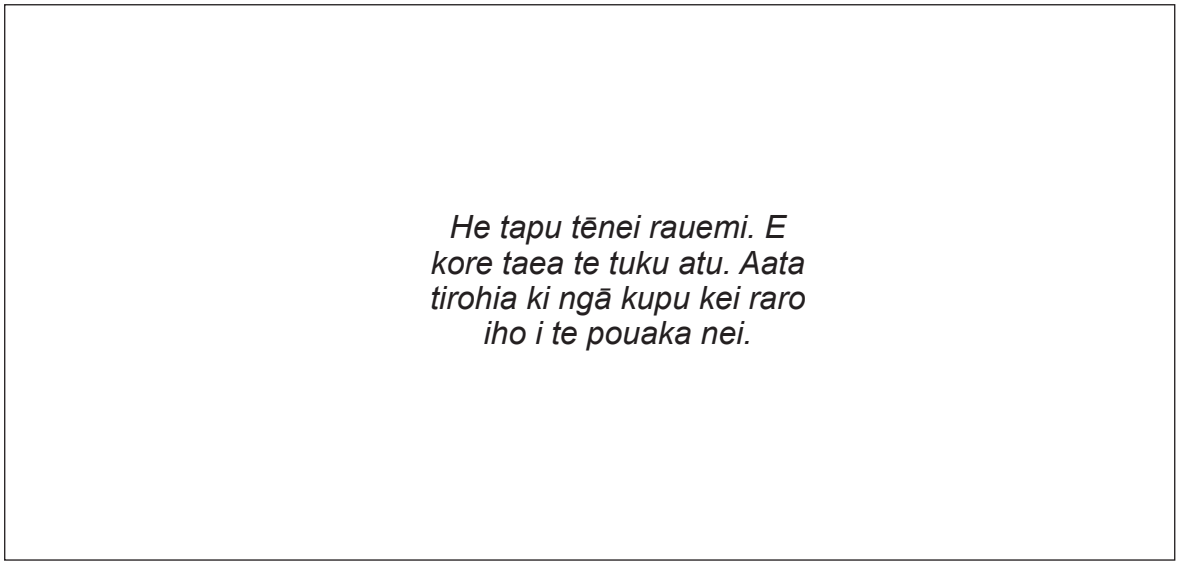
State the type of charge on the hair, and explain why hair becomes charged this way.

(b) The diagram shows a **charged** strip of sticky tape hung from a wooden shelf. There are two charged rods on the wooden shelf. Rod A is positively charged, and rod B is negatively charged.



Explain how you could find out the type of charge on the tape using the rods.

(c) Whakamahia ai e ētahi kaiwhakatipu āporo i te whakarehu patekohiko o ngā matū hei papare i ngā tipu mai i ngā ngārara. I roto i te hoahoa, kua hiko oratia te rākau āporo ki te oneone. E tūhonoa ana te pū whakarehu ki tētahi puna oho ngaohiko teitei.



http://biology.phillipmartin.info/biology_apple_tree.html

Whakamāramahia te take e whiwhi rehu ana ngā taha e rua o ngā rau ina whakamahia te whakarehu patekohiko.

(d) Ka whakamarokehia he tarau me tētahi hāte ki roto i tētahi mīhini hurihuri whakamaroke kākahu. Ina tangohia mai i te mīhini whakamaroke, ka piri tahi ngā kākahu.

Mā te whakamahi i te whakaaro o te hiko pateko, whakamāramahia mai he aha i piri tahi ai ngā kākahu i te tangotanga mai i te mīhini whakamaroke.

MĀ TE KAIMĀKA ANAKE

ASSESSOR'S USE ONLY

(c) Some apple growers use electrostatic spraying of chemicals to protect plants from insects. In the diagram, the apple tree in the soil is earthed. The spray gun is connected to a high voltage positive supply.

http://biology.phillipmartin.info/biology_apple_tree.html

Explain why both sides of the leaves receive spray when electrostatic spraying is used.

(d) A pair of pants and a shirt are dried in an electric tumble clothes dryer. When taken out of the dryer, the clothes stick together.

Using the idea of static electricity, explain why the dry clothes stick to each other after being removed from the dryer.

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

90937 Demonstrate understanding of aspects of electricity and magnetism

2.00 pm Monday 25 November 2013
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 2–19 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.