See back cover for an English translation of this cover

1

90939M

909395

NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

SUPERVISOR'S USE ONLY

Ahupūngao, Kaupae 1, 2013

90939M Te whakaatu māramatanga ki ētahi āhuatanga o te wera

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 wera.	Te whakaatu māramatanga hōhonu ki ētahi āhuatanga o te wera.	Te whakaatu māramatanga matawhānui ki ētahi āhuatanga o te wera.

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 2–15 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

Ka taea e koe te whakamahi ngā raraunga e whai ake mō ngā pātai.

Kahapuri wera[1] motuhake o te wai	$= 4200 \text{ J kg}^{-1} \text{ K}^{-1}$
Wera torohū o te hononga tio	$= 3.3 \times 10^5 \text{ J kg}^{-1}$
Wera torohū o te tākohutanga o te wai	$= 2.3 \times 10^6 \text{ J kg}^{-1}$

PĀTAI TUATAHI: WHAKAWHITI PŪNGAO WERA

(a) E toru ngā momo tikanga whakawhiti pūngao wera.

Whakaingoatia ia tikanga whakawhiti pūngao wera me te whakaingoa anō i te kawenga (totoka/wē/haurehu) mō ia tikanga e taea ai te whakawhiti pūngao wera mōrahi.

1. _____

_____

2. _____

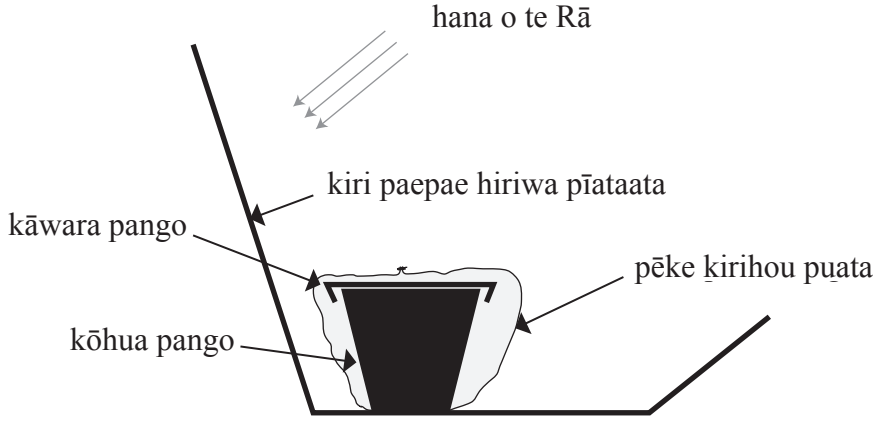
_____

3. _____

_____

E whakaatu ana te pikitia i tētahi tō kōmaru e whakamahia ana ki te whakawera kai. He kiri paepae hanga-L tōna me tētahi pātū hiriwa o roto. He pūhara kei waenga mō tētahi kōhua. Ka whakatūhia tētahi kōhua pango me te kāwara[2] ki roto i tētahi pēke kirihou puata kati.

E whakaatu ana te hoahoa i raro i te tō mai i te taha.



[1] pōkākā
[2] taupoki, popoki

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

ASSESSOR'S USE ONLY

You may use the following data for any question:

Specific heat capacity of water	$= 4200 \text{ J kg}^{-1} \text{ K}^{-1}$
Latent heat of fusion of ice	$= 3.3 \times 10^5 \text{ J kg}^{-1}$
Latent heat of vaporisation of water	$= 2.3 \times 10^6 \text{ J kg}^{-1}$

QUESTION ONE: HEAT TRANSFER

(a) There are three different heat transfer methods.

Name each heat transfer method and name the medium (solid / liquid / gas) for each method that would allow for maximum heat transfer to occur.

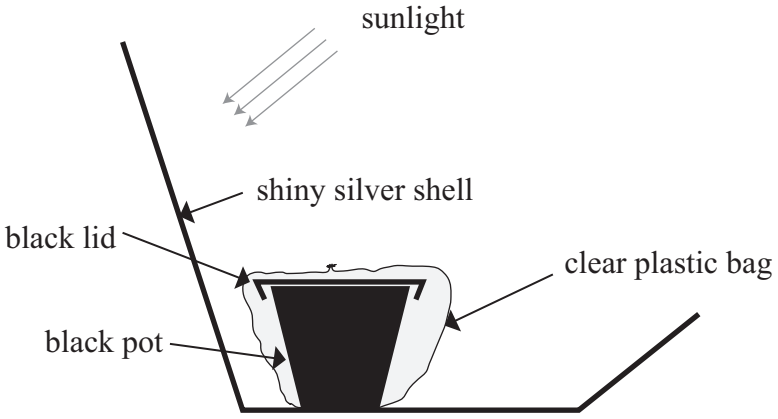
1. _____

2. _____

3. _____

The picture shows a solar cooker being used to heat food. It consists of an L-shaped shell with a silver interior wall. There is a platform in the middle for a cooking pot. A black cooking pot with a lid will be placed inside a closed clear plastic bag.

The diagram below shows a side view of the cooker.



Ko ngā āhuatanga matua o te tō:

- te pātū pīataata o roto o te tō
- te mata pango o te kōhua
- te kiri paepae whakaata hanga-L

(b) Whakamāramahia mai he pēhea e āwhina ai ēnei tūāhua ki te whakawera tōtika i te kai.

(c) Whakamāramahia te take ka āwhina te kāwara ki te whakatere ake i te tunu i te kai.

(d) Ka katia e te pēke kirihou puata kati tētahi apa[3] hau huri noa i te kōhua.

Whakamāramahia mai he pēhea te kōpani i te tō ki roto i te pēke kirihou **puata** e āwhina ai ki te whakatere ake i te tunu kai.

MĀ TE KAIMĀKA ANAKE

[3] papanga

ASSESSOR'S USE ONLY

The main features of the cooker are:

- the shiny interior wall of the cooker
- the black surface of the pot
- the L-shaped reflector shell.

(b) Explain how these features help heat the food efficiently.

(c) Explain why the lid on the pot helps to cook the food more quickly.

(d) The closed clear plastic bag traps a layer of air around the pot.

Explain how enclosing the cooker inside the **clear** plastic bag aids faster cooking.

PĀTAI TUARUA: TE WHAKAWERA WAI I ROTO I TĒTAHI TŌ KŌMARU

MĀ TE KAIMĀKA ANAKE

(a) Tuhia mai te tikanga o te kupu **pāmahana**.

(b) Ka putua[4] 100 g wai i te 23°C ki roto i te kōhua o te tō kōmaru ka waiho i te Rā me te kore kāwara mō te 20 meneti.

I te paunga o te rua meneti, ko te pāmahana o te wai he 42°C.

Tātaihia te nui o te **pūngao wera** i riro mai i te wai.

pūngao wera _____

(c) Ka pau te 20 meneti e whakawerahia ana, ka korohū te wai i te 100°C. I te tangohanga mai o te kōhua i te tō, he 87 g anake te papatipu o te wai i roto i te kōhua.

Whakamāramahia mai, e pā ana ki te nekehanga korakora, i ahatia te wai i roto i te 20 meneti.

Me whakaatu tō whakautu i te māramatanga ki ngā kupu **pūngao wera** me te **pāmahana**.

[4] tāringitia

QUESTION TWO: HEATING WATER IN A SOLAR COOKER

ASSESSOR'S USE ONLY

(a) State what is meant by the term **temperature**.

(b) 100 g of water at 23°C is poured into the solar cooker's pot and left in the sun without the lid for 20 minutes.

Two minutes later, the temperature of the water is 42°C.

Calculate the amount of **heat energy** gained by the water.

heat energy

(c) After 20 minutes of heating, the water boils at 100°C. When the pot was removed from the cooker, the mass of the water in the pot was only 87 g.

Explain, in terms of particle motion, what has happened to the water during the 20 minutes.

Your answer should show an understanding of the terms **heat energy** and **temperature**.

(d) (i) I roto i te 20 meneti o te whakawera, ka piki te pāmahana o te wai mai i te 23°C ki te 100°C, ā, ka heke te papatipu o te wai mai i te 100 g ki te 87 g.

Tātaihia te nui o te pūngao wera i whakawhitihia ki te wai i roto i te 20 meneti.

nui o te pūngao wera _____

(ii) Tātaihia te **hiko toharite** o te tō kōmaru i roto i te 20 meneti.

hiko _____

MĀ TE KAIMĀKA ANAKE

ASSESSOR'S USE ONLY

(d) (i) During 20 minutes of heating, the temperature of the water rises from 23°C to 100°C, and the mass of the water decreases from 100 g to 87 g.

Calculate the amount of heat energy transferred to the water in 20 minutes.

amount of heat energy _____

(ii) Calculate the **average power** of the solar cooker during the 20 minutes.

power _____

PĀTAI TUATORU: NOHO PUNI

MĀ TE KAIMĀKA ANAKE

(a) Ina noho a Sonya ki tētahi tūru puni, ka pā mai te mōhio ki a ia he mātao ake te anga maitai ki te papanga o te tūru, ahakoa kei te pāmahana ōrite te maitai me te papanga.

Whakamāramahia mai tēnei rerekētanga.

(b) Ka tahuna e Sonya he ahi kōpae. E mōhio ana ia me eke te pāhamana o te wahia ki te 350°C kia tahu ai. Ka kite ia he māmā ake te tiki rārā iti hei tahu tēnā i ngā wahia nui.

Whakamahia ngā kupu **kahapuri wera** me te **pūngao wera** hei whakamārama he aha i māmā ake ai ki te whakawera i ngā rārā iti ki te 350°C hei tahu i te ahi tēnā i ngā wahia nui ake.

(c) E roa ana te noho a Sonya i te taha o te ahi, ka tīmata tana werawera.

Whakamāramahia mai he pēhea e āwhina ai te werawera kia noho kōangiangi te tinana.

QUESTION THREE: CAMPING

ASSESSOR'S USE ONLY

(a) When Sonya sits in a camp chair, she notices that the metal frame feels colder than the fabric of the chair, even though the metal and fabric are at the same temperature.

Explain this difference.

(b) Sonya lights a camp fire. She knows that wood must reach a temperature of 350ºC to burn. She finds that it is easier to get small twigs to burn than large logs.

Use the terms **heat capacity** and **heat energy** to explain why it is easier to heat the small twigs to 350°C to start the fire than the large logs.

(c) After being near the fire for a while, Sonya begins to sweat.

Explain how sweat helps to cool her body.

(d) Ao ake i te ata, ka rewa i a Sonya he tio mā te tō kōmaru. Ko te hiko e wātea ana i te tō he 0.15 kW.

Tātaihia te wā mō te tio 100 g i te 0°C kia rewa hei wai i te 0°C.

wā _____

MĀ TE KAIMĀKA ANAKE

ASSESSOR'S USE ONLY

(d) The next morning, Sonya melts some ice using a gas cooker. The power available from the cooker is 0.15 kW.

Calculate the time for 100 g of ice at 0°C to melt into water at 0°C.

time _____

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

90939 Demonstrate understanding of aspects of heat

2.00 pm Monday 25 November 2013
Credits: Four

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

90939M

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 – 15 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.