

SUPERVISOR'S USE ONLY

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Tirohia te uhi o muri e kitea ai te
whakapākehātanga o tēnei uhi

92047M



920475

Tuhia he (X) ki te pouaka mēnā
kāore koe i tuhi kōrero ki tēnei puka

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Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Te Pūtaiao ā-Ahupūngao, ā-Nuku, ā-Tuarangi, Kaupae 1, 2025

92047M Te whakaatu māramatanga ki tētahi pūnaha ōkiko
mā te whakamahi huatau pūngao

Ngā whiwhinga: E rima

Paetae	Kaiaka	Kairangi
Te whakaatu māramatanga ki tētahi pūnaha ōkiko mā te whakamahi huatau pūngao.	Te whakamārama i tētahi pūnaha ōkiko mā te whakamahi huatau pūngao.	Te tātari i tētahi pūnaha ōkiko mā te whakamahi huatau pūngao.

Tirohia kia kitea ai e rite ana te Tau Ākonga ā-Motu (NSN) kei runga i tō puka whakauru ki te tau kei runga i tēnei whārangi.

Me whakamātau koe i ngā tūmahi KATOA kei roto i tēnei pukapuka.

Tangohia te Pukapuka Rauemi 92047MR i te puku o tēnei pukapuka.

Whakaaturia ngā whiriwhiringa KATOA.

Ki te hiahia wāhi atu anō koe mō ō tuhinga, whakamahia ngā whārangi kei muri o tēnei pukapuka.

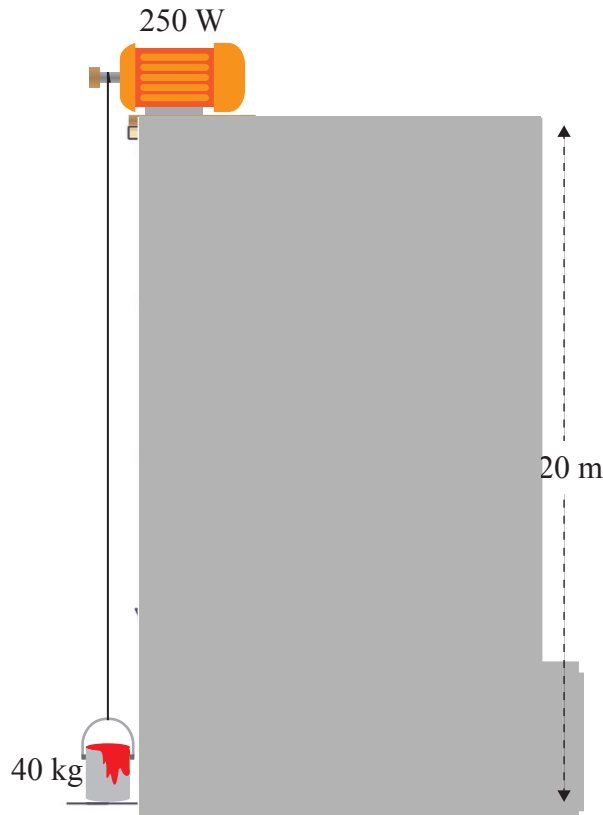
Tirohia kia kitea ai e tika ana te raupapa o ngā whārangi 2–23, ka mutu, kāore tētahi o aua whārangi i te takoto kau.

Kaua e tuhi ki ngā paenga (///). Ka poroa aua wāhanga ka mākahia ana te pukapuka.

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

TE TŪMAHI TUATAHI: TE HIKI I TĒTAHI IPU PEITA

Kua herea tētahi ipu peita ki tētahi taura e tino kōmāmā ana. Ka whakamahia e tētahi kaipeita tētahi pūkaha hiko e 250 ana te waekaha hei hiki i te ipu peita, e 40 manokaramu nei te taumaha, i te papa, i te taha o tētahi whare e 20 mita nei te teitei. Ka 35 hēkona te roa e hīkina ai te ipu peita i te papa ki runga o te whare.



Te mātāpuna (kua whakahāngaitia): https://img.pikbest.com/png-images/qiantu/city-cartoon-vector-building-mbe-style-apartment-house_2583356.png!sw800

- (a) Whakaahuatia ngā panonitanga pūngao i te wā ka hīkina e te pūkaha hiko te ipu peita i te taha o te whare.

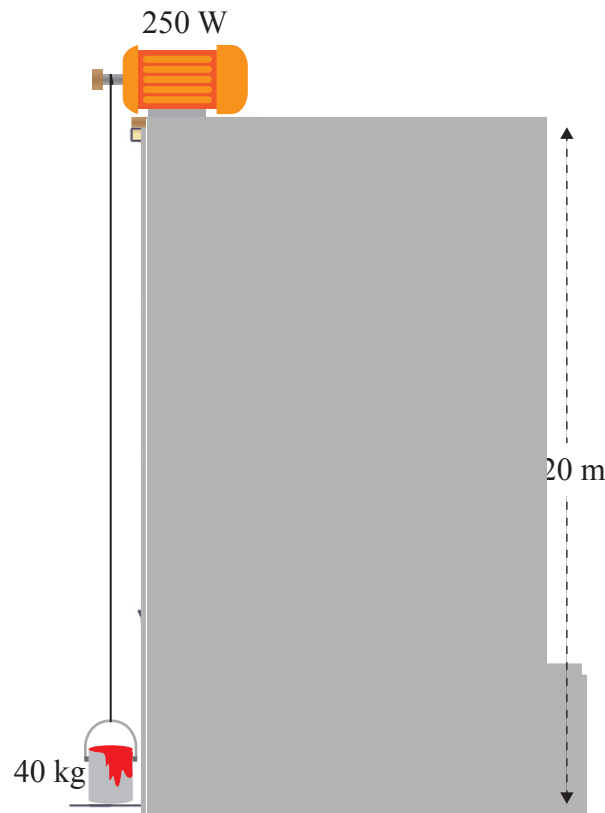
- (b) Whakatairitea te nui o te pūngao ka tukuna e te pūkaha i te nui ake o te pūngao tō ā-papa moe o te ipu peita, i tōna ekenga ki runga o te whare.

I tō tuhinga:

- wānangahia te nui o te pūngao hiko ka tukuna e te pūkaha
- wānangahia te nui ake o te pūngao tō ā-papa moe o te ipu peita atu i te papa ki te 20 m te teitei
- whakamāramahia te take i rerekē ai ēnei tau e rua.

QUESTION ONE: LIFTING A PAINT POT

A paint pot is attached to a very light rope. A painter uses a 250 Watt electric motor to lift a 40 kilogram paint pot up the side of a 20 metre building from the ground. It takes 35 seconds to lift the pot from the ground to the top of the building.



Adapted from: https://img.pikbest.com/png-images/qiantu/city-cartoon-vector-building-mbe-style-apartment-house_2583356.png!sw800

- (a) Describe the energy changes as the motor lifts the paint pot up the side of the building.

- (b) Compare the amount of energy provided by the motor with the gain in gravitational potential energy of the paint pot when it is at the top of the building.

In your answer, you should:

- consider the amount of electrical energy provided by the motor
- consider the amount of gravitational potential energy gained by the paint pot from the ground to a height of 20 m
- explain why there is a difference between these two numbers.

- (c) Kei runga o te whare te ipu peita, kātahi ka motu te taura.

Matapakina te whakawhitinga pūngao o te ipu peita mai i runga o te whare ki te wā e eke ai te ipu ki te hauruatanga o tana takanga iho.

Ka āhei tō whakamahi i te hoahoa rānei, i ngā kupu rānei, (i ngā mea e rua rānei) i tō tuhinga.

Ngā hoahoa:

Ngā hoahoa:

- (c) The paint pot is at the top of the building and the rope breaks.

Discuss the energy transfer of the paint pot from the top of the building to when it is halfway down.

You may use diagrams or words (or both) for your answer.

Diagrams:

Diagrams:

I tō tuhinga, me pānei koe:

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- (d) The paint pot falls from 20 m.

Discuss the speed of the paint pot just before it hits the ground.

In your answer, you will need to:

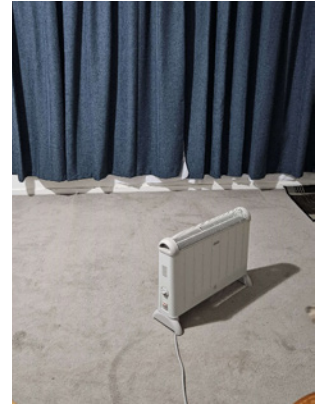
- calculate the maximum speed at which the paint pot hits the ground
- include any assumptions you have made in this calculation
- explain why the paint pot will not reach this speed.



TE TŪMAHI TUARUA: TE NOHO MAHANA TONU

Kei te rūma noho a Loa e makariri ana. Ka tūhono ia i tētahi whakamahana iakawe ki te pūtuku hiko, ka whakakā ai. Ka waiho a Loa i te whakamahana ki te rūma, ā, ka rongohia ia i te paemahana o te hau takiwā e piki haere ana.

- (a) Whakatairitea ngā huatau o te pūngao paemahana me te pūngao pōkākā.



- (b) Ka kite a Loa ko te 2000 W te mōrahi o te pae pūngao o te whakamahana. Ko te pūtuku ngaohiko i tōna whare, ko te 240 V. Ka whakarite ia i te mataine kia **50% te mōrahi**.

Tātaia te iahiko i te ara pōkākā.

Whakaurua ngā waeine e tika ana.



QUESTION TWO: KEEPING WARM

Loa is in the lounge and feeling cold. She connects a convection heater to the power supply and switches it on. Loa places the heater in the room and notices the temperature of the air begin to rise.

- (a) Compare the concepts of temperature and heat energy.



- (b) Loa notices the maximum power rating for the heater is 2000 W.

The voltage supply in her house is 240 V.

She sets the dial to **50% maximum**.

Calculate the current in the heater circuit.

Include the correct units.



- (c) Loa turns the dial on the heater, which increases the current in the heater.

Discuss how an increase in current in the circuit affects the amount of thermal energy released by the heater.

Use relevant formulae to support your answer; calculations are not required.

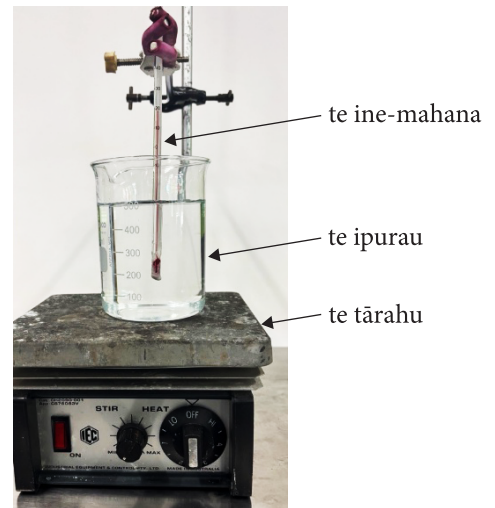
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TE TŪMAHI TUATORU: TE WHAKAWERA I TE WAI

Ka whakamahia e Cecelia ngā taputapu e whakaaturia nei hei ine i te kītanga pōkākā whāiti (c) o te wai.

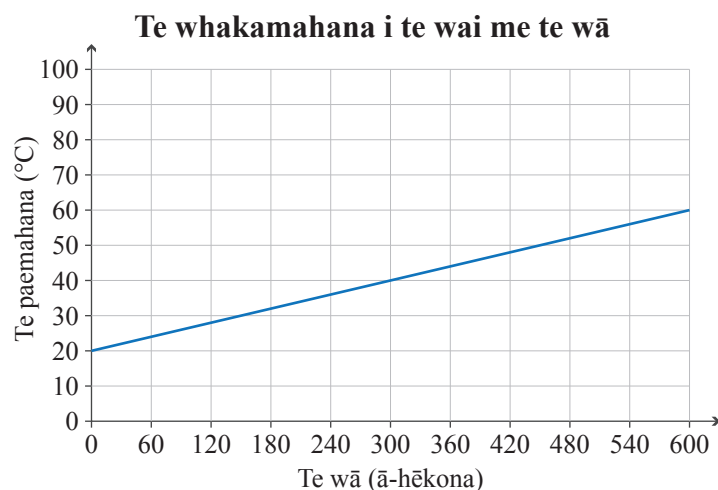
Ka hoatu e ia te 0.5 manokaramu (kg) o te wai ki tētahi ipurau, ka waiho ai ki tētahi tārahu hei whakawera i te wai. Ko te ngaohiko o te tārahu, ko te 24 V, ā, ko te iahiko e tukuna ana ki te tārahu, ko te 5.0 A.



- (a) Tautuhia te kītanga nei: **te kītanga pōkākā whāiti**

- (b) Whakaaturia ko te pūngao hiko ka whakamahia e te tārahu i roto i nga meneti tekau (e 600 hēkona), ko te 72 000 J.

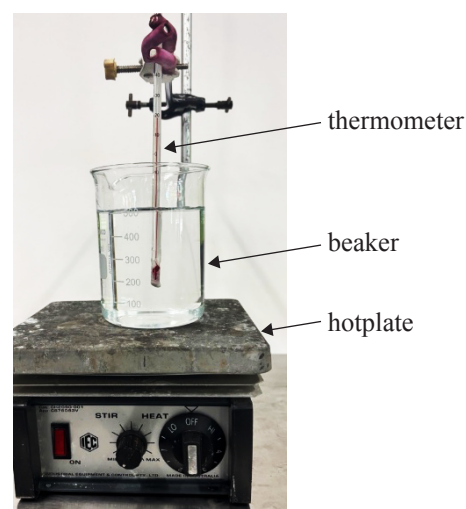
- (c) Ka kauwhatatia e Cecelia te pikinga o te paemahana o te wai i roto i te wā, ā, ka riro i a ia ngā hua e whai ake nei.



QUESTION THREE: HEATING WATER

Cecelia uses the equipment shown to measure the specific heat capacity (c) of water.

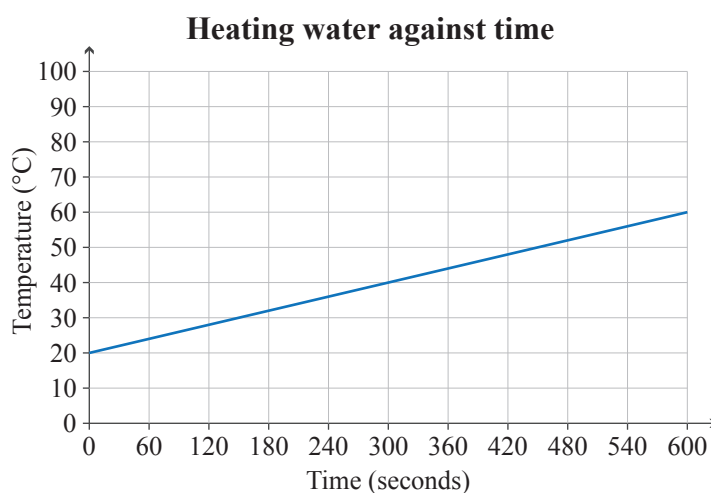
She puts 0.5 kg of water in a beaker on a hotplate to heat the water. The voltage of the hotplate is 24 V, and the current provided to the hotplate is 5.0 A.



- (a) Define the term **specific heat capacity**.

- (b) Show that the electrical energy used by the hotplate over 10 minutes (600 seconds) is 72 000 J.

- (c) Cecelia graphs the increase in water temperature over time, and obtains the following result.



- (i) Tātaia te uara a Cecelia mō te kītanga pōkākā whāiti i puta mai ai i ana hua i roto i te 10 meneti.

I tō tuhinga:

- me mahara ake, e 72 000 J te pūngao hiko
- whakamahia te kauwhata hei rapu i te panonitanga paemahana i roto i te 10 meneti
- kātahi ka tātaia te uara a Cecelia mō te kītanga pōkākā whāiti o te wai.

Whakaurua te waeine e tika ana ki tō tuhinga whakamutunga.

- (ii) Kātahi ka whakatairitea e Cecelia tana uara ki tērā kei te pukamatua.

Matapakina te take e rerekē ana tana uara i te uara kei te pukamatua.

*E rere tonu ana te
Tūmahi Tuatoru i te
whārangi e whai ake ana.*

- (i) Calculate Cecelia's value for the specific heat capacity gained from her results over 10 minutes.

In your answer, you should:

- consider the electrical energy is 72 000 J
- use the graph to find the change in temperature over 10 minutes
- then calculate Cecelia's value for the specific heat capacity of water.

Include the correct unit in your final answer.

- (ii) Cecelia then compares her value with the one in the textbook.

Discuss why her value and the textbook value are different.

*Question Three
continues on the
following page.*

- (d) E rerekē ana te uara a Cecelia mō te kītanga pōkākā whāiti o te wai, tēnā i te uara e takoto ana i te pukamatua.

Matapakina te ara e pai ake ai i a ia tēnei whakamātau kia tika ake ai ngā hua.

I tō tuhinga, me pēnei rawa koe:

- me tā tētahi hoahoa kua whai tapanga e whakaatu ana i ngā whakaritenga o te whakamātau, me TĒTAHI whakapainga ake hei tūtohunga
- whakamāramahia te take e tika ake ai te tuhinga i tēnei panonitanga
- matapakina te huatau o te whakawhitinga pōkākā e whai pānga ana ki tēnei whakapainga ake.

He wāhi tā

- (d) Cecelia's value for the specific heat capacity of water is different from the value given in a textbook.

Discuss how she could improve this experiment to get a more accurate result.

In your answer, you will need to:

- draw a labelled diagram showing an experimental setup with ONE suggested improvement
- explain why this change would give you a more accurate answer
- discuss the idea of heat transfer linked to this improvement.

Space for drawing

He whārangi anō ki te hiahiatia.
Tuhia te tau tūmahi mēnā e hāngai ana.

TE TAU
TŪMAHI

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

QUESTION
NUMBER

**He whārangi anō ki te hiahiatia.
Tuhia te tau tūmahi mēnā e hāngai ana.**

TE TAU
TŪMAHI

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

QUESTION
NUMBER

English translation of the wording on the front cover

Level 1 Physics, Earth and Space Science 2025

92047M Demonstrate understanding of a physical system using energy concepts

Credits: Five

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of a physical system using energy concepts.	Explain a physical system using energy concepts.	Analyse a physical system using energy concepts.

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.

Pull out Resource Booklet 92047MR from the centre of this booklet.

Show ALL working.

If you need more room for any answer, use the extra space provided at the back of this booklet.

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

Do not write in the margins (///). This area will be cut off when the booklet is marked.

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