91261M

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SUPERVISOR'S USE ONLY

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

Te Pāngarau me te Tauanga, Kaupae 2, 2017

91261M Te whakahāngai tūāhua taurangi hei whakaoti rapanga

2.00i te ahiahi Rāmere 24 Whiringa-ā-rangi 2017
Whiwhinga: Whā

Paetae	Kaiaka	Kairangi
Te whakahāngai tūāhua taurangi hei whakaoti rapanga.	Te whakahāngai tūāhua taurangi mā te whakaaro whaipānga hei whakaoti rapanga.	Te whakahāngai tūāhua taurangi mā te whakaaro waitara hōhonu hei whakaoti rapanga.

Tirohia mēnā 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.

Tirohia mēnā kei a koe te Puka Tikanga Tātai L2–MATHMF.

Whakaaturia ngā mahinga KATOA.

Mēnā ka hiahia whārangi atu anō mō ō tuhinga, whakamahia ngā whārangi wātea kei muri o tēnei pukapuka, ka āta tohu ai i ngā tau tūmahi.

Me whakaatu e koe ngā mahinga taurangi i tēnei pepa. Mā te whakamahi anake i ngā tikanga o te kimikimi ka tirotiro me te whakatika ka herea te ākonga ki te taumata Paetae.

Tirohia mēnā e tika ana te raupapatanga o ngā whārangi 2–23 kei roto i tēnei pukapuka, ā, kāore tētahi o aua whārangi i te takoto kau.

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

TAPEKE

MĀ TE KAIMĀKA ANAKE

TŪMAHI TUATAHI

MĀ TE KAIMĀKA ANAKE

(a) Whakarūnāhia, ā, kia tōrunga ngā taupū:

(i) $3(4x)^{-2}$

(ii) $\left(\dfrac{16x^4}{x^6}\right)^{\frac{3}{2}}$

(b) Whakarūnā katoatia te kīanga $\dfrac{2x^2-50}{9x^2-39x-30}$.

QUESTION ONE

ASSESSOR'S USE ONLY

(a) Simplify the following, leaving your answer with positive indices:

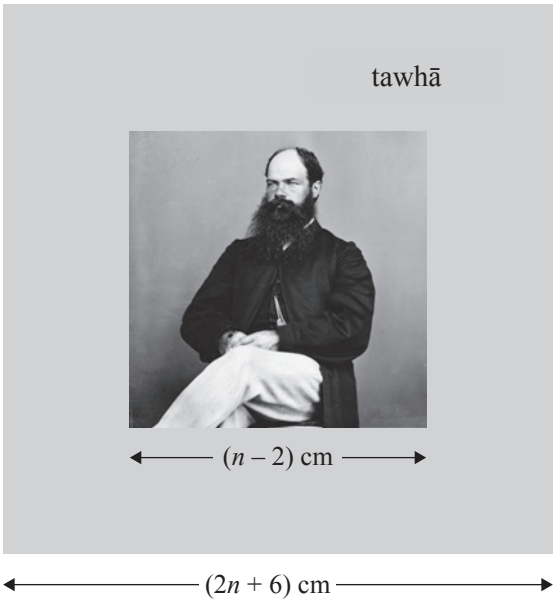
(i) $3(4x)^{-2}$

(ii) $\left(\dfrac{16x^4}{x^6}\right)^{\frac{3}{2}}$

(b) Fully simplify the expression $\dfrac{2x^2 - 50}{9x^2 - 39x - 30}$.

(c) Kua whakamaua e Rāwiri he whakaahua tapawhā-rite ki tētahi kāri tapawhā-rite.

MĀ TE KAIMĀKA ANAKE



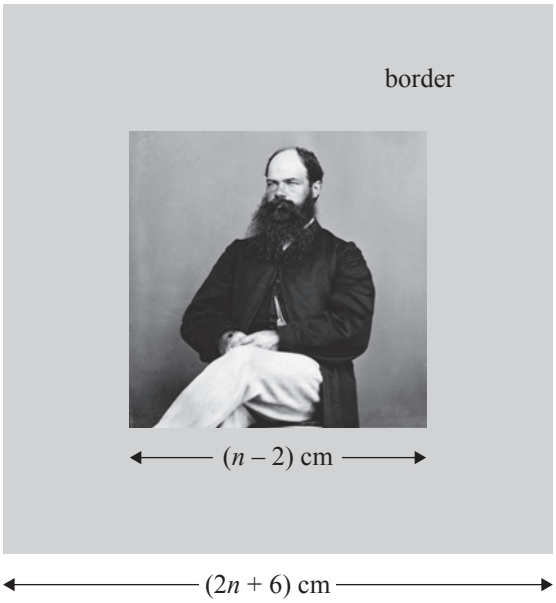
He whānui aumou te tawhā o te whakaahua.

He $(n - 2)$ cm ngā roanga taha o te whakaahua, ā, ko ngā roanga taha o te kāri he $(2n + 6)$ cm.

Mēnā ko te horahanga tapeke o te tawhā he 200 cm^2, whiriwhiria te whānui o te tawhā.

ASSESSOR'S USE ONLY

(c) David has mounted a square photo on a square piece of card as shown below.



The border around the photo is of constant width.

The photo has sides of length $(n - 2)$ cm while the card has sides of $(2n + 6)$ cm.

If the total area of the border is 200 cm^2, find the width of the border.

(d) Kua rīhitia e tētahi kaiako he pahi kura mō te $560 mō tētahi haerenga ā-rā me ngā ākonga.
Ko te utu o te rīhi i te pahi ka tuaritia ōritetia i waenga i ngā ākonga.
I mua tonu iho i te haere, e tokoturu o ngā ākonga kāore i wātea ki te haere.
Nā tēnei, ka piki te utu ki tēnā ki tēnā o rātou i haere mā te $1.50.

E hia ngā ākonga i haere i te haerenga?
Parahautia tō tuhinga.

MĀ TE KAIMĀKA ANAKE

(d) A teacher has hired a school bus for $560 for a day trip with students.
The cost of hiring the bus is to be shared equally between the students.
At the last moment, three of the students were unable to go.
As a result, the cost to each of those who did go was increased by $1.50.

How many students finally went on the trip?
Justify your answer.

ASSESSOR'S USE ONLY

TŪMAHI TUARUA

MĀ TE KAIMĀKA ANAKE

(a) Whakaotihia te whārite e whai nei mō x:

$\log_2 x = 10$

(b) Whakaotihia te whārite e whai nei mō x:

$\log_x 49 = 2$

Parahautia tō whakautu.

(c) Whiriwhiria te uara o $\log_{\sqrt{5}}\left(\frac{1}{125}\right)$.

QUESTION TWO

ASSESSOR'S USE ONLY

(a) Solve the following equation for x:

$\log_2 x = 10$

(b) Solve the following equation for x:

$\log_x 49 = 2$

Justify your answer.

(c) Find the value of $\log_{\sqrt{5}}\left(\frac{1}{125}\right)$.

(d) Ka whakaheke haere tonu te uara o tētahi rorohiko mai i te $4699 ki te $1500 i roto i te 4.25 tau.

Ko te uara, $\$y$, o te rorohiko i te t tau i muri i te wā e $4699 te uara ka taea te whakatauira mā tētahi pānga o te āhua

$y = Ar^t$, ina ko r he aumou.

Whiriwhiria te uara o te rorohiko i muri i te ono tau.

MĀ TE KAIMĀKA ANAKE

(d) A computer depreciates continuously in value from \$4699 to \$1500 over a period of 4.25 years.

The value, \$$y$, of the computer t years after its value was \$4699 can be modelled by a function of the form

$y = A\mathrm{r}^t$, where r is a constant.

Find the computer's value after six years.

ASSESSOR'S USE ONLY

(e) Me kī ko p te kaupapa o te ture tātai:

$$81^{\left(\frac{px}{q}-3\right)} = 243$$

MĀ TE KAIMĀKA ANAKE

(e) Make p the subject of the formula:

$$81^{\left(\frac{px}{q}-3\right)} = 243$$

ASSESSOR'S USE ONLY

TŪMAHI TUATORU

MĀ TE KAIMĀKA ANAKE

(a) Ko te whārite pūrua $4x^2 + bx - 5 = 0$ kua whai otinga $-\frac{1}{2}$ me $\frac{5}{2}$.

Whiriwhiria te uara o b.

(b) Mō tēhea, ēhea uara rānei o m he pūtake ōrite e rua tō te whārite $6x^2 - mx = -3$?

QUESTION THREE

ASSESSOR'S USE ONLY

(a) The quadratic equation $4x^2 + bx - 5 = 0$ has solutions $-\frac{1}{2}$ and $\frac{5}{2}$.

Find the value of b.

(b) For what value(s) of m does the equation $6x^2 - mx = -3$ have two equal roots?

(c) Whiriwhiria te (ngā) uara mō k ko te kīanga $kx^2 - 12x + 5k$ he nui ake i te kore i ngā wā katoa.

MĀ TE KAIMĀKA ANAKE

Ka haere tonu te Tūmahi Tuatoru i te whārangi 18.

(c) Find the value(s) for k for which the expression $kx^2 - 12x + 5k$ is always greater than zero.

ASSESSOR'S USE ONLY

Question Three continues on page 19.

MĀ TE KAIMĀKA ANAKE

(d) Tuhia $\frac{9}{x^2-9}+\frac{3}{2x+6}$ hei hautanga kotahi ki tōna āhua rūnā rawa atu.

(e) Whiriwhiria te (ngā) uara o m ina kotahi nei te otinga o te whārite $2^{mx-3}=8^{x^2}$.

ASSESSOR'S USE ONLY

(d) Write $\frac{9}{x^2-9}+\frac{3}{2x+6}$ as a single fraction in its simplest form.

(e) Find the value(s) of m for which the equation $2^{mx-3}=8^{x^2}$ has exactly one solution.

He whārangi anō ki te hiahiatia.
Tuhia te (ngā) tau tūmahi mēnā e tika ana.

TAU TŪMAHI

MĀ TE KAIMĀKA ANAKE

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

QUESTION NUMBER

ASSESSOR'S USE ONLY

He whārangi anō ki te hiahiatia.
Tuhia te (ngā) tau tūmahi mēnā e tika ana.

TAU TŪMAHI

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 2 Mathematics and Statistics, 2017

91261 Apply algebraic methods in solving problems

2.00 p.m. Friday 24 November 2017
Credits: Four

91261M

Achievement	Achievement with Merit	Achievement with Excellence
Apply algebraic methods in solving problems.	Apply algebraic methods, using relational thinking, in solving problems.	Apply algebraic methods, using extended abstract thinking, in solving problems.

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 Formulae Sheet L2–MATHF.

Show ALL working.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

You are required to show algebraic working in this paper. Guess-and-check methods, and correct answer(s) only, will generally limit grades to Achievement.

Check that this booklet has pages 2–23 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.