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91261M



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NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

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Te Pāngarau me te Tauanga, Kaupae 2, 2018

91261M Te whakahāngai tūāhua taurangi hei whakaoti rapanga

9.30i te ata Rāapa 14 Whiringa-ā-rangi 2018
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 koe mō ō tuinga, whakamahia te (ngā) whārangi wātea kei muri o tēnei pukapuka, ka āta tohu ai i te tau tūmahi.

Me whakaatu e koe ngā mahinga taurangi i tēnei pepa. Ko te tikanga, mā te whakamahi i ngā tikanga o te kimikimi ka tiro tiro, me te whakautu tika noa iho, 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.

**ME HOATU RAWA KOE I TĒNEI PUKAPUKA KI TE KAIWHAKAHAERE
Ā TE MUTUNGA O TE WHAKAMĀTAUTAU.**

TAPEKE

MĀ TE KAIMĀKA ANAKE

TŪMAHI TUATAHI

(a) Whakarūnā katoatia $(25m^{16})^{\frac{1}{2}}$

(b) Whakarūnā katoatia $\left(\frac{4}{3a}\right)^{-2}$, ā, kia tōrunga te taupū ki tō tuinga.

(c) Tuhia $4 - \frac{b+8c}{3c}$ hei hautanga kotahi ki tōna āhua rūnā rawa atu.

(d) Whakatauwehea katoatia $4bx + 2xy - 6ab - 3ay$

QUESTION ONE

(a) Simplify fully $(25m^{16})^{\frac{1}{2}}$

(b) Simplify fully $\left(\frac{4}{3a}\right)^{-2}$, leaving your answer with a positive index.

(c) Write $4 - \frac{b+8c}{3c}$ as a single fraction in its simplest form.

(d) Factorise fully $4bx + 2xy - 6ab - 3ay$

TŪMAHI TUARUA

(a) Whiriwhiria x mēnā $\log_x 243 = 5$

(b) Whiriwhiria m mēnā $\log_3(4m - 1) = 2$

(c) Kimihia tētahi kīanga mō x e pā ana ki w mēnā $\frac{3^{4x+1}}{9^x} = 27^{\frac{w}{3}}$

QUESTION TWOASSESSOR'S
USE ONLY

(a) Find x if $\log_x 243 = 5$

(b) Find m if $\log_3(4m - 1) = 2$

(c) Find an expression for x in terms of w if $\frac{3^{4x+1}}{9^x} = 27^{\frac{w}{3}}$

(e) Ka pūruatia te huamoni o tētahi haumitanga moni, $\$P$, i te mutunga o ia tau.

Mēnā ko te rahinga tapeke o te haumitanga i muri i te n tau he $\$A$, ko $A = P\left(1 + \frac{r}{100}\right)^n$

ina ko $r\%$ te utu huamoni pūrua i te tau.

(i) Ka haumi a Anushka i te $\$20\,000$ ki te utu huamoni o te 3.85% (arā, ko $A = P(1.0385)^n$).

E hia ngā tau kia eke ai te rahinga o tana haumitanga ki te $\$25\,000$?

(ii) Ka haumi a Semisi i ana moni i tētahi utu huamoni rerekē i te haumitanga a Anushka. Ka huarua te uara o tana haumitanga i muri i te tekau mā rua tau.

He aha te utu huamoni (ōrau) mō te haumitanga a Semisi?

- (e) Interest is compounded on a principal investment, $\$P$, **at the end of each year.**

If the total amount of the investment after n years is $\$A$ then $A = P\left(1 + \frac{r}{100}\right)^n$

where $r\%$ is the compound interest rate per year.

- (i) Anushka invests $\$20\,000$ at an interest rate of 3.85% (so $A = P(1.0385)^n$).

How many years will it take for her investment to be worth $\$25\,000$?

- (ii) Semisi invests his money at a different interest rate than Anushka's investment.
His investment will double in value after twelve years.

What is the interest rate for Semisi's investment?

TŪMAHI TUATORU

(a) Whakaotia ia whārite e whai ake nei mō x :

(i) $12x^2 - 5x = 2$

(ii) $x + 1 - \frac{3}{x} = 0$

(b) Me whakaatu kāore e haukotia te kauwhata o te pānga $y = 2x^2 - 5x + 6$ i te tuaka- x .
Me mātua whakamahi i te taurangi hei tautoko i tō tuhinga.

QUESTION THREE

(a) Solve each of the following equations for x :

(i) $12x^2 - 5x = 2$

(ii) $x + 1 - \frac{3}{x} = 0$

(b) Show that the graph of the function $y = 2x^2 - 5x + 6$ does not cross the x -axis.
You must use algebra to support your explanation.

- (c) E rua ngā otinga tūturu o te whārite $3x^2 + kx - 12 = 0$.

Mēnā ko tētahi o ngā otinga ko te $x = 3$, whiriwhiria tērā atu otinga.

(c) The equation $3x^2 + kx - 12 = 0$ has two real solutions.

If one of the solutions is $x = 3$, find the other solution.

English translation of the wording on the front cover

Level 2 Mathematics and Statistics, 2018

91261 Apply algebraic methods in solving problems

9.30 a.m. Wednesday 14 November 2018
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.