Mā te Kaiwhakauru me te Kura e whakaoti:	
Ingoa:	
Tau NSN:	
Waehere Kura:	

See back cover for an English translation of this cover

1

SUPERVISOR'S USE ONLY

RĀ 1
RĀTŪ

NZQA
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 CAT, Kaupae 1, 2015

91027M Te whakahāngai tūāhua taurangi hei whakaoti rapanga

Rātū 15 Māhuru 2015
Whiwhinga: Whā

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

KĀORE e whakaaetia ngā tātaitai.

Whakaaturia ngā mahinga KATOA.

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

Me whakaatu e koe ngā mahinga taurangi kei tēnei pukapuka. Kāore e whakaaturia te whakaaro whaipānga mā te whakamahi anake i ngā tikanga o te kimikimi ka tirotiro me te whakatika, ā, ka herea te tauira mō tērā wāhanga o te tūmahi ki te taumata Paetae. Ka tāea anake te whakamahi ngā tikanga o te kimikimi ka tirotiro me te whakatika mō te wā kotahi noa iho i roto i tēnei pepa, ā, kāore e whakamahia ēnei hei taunakitanga o te whakaoti rapanga.

Me mātua whakaoti i te ākonga tētahi rapanga i te iti rawa kia tāea ai te taumata Paetae i tēnei paerewa.

Me tuhi ngā otinga ki te āhua taurangi rūnā rawa.

Ina tuhia tētahi tūmahi ki te rerenga kupu me whakamahi koe i tētahi whārite.

Tirohia mēnā e tika ana te raupapatanga o ngā whārangi 2–19 kei roto i tēnei pukapuka, ka mutu, 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.

MĀ TE KAIMĀKA ANAKE	Paearu Paetae	
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.
		Whakakaotanga o te tairanga mahinga

TŪMAHI TUATAHI

MĀ TE KAIMĀKA ANAKE

(a) Whakawhānuitia $(x + 2)(4x - 5)$

(b) Homai ngā taunga-x o ngā pūwāhi e tapahi ana te kauwhata o $y = x(x + 3)$ i te tuaka-x.

(c) I rīhihia e Rani he pahikara hei eke haere.
He $8 te utu mō te rua hāora, ā, me te $3 mō ia hāora i muri mai.
E $23 te utu o tana ekenga.

E hia te roa i rīhihia e Rani te pahikara?

(d) Whakarūnāhia $\dfrac{3ab^2 - 4a^3b + ab^2}{4ab^2}$

QUESTION ONE

ASSESSOR'S USE ONLY

(a) Expand $(x + 2)(4x - 5)$

(b) Give the x-coordinates of the points where the graph of $y = x(x + 3)$ cuts the x-axis.

(c) Rani hired a bike for a ride.
It cost $8 for two hours, and then $3 for every additional hour.
Her ride cost $23.

How long did Rani hire the bike?

(d) Simplify $\dfrac{3ab^2 - 4a^3b + ab^2}{4ab^2}$

(e) He 8 km te tawhiti o te noho i waenga i a Sam rāua ko Jake.

He 10 km te haere a Sam i runga papareti i taua wā tonu ka pahikara mai a Jake i te 15 km.

Mēnā he ōrite tō rāua wā wehe i te kāinga me te ahu atu ki a rāua anō, e hia te tawhiti mai i te kāinga o Jake ki te wāhi ka tūtaki rāua?

Me mātua whakaatu koe kei te whakamahia ngā tikanga taurangi.

MĀ TE KAIMĀKA ANAKE

(f) Kei te ngana a Dani ki te kimi i tētahi uara mō c kia kotahi anake te otinga mō x mai i $x^2 + 6x + c = 0$.

Kimihia te uara mō c me te otinga ki te whārite.

ASSESSOR'S USE ONLY

(e) Sam and Jake live 8 km from each other.

Sam skateboards 10 km in the same time as Jake rides his bike 15 km.

If they both leave home at the same time and travel towards each other, how far from Jake's home will they meet?

You must show the use of algebra.

(f) Dani is trying to find a value for c so that $x^2 + 6x + c = 0$ has only one solution for x.

Find the value for c and the solution to the equation.

TŪMAHI TUARUA

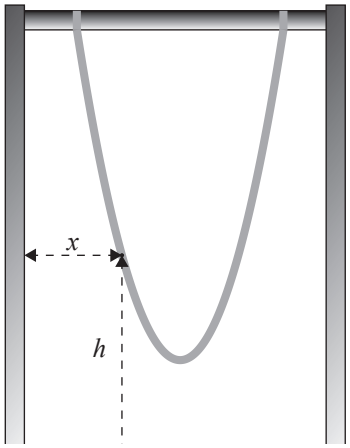
MĀ TE KAIMĀKA ANAKE

(a) Whakatauwehetia a $3x^2 - 11x + 6$

(b) Hangaia ai he tārere mā te whakamau i ngā pito e rua o tētahi taura ki ētahi pūwāhi e rua o tētahi tāpare maitai.

Ko te teitei h mita o te taura i runga ake o te papa mai i te tawhiti o te x mita mai i te taha mauī o te tāpere ka whakatauirahia mā $h = 2x(x - 1.5) + 1$

He aha te teitei i runga ake o te papa o te pūwāhi o te taura ina ko x he 2?



(c) Mēnā $y = x^2 + 3x - 10$, mō ēhea uara o te x ka noho tōraro a y?

QUESTION TWO

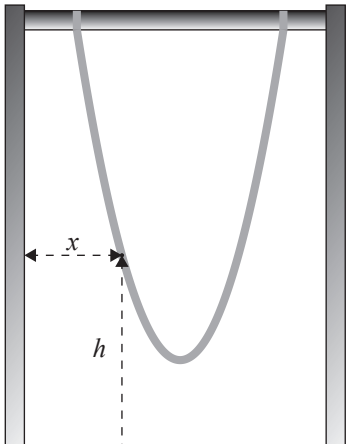
ASSESSOR'S USE ONLY

(a) Factorise $3x^2 - 11x + 6$

(b) A swing is made by attaching two ends of a rope to two different points on a steel frame.

The height h metres of the rope above the ground at a distance x metres from the left-hand side of the frame is modelled by $h = 2x(x - 1.5) + 1$

What is the height above ground of the point on the rope where x is 2?



(c) If $y = x^2 + 3x - 10$, for what values of x will y be negative?

(d) I pokaina a Sharee, ā, me whakapakari ia i tōna kaha mā te hīkoikoi.

Ka āta whakaroa haere ia i ana wā hīkoi.

Kei te hiahia ia ki te whakaroa i te wā e hīkoi ana ia ki te 160 meneti i ia rā.

I te wiki tuatahi ka haere ia ki te hīkoi mō te 10 meneti i ia rā.

I ia Rāhina ka rearuatia e ia te wā e hīkoi ana ia i ia rā.

Ka tāea te whakatauira te wā e hīkoihia ana e ia i ia rā i te wiki n mā te whārite

$$T = 10 \times 2^{n-1}$$

E hia ngā wiki ka eke i a ia tana tūmanako kia hīkoi ia mō te 160 meneti i ia rā?

(e) Ka tonoa a Tāne ki te whakaoti i te whārite:

$$\frac{x^2 - 1}{x^2 + 2x + 1} = \frac{3}{4}$$

Kua hoatu te otinga a Tāne i raro

$4(x^2 - 1) = 3(x^2 + 2x + 1)$

$4x^2 - 4 = 3x^2 + 6x + 3$

$x^2 + 6x - 7 = 0$

$(x + 7)(x - 1) = 0$

$x = -7$, $x = 1$ rānei

Ka kī atu te kaiako o Tāne kei te hē ia, i te mea kotahi anake te otinga tika.

Whakamāramahia mai te hapa a Tāne.

ASSESSOR'S USE ONLY

(d) Sharee has had an operation and needs to build up her strength by walking.

She slowly increases the time for which she walks.

She wants to increase the time for which she walks to 160 minutes each day.

The first week she goes for a 10-minute walk each day.

Each Monday she doubles the time for which she walks each day.

The time for which she walks each day in week n can be modelled by the equation

$$T = 10 \times 2^{n-1}$$

How many weeks will it take her to reach her goal of walking for 160 minutes a day?

(e) Tane is asked to solve the equation:

$$\frac{x^2 - 1}{x^2 + 2x + 1} = \frac{3}{4}$$

Tane's solution is given below

$4(x^2 - 1) = 3(x^2 + 2x + 1)$

$4x^2 - 4 = 3x^2 + 6x + 3$

$x^2 + 6x - 7 = 0$

$(x + 7)(x - 1) = 0$

$x = -7$ or $x = 1$

Tane's teacher tells him he is wrong, as it has only one valid solution.

Explain Tane's mistake.

(f) Ka haere tētahi rōpū ki tētahi papa whakangahau.

E 38 ngā tāngata i roto i te rōpū.

$10 te utu mō te ākonga.

$12 te utu mō te pakeke.

He $420 te utu mō te rōpū katoa.

E hia ngā ākonga i roto i te rōpū?

MĀ TE KAIMĀKA ANAKE

ASSESSOR'S USE ONLY

(f) A group of people go to a fun park.

There are 38 in the group.

The cost for a student is $10.

The cost for an adult is $12.

The total cost for the group is $420.

How many students were in the group?

TŪMAHI TUATORU

MĀ TE KAIMĀKA ANAKE

(a) Ka whakaarohia e Jake tētahi tau, ka tāpiri i te 5, ā, ka whakarea i te otinga mā te 4.
He 24 tana otinga.

Kimihia te tau i whakaarohia e Jake.

(b) He n mita te whānui o tētahi māra tapawhā hāngai.
He 2 mita te roa ake o tana roa i tana whānui.

Kimihia he tātai mō te horahanga o te māra e ai ki a n.

(c) E rima ngā tāngata kei tētahi puni kei te pāngia e te mate puku.
Ka hōrapa te mate ki te pāpātanga aumou r.
I te mutunga o ngā rā e 3, e 320 ngā tāngata kei te pāngia e taua mate.
Ka tāea tēnei te whakatauira mā te:

$$320 = 5r^3$$

Kimihia te pāpātanga aumou, r, i hōrapa ai te mate.

QUESTION THREE

ASSESSOR'S USE ONLY

(a) Jake thinks of a number, adds 5, and multiplies the result by 4.
He gets an answer of 24.

Find the number Jake was thinking of.

(b) A rectangular garden is n metres wide.
Its length is 2 metres longer than its width.

Find a formula for the area of the garden in terms of n.

(c) Five people on a camp have a stomach bug.
The bug spreads at a constant rate r.
At the end of 3 days, 320 people have the bug.
This can be modelled by:

$$320 = 5r^3$$

Find the rate, r, at which the bug is spreading.

MĀ TE KAIMĀKA ANAKE

(d) Kei te akoako a Sarah rāua ko Miree mō ā rāua aromatawai NCEA.

E whakapae ana a Sarah he nui ake ana akoako i a Miree.

Hei tā Miree e 3 hāora te roa o ana akoako i ngā rā e whā o te wiki.

Hei tā Sarah he rua hautoru o taua wā i te wiki te nui o ana akoako, ka mutu he 2 hāora anō i ngā mutunga wiki.

Kei te tika te whakapae a Sarah i ngā wā katoa?

Whakamāramahia mai tō otinga.

(e) Ka whiwhi moni a Samie rāua ko Marius mā te mahi i roto i tētahi māra.

He $14 i te hāora te utu a Marius.

Ko te utu a Samie he $4 te nui ake i te hāora i tā Marius.

He rearuatanga te roa ake o te mahi a Marius i tā Samie.

Huihui katoa he $138 te tapeke o tā rāua utu.

E hia te utu a Samie?

ASSESSOR'S USE ONLY

(d) Sarah and Miree are studying for their NCEA exams.

Sarah claims she does more study than Miree.

Miree says she does 3 hours study on each of four days during the week.

Sarah says she studies for two thirds of that time during the week, and at least a further 2 hours on the weekend.

Is Sarah's claim always correct?

Explain your solution.

(e) Samie and Marius earn pocket money by working in a garden.

Marius earns $14 an hour.

Samie earns $4 an hour more than Marius.

Marius works twice as long as Samie.

Together they earn a total of $138.

How much does Samie earn?

(f) Ko te rōrahi o tētahi rango ko $V = \pi r^2 h$, ā, ko tō te koeko ko $V = \frac{\pi}{3} r^2 h$.
He ōrite te pūtoro o tētahi rango ki te pūtake o tētahi koeko.

Mēnā he rearuatanga ake te rōrahi o te rango ki tō te koeko, homai he kīanga mō te ōwehenga o te teitei o te rango ki te teitei o te koeko.

MĀ TE KAIMĀKA ANAKE

ASSESSOR'S USE ONLY

(f) The volume of a cylinder is given by $V = \pi r^2 h$ and that of a cone is given by $V = \frac{\pi}{3} r^2 h$.
A cylinder has the same radius as the base of a cone.

If the volume of the cylinder is twice that of the cone, give an expression for the ratio of the height of the cylinder to the height of the cone.

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 1 Mathematics and Statistics CAT, 2015

91027 Apply algebraic procedures in solving problems

Tuesday 15 September 2015
Credits: Four

91027MA

You should attempt ALL the questions in this booklet.

Calculators may NOT be used.

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 and correct answer only methods do not demonstrate relational thinking and will limit the grade for that part of the question to a maximum of an Achievement grade. Guess and check and correct answer only may only be used a maximum of one time in the paper and will not be used as evidence of solving a problem.

A candidate cannot gain Achievement in this standard without solving at least one problem.

Answers must be given in their simplest algebraic form.

Where a question is given in words you will be expected to write an equation.

Check that this booklet has pages 2–20 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.

ASSESSOR'S USE ONLY	Achievement Criteria	
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Apply algebraic procedures in solving problems.	Apply algebraic procedures, using relational thinking, in solving problems.	Apply algebraic procedures, using extended abstract thinking, in solving problems.
		Overall level of performance