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 2
RĀPARE

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

Rāpare 17 Mahuru 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 i 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 pātai ki te taumata Paetae. Ka taea 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 taea 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 2–17 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

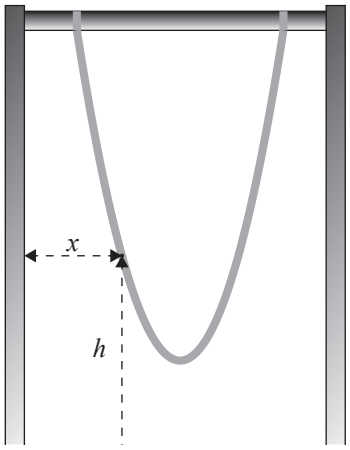
TŪMAHI TUATAHI

MĀ TE KAIMĀKA ANAKE

(a) Whakatauwehetia $2x^2 - 15x + 18$.

(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 x mita mai i te taha mauī o te tāpere ka whakatauirahia mā $h = x(x - 1) + 2$



He aha te teitei o te tārere ina ko x he 2?

(c) Mēnā $y = x^2 + 4x - 12$, mō ēhea uara o te x ka noho tōraro a y?

(d) Kei te whakangungu a Tāne mō tētahi hākinatoru.

I kī atu tana kaiako ki a ia me āta whakapiki haere e ia tana whakangungu.

I te wiki tuatahi he 7 km te tapeke o te tawhiti i oma ia.

I ia wiki ka rearuatia te tawhiti ka omahia e ia.

Ka taea te whakatauira te tawhiti, D, ka omahia e ia mā te whārite $D = 7 \times 2^{n-1}$, ina ko n te maha o ngā wiki.

E hia ngā wiki ka taea e ia te oma ki te 112 km i te wiki.

QUESTION ONE

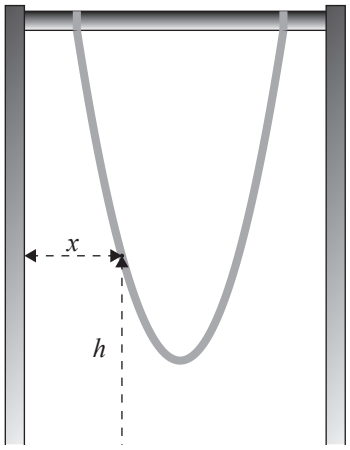
ASSESSOR'S USE ONLY

(a) Factorise $2x^2 - 15x + 18$.

(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 $h = x(x - 1) + 2$

What is the height of the swing when x is 2?



(c) If $y = x^2 + 4x - 12$, for what values of x will y be negative?

(d) Tane is training for a triathlon.

His coach tells him that he should build up his training gradually

The first week he runs a total distance of 7 km.

Each week he doubles the distance that he runs.

The distance, D, that he runs each week can be modelled by the equation $D = 7 \times 2^{n-1}$, where n is the number of weeks.

How many weeks will it take him to be running 112 km per week.

MĀ TE KAIMĀKA ANAKE

(e) Ka tonoa a Shari ki te whakaoti i te whārite $\frac{x^2-1}{x^2+2x+1}=\frac{3}{4}$

Kua hoatu te otinga a Shari 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 Shari kei te hē ia, i te mea kotahi anake te otinga tika.

Whakamāramahia mai te hapa a Shari.

(f) E 21 ngā tāngata ka haere ki tētahi kiriata.
He $14 te utu mō ngā tāngata i raro i te 65 tau, ā, he $10 mō ngā tāngata 65 tau, neke atu rānei.
He $258 te utu mō te rōpū katoa.

E hia ngā tāngata i roto i te rōpū he 65 ō rātou tau, neke atu rānei?

ASSESSOR'S USE ONLY

(e) Shari is asked to solve the equation $\frac{x^2-1}{x^2+2x+1}=\frac{3}{4}$

Shari'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 $x = 1$

Shari's teacher tells her she is wrong, as it has only 1 valid solution.

Explain Shari's mistake.

(f) 21 adults go to a movie.
The cost is \$14 for people under age 65, and \$10 for people aged 65 or over.
The cost for the group is \$258.

How many of the adults in the group are aged 65 or over?

TŪMAHI TUARUA

MĀ TE KAIMĀKA ANAKE

(a) Whakawhānuitia $(3x + 7)(x - 2)$

(b) Ki hea ka tapahi te kauwhata o $y = x(x + 9)$ i te tuaka-x?

(c) He $38 te utu i a Manu ki te tiaki i tana teina mō te rua hāora.
Ka utua anō ia ki te $13 mō ia hāora i muri i tērā.
$77 te tapeke o tana utu.

E hia ngā hāora i utua ia?

(d) Whakarūnāhia $\dfrac{5xy^2 - 2x^3y + xy^2}{4xy^2}$

QUESTION TWO

ASSESSOR'S USE ONLY

(a) Expand $(3x + 7)(x - 2)$

(b) Where would the graph of $y = x(x + 9)$ cut the x-axis?

(c) Manu is paid \$38 to look after her cousin for 2 hours.
She is then paid \$13 per hour after that.
She was paid \$77 altogether.

How many hours was she paid for?

(d) Simplify $\dfrac{5xy^2 - 2x^3y + xy^2}{4xy^2}$

(e) He 15 km te tawhiti o te noho i waenga i a Uenuku rāua ko Tom.
He 12 km te haere a Sam i runga papareti i taua wā tonu ka pahikara mai a Tom i te 18 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 Uenuku 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 Marnie ki te kimi i te uara mō b, kia kotahi anake te otinga mō $x^2 + bx + 16 = 0$.

Whakamahia te taurangi hei kimi i te uara mō b, me te otinga ki te whārite.

ASSESSOR'S USE ONLY

(e) Uenuku and Tom live 15 km from each other.
Uenuku skateboards 12 km in the same time as Tom rides his bike 18 km.

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

You must show the use of algebra.

(f) Marnie is trying to find a value for b so that $x^2 + bx + 16 = 0$ has only one solution.

Use algebra to find the value for b, and the solution to the equation.

TŪMAHI TUATORU

MĀ TE KAIMĀKA ANAKE

(a) E kī ana a Aroha ki te tāpirihia te 7 ki tana tau makau, ka whakawehe i te otinga mā te 4, ko te otinga he 5.

Whakamahia te taurangi hei kimi i te tau makau a Aroha.

(b) Kei te hiahia a Jono ki te hanga i tētahi māra kai he tapawhā hāngai, ko a mita te roa.
He 3 mita te poto ake o tana whānui i tana roa.

Kimihia te horahanga o te māra e ai ki a.

(c) Kei te tipu tētahi taru i te roto ki te pāpātanga o te r m^2 i ia wiki.
He 6 m^2 o te roto i kapia e te taru i te wā i inea tuatahitia te horahanga.
I te mutunga o te 4 wiki i muri mai i te inetanga tuatahi, ko te horahanga e kapia ana e te taru he 486 m^2.
Ka taea tēnei te whakatauira mā te $486 = 6r^4$

Whakamahia te taurangi hei kimi i te pāpātanga r e hōpara ana te taru.

QUESTION THREE

ASSESSOR'S USE ONLY

(a) Aroha says that if she takes her favourite number, adds 7, and then divides the answer by 4, she gets an answer of 5.

Use algebra to find Aroha's favourite number.

(b) Jono wants to make a vegetable garden that is a rectangle a metres long.
Its width is 3 metres shorter than its length.

Find the area of the garden in terms of a.

(c) A weed is growing on a lake at the rate of r m^2 each week.
6 m^2 of the lake was covered when the area was first measured.
At the end of 4 weeks after the area was first measured, the area covered by the weed was 486 m^2.
This can be modelled by $486 = 6r^4$

Use algebra to find the rate r at which the weed is spreading.

(d) Kei te hiahia a Talia rāua ko Kaziah i te tūranga Ringa Tītere o tō rāua kapa poitarawhiti.

E whakapae ana a Talia he nui ake ana whakangungu tītere piro i tā Kaziah.

Hei tā Kaziah 100 ngā tītere i ngā rā whā o te wiki.

Hei tā Talia he toru hauwhā o te rahinga o tā Kaziah ka oti i a ia i te wiki, ka mutu he 80 atu anō i ngā mutunga wiki.

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

Whakamāramahia tō otinga.

(e) Ko te mahi a Marina rāua ko Wiremu he peita i te taiapa a tō rāua Matua Kēkē.
He $20 i te hāora tana utu ki a Marina.
Ko te utu a Wiremu he $2 te iti ake i te hāora i tā Marina.
He reatoru te roa ake o te mahi a Marina i tā Wiremu.
Huihui katoa he $156 te tapeke o tā rāua utu.

E hia te utu a Wiremu?

ASSESSOR'S USE ONLY

(d) Talia and Kaziah are both wanting to get the position of Goal Shoot in their netball team.

Talia claims she does more goal shooting practice than Kaziah.

Kaziah says she does 100 shots on each of four days of the week.

Talia says she does three quarters the amount Kaziah does during the week, and at least a further 80 shots on the weekend.

Is Talia's claim always correct?

Explain your solution.

(e) Marina and Wiremu have a job painting their Uncle's fence.
He pays Marina $20 an hour.
Wiremu is paid $2 less per hour than Marina.
Marina works three times as long as Wiremu.
Together they earn a total of $156.

How much does Wiremu earn?

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

He ōrite te teitei o tētahi rango ki te teitei o tētahi koeko.

Mēnā he reawhā te rōrahi ake o te rango ki tō te koeko, homai he kīanga mō te ōwehenga o te pūtoro o te rango ki te pūtoro 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 height as a cone.

If the volume of the cylinder is 4 times that of the cone, give an expression for ratio of the radius of the cylinder to the radius 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

Thursday 17 September 2015
Credits: Four

91027MB

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 2–18 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