Mā te Kaiwhakauru me te Kura e whakaoti:

Ingoa: _____

Tau NSN: _____

Waehere Kura: _____

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, 2016

91027M Te whakahāngai tūāhua taurangi hei whakaoti rapanga

Rāpare 15 Mahuru 2016
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 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. 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 taumata mō tērā wāhanga o te pātai 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 tēnei 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 2−20 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

(a) (i) Ko te horahanga o tētahi tapawhā hāngai ko $x^2 + 5x - 36$.

(i) He aha ngā roanga o ngā taha o te tapawhā hāngai e ai ki x?

(ii) Mēnā ko te 114 cm^2 te horahanga o te tapawhā hāngai, he aha te (ngā) uara o x?

(b) Ka mauria he nūpepa e Jake rāua ki Mele ki ngā kāinga.

He nui ake ngā nūpepa hei mau mā Jake i ērā mā Mele e mau.

Mēnā ka hoatu a Jake i te 23 nūpepa ki a Mele, ka ōrite te nui o ngā nūpepa ki a rāua.

Mēnā, ka hoatu kē a Mele i te 7 nūpepa ki a Jake, e rua whakareanga ake te maha kei a Jake i ērā kei a Mele.

E hia ngā nūpepa a tēnā, a tēna?

QUESTION ONE

(a)   (i)   A rectangle has an area of $x^2 + 5x - 36$.

What are the lengths of the sides of the rectangle in terms of x?

(ii)   If the area of the rectangle is 114 cm², what is the value(s) of x?

(b)   Jake and Mele deliver newspapers.

Jake has more newspapers to deliver than Mele.

If Jake gave Mele 23 newspapers, they would have the same number of newspapers.

If, instead, Mele gave Jake 7 newspapers, Jake would then have twice as many as Mele.

How many newspapers does each person actually have?

(c) Whakaaturia he ōrite te $\dfrac{3}{2x} + \dfrac{x+4}{4}$ ki te $\dfrac{2x^2 + 8x + 12}{8x}$.

(d) Mō tēhea uara o x ko te $9 \times 3^x = 3^{5x+4}$?

(c)   Show that $\dfrac{3}{2x} + \dfrac{x+4}{4}$ is the same as $\dfrac{2x^2 + 8x + 12}{8x}$.

(d)   For what value of x will $9 \times 3^x = 3^{5x+4}$?

TŪMAHI TUARUA
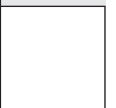
(a) Ko te whārite o tētahi unahi ko $y = 3x^2 - 5x + 7$

He aha te uara o y ina ko $x = 2$?

(b) Mō ēhea uara o x ko te $(x - 3)(x + 3) > (x - 4)(x + 2)$?

(c) Mēnā ko p he tauoti, mō ēhea uara o te p ko te $10 \times 2^{p-1} < 165$?

QUESTION TWO

(a) A parabola has the equation $y = 3x^2 - 5x + 7$

What is the value of y when $x = 2$?

(b) For what values of x is $(x - 3)(x + 3) < (x - 4)(x + 2)$?

(c) If p is a whole number, for what values of p is $10 \times 2^{p-1} < 165$?

(d) $M = 5(a^2 - 3a + 4) + a^2$

$N = (3a - 5)(2a - 4) + 7a$

Kimihia tētahi kīanga mō M e pā ana ki N.

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(e)   Ka tuhi a Janine i ētahi tau e whā: 2, 4, 6, me te 8.

Ka tāpiri ia i ngā takirua tau kia puta mai ai he tapatoru, pēnei e whakaaturia nei i raro.

Ka mutu ia ina tae ki te tau kotahi i runga ake i te tapawhā.

Rārangi 4 $16 + 24 = \mathbf{40}$

Rārangi 3 $6 + 10 = \mathbf{16}$ $10 + 14 = \mathbf{24}$

Rārangi 2 $2 + 4 = \mathbf{6}$ $4 + 6 = \mathbf{10}$ $6 + 8 = \mathbf{14}$

Rārangi 1   **2**   **4**   **6**   **8**
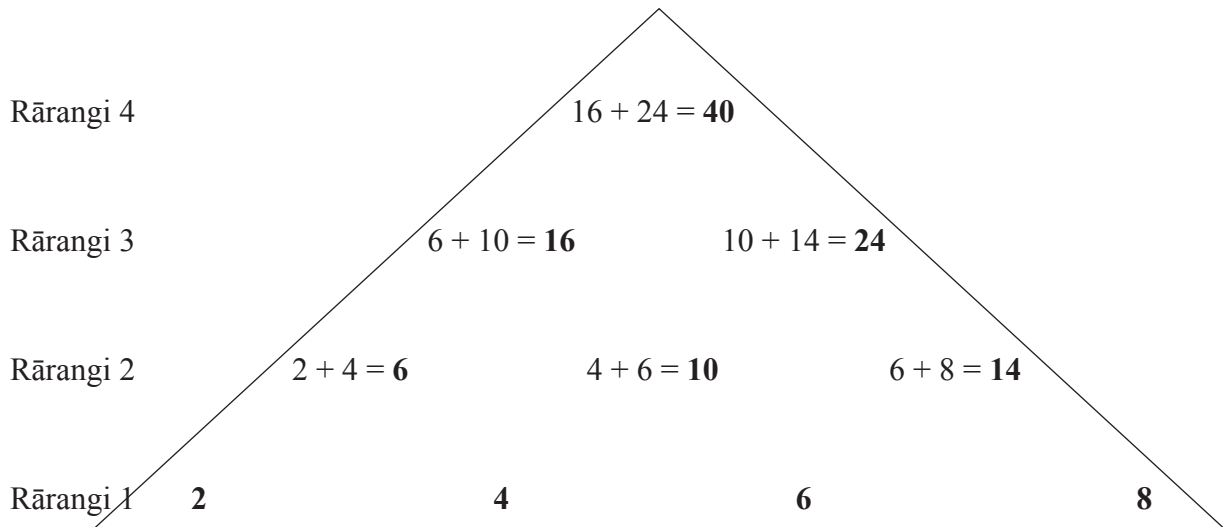
(i)   Tūhura ka tūpono te aha ina hurihia e Janine te raupapa o ngā tau i te Rārangi 1.

Ka whiwhi ia i te otinga ōrite i te Rārangi 4?

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(ii)   Kimihia, mā te taurangi, te pānga o ngā tau i te rārangi tuatahi ki ngā tau i te rārangi tuawhā ina hurihia e ia te raupapa o ngā tau i te Rārangi 1.

Whakamāramatia tō tuhinga.

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(iii) Mēnā ka tuhituhi a Janine i ngā tau piritata e whā kia raupapa, he aha ō mōhio ki aua tau mēnā ka tāea te wehe pū te tau kei runga rawa o te tapatoru ki te toru?

Whakamāramatia tō tuhinga.

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(d) $M = 5(a^2 - 3a + 4) + a^2$

$N = (3a - 5)(2a - 4) + 7a$

Give an expression for M in terms of N.
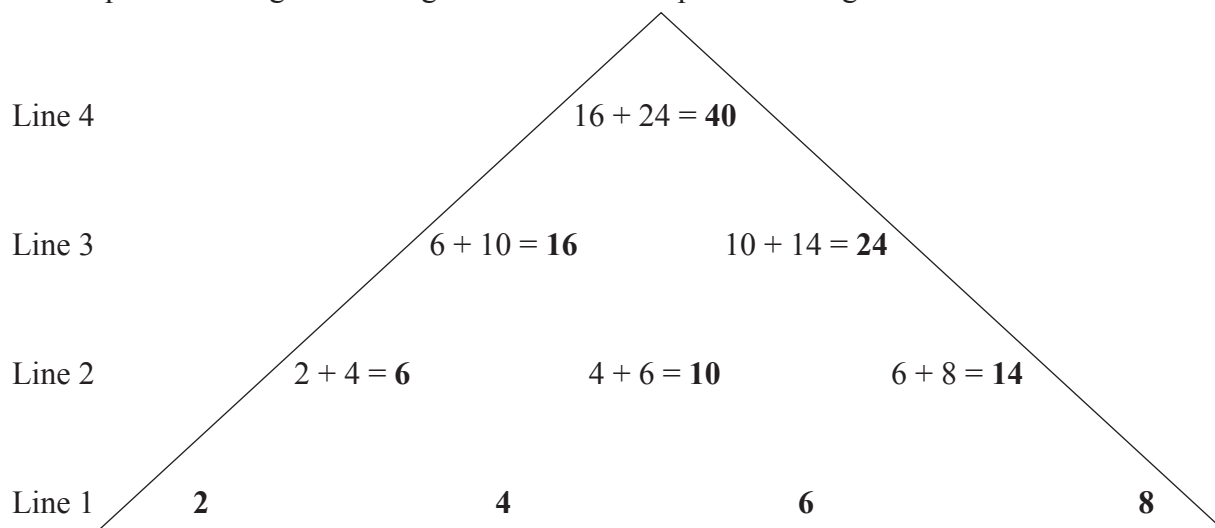
(e) Janine writes down 4 numbers: 2, 4, 6, and 8.

She adds the pairs of numbers to form a triangle as shown below.

She stops when she gets to a single number at the top of the triangle.

Line 4 $16 + 24 = \mathbf{40}$

Line 3 $6 + 10 = \mathbf{16}$ $10 + 14 = \mathbf{24}$

Line 2 $2 + 4 = \mathbf{6}$ $4 + 6 = \mathbf{10}$ $6 + 8 = \mathbf{14}$

Line 1   **2**   **4**   **6**   **8**

(i) Investigate what happens when Janine changes the order of the numbers in Line 1.
Does she get the same answer as in Line 4?

(ii) Find, using algebra, the relationship of the numbers in the first line to the numbers in the fourth line when she changes the order of the numbers in Line 1.

Explain your answer.

(iii) If Janine writes 4 consecutive numbers in order, what do you know about the numbers if the number at the top of the triangle is divisible by 3?

Explain your answer.

TŪMAHI TUATORU

(a) (i) Ko $n^2 - 4n - 5$ te horahanga o tētahi tapawhā hāngai, ina ko n he tau tōrunga.

Mēnā ko $n + 1$ te roanga o tētahi taha, homai te taha tuarua e ai ki n.

(ii) He aha ō mōhio ki te uara o n mō tēnei tapawhā hāngai?

QUESTION THREE

(a)　(i)　The area of a rectangle is $n^2 - 4n - 5$, where n is a positive number.

　　　If one side is has length $n + 1$, give the second side in terms of n.

　(ii)　What do you know about the value of n for this rectangle?

(b)   E tukuna ana te horahanga o tētahi wāhi o te parehe porowhita mā te tātai $A = \dfrac{3}{4}\pi r^2$.

Tuhia te tātai ka tāea te whakamahi ki te whiriwhiri i te pūtoro o te wāhi o tēnei parehe porowhita.

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(c)   Whakaotihia $x^2 - 3x - 10 = 0$.

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(d)   Whakaotihia $\dfrac{x^2 - 3x - 10}{(x+5)(x-5)} = \dfrac{x}{2}$.

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(b) The area of a piece of a circular pizza is given by the formula $A = \dfrac{3}{4}\pi r^2$.

Write the formula that could be used to find the radius of the piece of this circular pizza.

(c) Solve $x^2 - 3x - 10 = 0$.

(d) Solve $\dfrac{x^2 - 3x - 10}{(x+5)(x-5)} = \dfrac{x}{2}$.

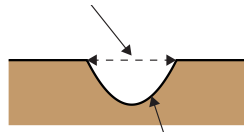(e)   He whakaawa tō tētahi kēmu e pīroritia ai tētahi pōro iti.

whānui mōrahi o te whakaawa

whakaawa

http://offers.kd2.org/en/gb/lidl/pbaHo/

Ka tāea te whakaawa te whakatauira mā te

$y = x^2 - 4x$, ina $0 \le x \le 4$, ā, ka inetia ā-henimita a x me y.

(i)   Kei te ine te y i te aha?

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(ii) E hia te ōrautanga o te whānui huapae mōrahi o te whakaawa ko te whānui o te whakaawa ina 3 cm te hōhonu poutū?
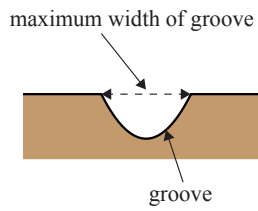
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(e) A game has a groove that a small ball is rolled along.

maximum width of groove

groove

http://offers.kd2.org/en/gb/lidl/pbaHo/

The groove can be modelled by

$y = x^2 - 4x$, where $0 \le x \le 4$, and x and y are measured in centimetres.

(i) What does y measure?

_____

(ii) What percentage of the maximum horizontal width of the groove is the width of the groove when it's at a vertical depth of 3 cm?

TAU TŪMAHI

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

TAU TŪMAHI

QUESTION
NUMBER

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

QUESTION
NUMBER

English translation of the wording on the front cover

Level 1 Mathematics and Statistics CAT, 2016

91027 Apply algebraic procedures in solving problems

Thursday 15 September 2016
Credits: Four

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.