See back cover for an English translation of this cover

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91267M

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NZQA
NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Te Pāngarau me te Tauanga, Kaupae 2, 2012

91267M Te whakahāngai tikanga tūponotanga hei whakaoti rapanga

2.00 i te ahiahi Rāhina 19 Whiringa-ā-rangi 2012
Whiwhinga: Whā

Paetae	Paetae Kaiaka	Paetae Kairangi
Te whakahāngai tikanga tūponotanga hei whakaoti rapanga.	Te whakahāngai tikanga tūponotanga mā te whakaaro whaipānga hei whakaoti rapanga.	Te whakahāngai tikanga tūponotanga mā te whakaaro waitara hōhonu hei whakaoti rapanga.

Tirohia mehemea e ōrite ana te Tau Ākonga ā-Motu (NSN) kei tō pepa whakauru ki te tau kei runga ake nei.

Me whakautu e koe ngā pātai KATOA kei roto i te pukapuka nei.

Whakaaturia tō mahinga KATOA.

Ki te hiahia koe ki ētahi atu wāhi hei tuhituhi whakautu, whakamahia te (ngā) whārangi kei muri i te pukapuka nei, ka āta tohu ai i ngā tau pātai.

Tirohia mehemea kei roto nei ngā whārangi 2–21 e raupapa tika ana, ā, kāore hoki he whārangi wātea.

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

TAPEKE

MĀ TE KAIMĀKA ANAKE

Kia 60 meneti hei whakautu i ngā pātai o tēnei pukapuka.

MĀ TE KAIMĀKA ANAKE

PĀTAI TUATAHI

Hangaia ai ngā Nutty Snack Bars mai i ngā mīhini e whakahaerehia ana e ngā kaimahi tiriwā.

Ko te tikanga ka tuarihia te taumaha o ēnei paramanawa, arā, he 41 karamu te tau toharite, he 0.8 karamu hoki te ine mahora.

(a) He aha te tūponotanga ko te taumaha o tētahi Nutty Snack Bar kei waenga i te 41 me te 42.2 karamu?

(b) He aha te ōrautanga o ngā Nutty Snack Bars kei kō atu i te 42 karamu?

(c) I waenganui i ēhea taumaha noho ai te 60 ōrau waenga o ngā Nutty Snack Bars?

(d) I te wā o te mahi tiriwā a Jamie, e 18 000 ngā Nutty Snack Bars i mahia e te mīhini.

E hia ngā Nutty Snack Bars e tūmanakohia ana kei raro i te 40 karamu te taumaha ka mahia i te mahi tiriwā a Jamie?

You are advised to spend 60 minutes answering the questions in this booklet.

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QUESTION ONE

Nutty Snack Bars are produced on machines operated by shift workers.

The weights of the bars are normally distributed, with a mean of 41 grams and standard deviation of 0.8 grams.

(a) What is the probability that a Nutty Snack Bar weighs between 41 and 42.2 grams?

(b) What percentage of Nutty Snack Bars weigh more than 42 grams?

(c) Between what weights will the middle 60% of Nutty Snack Bars lie?

(d) During Jamie's shift, 18 000 Nutty Snack Bars are produced by the machine.

What is the expected number of Nutty Snack Bars produced on Jamie's shift that weigh less than 40 grams?

MĀ TE KAIMĀKA ANAKE

(e) E kī ana i runga i te pōkaitanga Nutty Snack Bars he 40 karamu te taumaha.

I whakatūhia tētahi mīhini hei hanga i ngā Nutty Snack Bars kia noho ū ariātia te 96 ōrau o ngā paramanawa he 40 karamu te taumaha te itinga rawa.

E whakaaro ana a Jamie kāore i tika te whakatū i te mīhini.

(i) He aha ngā taunaki e tautoko ana i te whakapae a Jamie?

Parahautia ō kōrero.

(ii) Ka taea te whakatū anō i te mīhini mā te huri i te tau toharite, i te ine mahora rānei o ngā taumaha o ngā Nutty Snack Bars (engari kaua ngā mea e rua).

Mēnā kāore i tika te whakatū i ngā mīhini, me whakatū anō.

Mēnā me whakatū anō te mīhini, homai tētahi huarahi e tutuki ai tēnei.

Whakaaturia ō tātainga.

ASSESSOR'S USE ONLY

(e) The stated weight on the Nutty Snack Bars packaging is 40 g.

A machine was set up to produce Nutty Snack Bars so that theoretically 96% of the bars produced would weigh at least 40 g.

Jamie thinks the machine was not set up correctly.

(i) What evidence supports Jamie's claim?

Justify your comments.

(ii) The machine can be reset by altering either the mean or the standard deviation of the weights of Nutty Snack Bars (but not both).

If the machine was not set up correctly, then it should be reset.

If the machine needs to be reset, give a possible way in which this may be done.

Show your calculations.

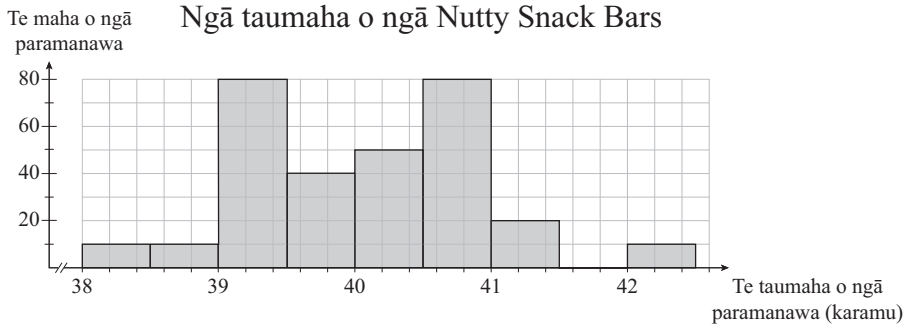
(f) Ina tika ai te mahi a te mīhini e hanga ana i ngā paramanawa Nutty Snack, he hangarite te tuaritanga o ngā taumaha o ngā paramanawa, arā, ko 41 karamu te tau toharite, ko 0.8 karamu te ine mahora.

MĀ TE KAIMĀKA ANAKE

Ka hoko mai a Sara i tētahi pouaka o ngā Nutty Snack Bars he 300 te maha hei whakatewha mēnā kei te tika te mahi a te mīhini.

Ka inea ia paramanawa me te tuhi anō i ngā hua.

E whakaatuhia ēnei taumaha ki te kauwhata kei raro.



Whakatauritea te tuaritanga o ngā taumaha o te pouaka o ngā Nutty Snack Bars a Sara ki te tuaritanga manako o ngā taumaha mēnā kei te tika te mahi a te mīhini.

Whakamahia ngā kīanga tauanga hei tautoko i tō whakautu.

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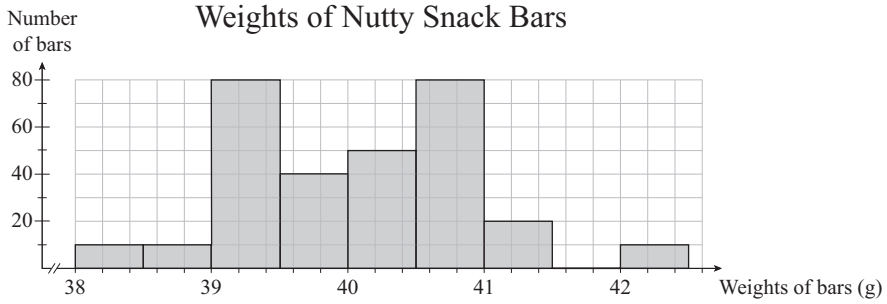
(f) When a machine producing nutty snack bars is working properly, the weights of the nutty snack bars are normally distributed with a mean of 41 grams and a standard deviation of 0.8 grams.

Sara buys a box of 300 Nutty Snack Bars to investigate if the machine is working properly.

She weighs each bar and records the results.

These weights are shown in the graph below.



Compare the distribution of the weights of Sara's box of Nutty Snack Bars with the expected distribution of the weights if the machine is working properly.

Use statistical terms to explain your answer.

PĀTAI TUARUA

MĀ TE KAIMĀKA ANAKE

(a) Tērā tētahi tohu kapa motuhake ka tukuna i te minenga kura.

Kāore he whakaōhiti i mua i te tuku i te tohu.

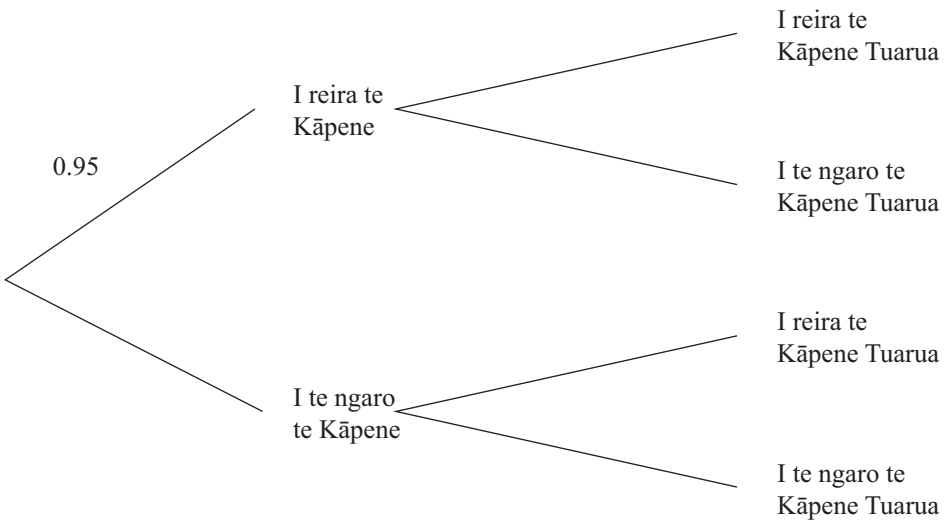
Ka whakawhiwhia te tohu ki te kapa haupoi.

Mā te Kāpene rā anō e kohi i te tohu, ā, ki te kore ia, ko te Kāpene Tuarua.

Ka tae te Kāpene o te kapa haupoi ki ngā minenga i te 95 ōrau o te wā.

He 93 ōrau te tae o te Kāpene Tuarua o te kapa ki ngā minenga i te wā kei reira anō te Kāpene, ā, he 75 ōrau ina kei te ngaro te Kāpene.

E whakaaturia ana ētahi o ngā mōhiohio ki te rākau tūponotanga i raro nei:



(i) Tātaitia te tūponotanga ka tae ngātahi te Kāpene me te Kāpene Tuarua o te kapa haupoi ki te minenga ina tukuna ai te tohu.

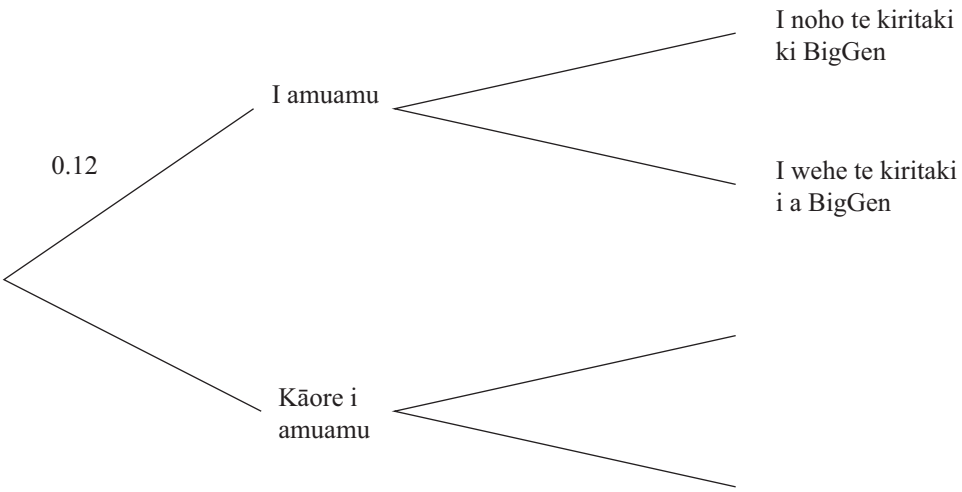
(ii) Tātaitia te tūponotanga ka tukuna te tohu ki te kapa haupoi i te minenga (arā, me tae rawa te Kāpene, te Kāpene Tuarua rānei o te kapa ki te minenga).

(iii) Mēnā kei te ngaro te Kāpene Tuarua o te kapa haupoi mai i te minenga, he 40 ōrau te tūponotanga kei te māuiui ia.

Mēnā kei te ngaro te Kāpene, he aha te tūponotanga ka ngaro hoki te Kāpene Tuarua ki te kore ia e māuiui?

(b) Ka whaiwhai haere ake te kamupene hiko a BigGen i ngā amuamu kua tukuna e ōna kiritaki ki te kamupene.

- He 12 ōrau o ngā kiritaki kua tuku amuamu i roto i te 12 marama kua pahure.
- Mēnā ka tuku amuamu mai tētahi kiritaki, he 0.7 ōrau te tūponotanga ka wehe ia i a BigGen.



(i) He aha te ōwehenga o ngā kiritaki ka tuku amuamu me te wehe mai anō i a BigGen?

(ii) E 250 000 ngā kiritaki o BigGen i te tīmatanga o te tau.

Tokohia e whakaaro ana ka amuamu, engari ka noho tonu ki BigGen?

QUESTION TWO

ASSESSOR'S USE ONLY

(a) There is a special team's award presented at a school assembly.

There is no prior warning about the award.

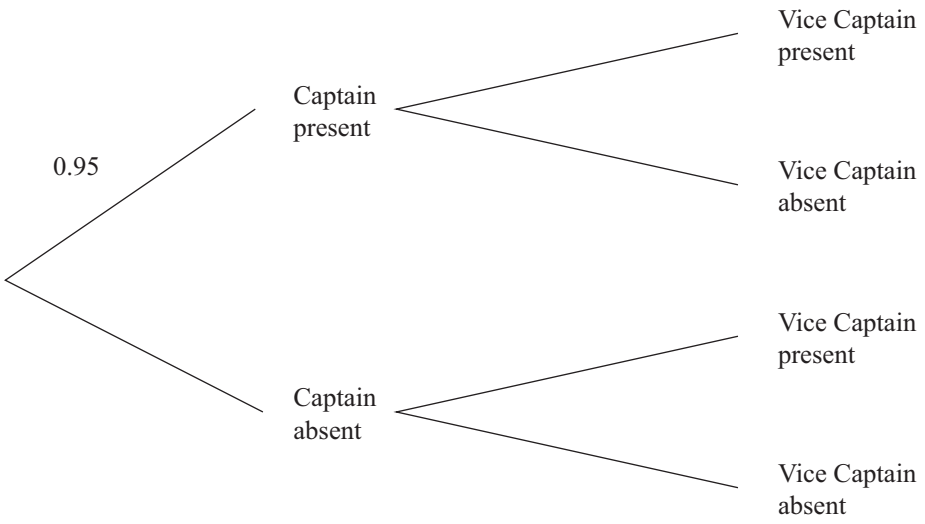
The hockey team is to receive the award.

The award must be accepted by the Captain or, if the Captain is absent, by the Vice Captain.

The Captain of the hockey team is present at assembly 95% of the time.

The Vice Captain of the team is present at assembly 93% of the time that the Captain is present and 75% of the time the Captain is absent.

Some of the information is shown on the probability tree below.



(i) Calculate the probability that both the Captain and the Vice Captain of the hockey team will be present at the assembly when the award is being presented.

(ii) Calculate the probability that the award will be presented to the hockey team at the assembly (ie at least the Captain or the Vice Captain is present at the assembly).

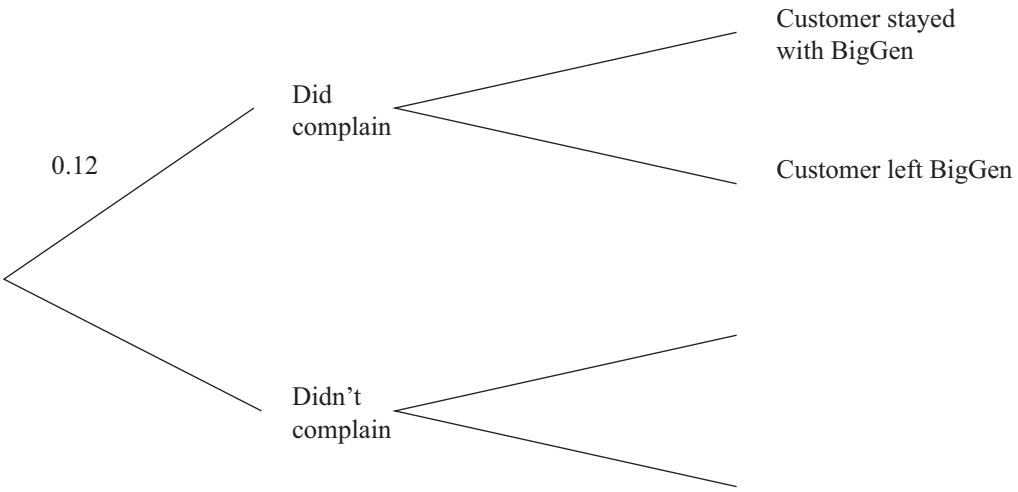
ASSESSOR'S USE ONLY

(iii) If the Vice Captain of the hockey team is absent from assembly, there is a 40% chance that he is sick.

If the Captain is absent, what is the probability that the Vice Captain will also be absent and he is not sick?

(b) BigGen power company keeps track of complaints made to the company by its customers.

- 12% of customers have made a complaint in the last 12 months.
- If a customer made a complaint, there was a 0.7 chance that they left BigGen.



(i) What proportion of customers complained and left BigGen?

(ii) There were 250 000 customers of BigGen at the beginning of the year.

How many would be expected to complain, but stay with BigGen?

(iii) Ko te ōrau o ngā kiritaki i wehe mai i BigGen i te 12 marama kua pahure he 10 ōrau.

MĀ TE KAIMĀKA ANAKE

- Kimihia te tūponotanga o te kiritaki kāore i amuamu engari i wehe mai i a BigGen.

- Kimihia te tūponotanga amuamu mēnā i wehe tētahi kiritaki i BigGen.

(iii) The percentage of customers leaving BigGen over the last 12 months was 10%.

ASSESSOR'S USE ONLY

- Find the probability that a customer who didn't complain left BigGen.

- If a customer left BigGen, find the probability that they complained.

PĀTAI TUATORU

MĀ TE KAIMĀKA ANAKE

Ka tūhura tētahi rangahau tōmua mēnā i whakaatu ētahi tāngata i ngā tohumate kaiponapona. Ka whakarāpopotohia ngā hua ki te papatau kei raro.

Ira Tangata	Kāore he tohumate kaiponapona	Ētahi tohumate kaiponapona	Tapeke
Tāne	167	33	200
Wāhine	405	195	600
Tapeke	572	228	800

(a) (i) He aha te ōwehenga o ngā tāngata i te rangahau tōmua kāore i whakaatu i ngā tohumate kaiponapona?

(ii) He aha te ōwehenga o ngā tāngata i te rangahau tōmua e whakaatu ana i ngā tohumate kaiponapona he tāne?

(iii) Mā te whakamahi i ngā hua o te rangahau tōmua, tokohia ngā tāngata ki tōu whakaaro ka whakaatu i ngā tohumate kaiponapona i tētahi hapori ōrite me te taupori o te 2000 tāngata?

(iv) Whakaatuhia mō ngā tāngata o te rangahau tōmua, e tokorua ngā tāngata o te tokowhitu ka noho mōrearea ki ngā tohumate kaiponapona.

QUESTION THREE

ASSESSOR'S USE ONLY

A pilot study investigated if people showed some symptoms of arthritis.
The results were summarised in the table shown below.

Gender	No symptoms of arthritis shown	Some symptoms of arthritis shown	Total
Male	167	33	200
Female	405	195	600
Total	572	228	800

(a) (i) What proportion of people in the pilot study showed no symptoms of arthritis?

(ii) What proportion of people in the pilot study that showed symptoms of arthritis were male?

(iii) Using the results of the pilot study, how many people would you expect to show symptoms of arthritis in a similar community with a population of 2000 people?

(iv) Show that for the people in the pilot study, the risk of showing some symptoms of arthritis is approximately two out of seven.

MĀ TE KAIMĀKA ANAKE

(v) E kī ana te ūpoko o te niupepa, "E ai ki te Rangahau Tōmua he reatorutanga te hunga wāhine i te hunga tāne ka whakaatu i ngā tohumate kaiponapona."

Whakaatuhia mēnā ka whakaae, ka whakahē rānei koe ki tēnei ūpoko, me te whakatau anō i ngā pūtake me ngā tātainga katoa.

(b) I tātari anōtia **taua** rangahau tōmua ki ngā tāngata e 800.

I kitea:

E 299 ngā tāngata 40 tau neke atu, ā, he 121 o rātou ka whakaatu i tētahi tohumate kaiponapona.

E 501 ngā tāngata i raro iho i te 40 tau te pakeke.

Ka taea e koe te whakamahi i te papatau kei raro.

	Kāore he tohumate kaiponapona	**Ētahi tohumate kaiponapona**	**Tapeke**
Ki raro i te 40			
40 neke atu rānei			
Tapeke			

(i) He aha te ōwehenga o te hunga whakamātautau kei raro iho i te 40 tau i whakaatu i ngā tohumate kaiponapona?

Ka haere tonu te Pātai Tuatoru ki te whārangi 18.

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(v) A newspaper headline on the report stated "Pilot study shows females are three times more likely than males to show symptoms of arthritis."

Show whether or not you agree with this headline, stating full reasons and calculations.

(b) The **same** pilot study of 800 people was further analysed.

This showed:

There were 299 people aged 40 years and over, of whom 121 showed a symptom of arthritis.

There were 501 people aged under 40 years.

You may like to use the table below.

	No symptoms of arthritis shown	**Some symptoms of arthritis shown**	**Total**
Under 40			
40 and over			
Total			

(i) What proportion of people in the trial, aged under 40 years, showed symptoms of arthritis?

Question Three continues on page 19.

(ii) E whakapae ana ētahi kairangahau ko te mōreareatanga ki ngā tāngata neke atu i te 40 tau ka whakaatu i ngā tohumate kaiponapona, he rearuatanga te kaha ake ki ērā kei raro iho i te 40 tau te pakeke.

MĀ TE KAIMĀKA ANAKE

Kōrero mai mō tēnei whakapae.

Me homai e koe ngā pūtake tōtika e tautokotia ana e ngā tātainga mai i ngā raraunga o tēnei rangahau tōmua.

(ii) Some researchers claimed that the risk of people over the age of 40 years having arthritis symptoms is twice that of people under the age of 40 years.

Comment on this claim.

You should provide suitable reasons supported by calculations from data in this pilot study.

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He puka anō mēnā ka hiahiatia.
Tuhia te (ngā) tau pātai mēnā e hāngai ana.

TAU PĀTAI

MĀ TE KAIMĀKA ANAKE

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

QUESTION NUMBER

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English translation of the wording on the front cover

Level 2 Mathematics and Statistics, 2012

91267 Apply probability methods in solving problems

2.00 pm Monday 19 November 2012
Credits: Four

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

91267M

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.

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.

Check that this booklet has pages 2–21 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.