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91267M



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

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Tohua tēnei pouaka mēnā
KĀORE koe i tuhituhi i roto
i tēnei pukapuka

Te Pāngarau me te Tauanga, Kaupae 2, 2021

91267M Te whakamahi tikanga tūponotanga hei whakaoti rapanga

Ngā whiwhinga: Whā

Paetae	Kaiaka	Kairangi
Te whakamahi tikanga tūponotanga hei whakaoti rapanga.	Te whakamahi tikanga tūponotanga mā te whakaaro tūhonohono hei whakaoti rapanga.	Te whakamahi tikanga tūponotanga mā te whakaaro waitara 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.

Tuhia ō mahinga KATOA.

Ki te hiahia koe ki ētahi atu wāhi hei tuhituhi whakautu, whakamahia te wāhi wātea kei muri i te pukapuka nei.

Tirohia mēnā e tika ana te raupapatanga o ngā whārangi 2–25 kei roto i tēnei pukapuka, ka mutu, kāore tētahi o aua whārangi i te takoto kau.

Kaua e tuhi ki roto i tētahi wāhi kauruku whakahāngai (///). Ka tapahia pea tēnei wāhi ina mākahia te pukapuka.

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

TŪMAHI TUATAHI

E tino mōhiotia ana a Aotearoa mō tōna ahurea kawhe, ā, kua nui kē atu te kawhe e wātea ana i roto i te 20 tau. Engari, kei te tipu te māharahara kua nui rawa te inu kawhe a ngā taiohi, ā, ko ngā pānga kino pea ko ngā whanonga moe me ngā whakatutukitanga i te kura.

- (a) I te māharahara tētahi kura mō tēnei take ka whakahaerehia he rangahau tuihono, kirimuna o ana ākongā pakeke 300. I uia mēnā he rite tonu te inu kawhe a ngā ākongā (i te 3 wā i te wiki i te iti rawa), ā, mēnā kei te pā mai ngā raru moe. Kua whakarāpopototia ngā otinga ki te ripanga i raro nei.

Ripanga 1: Te inu kawhe me ngā raru moe mō ngā ākongā o te kura

	Ngā raru moe	Kāore he raru moe	Tapeke
He rite tonu te inu kawhe	68	54	122
Kāore i te rite tonu te inu kawhe	75	103	178
Tapeke	143	157	300

- (i) E ai ki ngā otinga o tēnei rangahau, he aha te ōwehenga o ngā ākongā pakeke he rite tonu te inu kawhe?

- (ii) He aha te tūponotanga mō tētahi ākongā ka tīpako matapōkeretia mai i tēnei rangahau he raru moe ōna, ā, he rite tonu te inu kawhe?

QUESTION ONE

New Zealand is well known for its café culture, and the availability of coffee has increased significantly over the last 20 years. However, there is growing concern that teenagers are consuming more caffeine, with potential negative effects on sleep behaviours and performance at school.

- (a) A school was concerned about this issue and conducted an online, anonymous survey of 300 of its senior students. It asked if students drink coffee regularly (at least 3 times a week) and if they have any sleep-related issues. The results are summarised in the table below.

Table 1: Coffee drinking and sleep issues for school students

	Sleep issues	No sleep issues	Total
Drink coffee regularly	68	54	122
Don't drink coffee regularly	75	103	178
Total	143	157	300

- (i) According to the results of this survey, what proportion of the senior students drink coffee regularly?
-
-
- (ii) What is the probability that a randomly selected student from this survey who has sleep issues also drinks coffee regularly?
-
-

Ripanga 1: Te inu kawhe me ngā raru moe mō ngā ākonga o te kura (he mea tuarua mai i te whārangi 2)

	Ngā raru moe	Kāore he raru moe	Tapeke
He rite tonu te inu kawhe	68	54	122
Kāore i te rite tonu te inu kawhe	75	103	178
Tapeke	143	157	300

- (b) E tino mōhiotia ana he maha ngā inu ngoi rorotu e inumia ana e ngā taiohi i Aotearoa he nui ake te matū whakakori (caffeine) i roto tēnā i te kawhe.

I pātai taua rangahau anō mō te inu i ngā inu ngoi. I kitea:

- 36 ngā ākonga kāore i te inu kawhe engari he inu i ngā inu ngoi.
- E 7 anake ēnei ākonga (he inu i ngā inu ngoi engari kaua te kawhe) kāore he raru moe.

- (i) Whakamahia ēnei meka ME ngā mōhiotia kei te Ripanga 1 hei whakaoti i te ripanga i raro.

Ripanga 2: Pānga o te matū whakakori ki ngā ākonga o te kura

	He raru moe	Kāore he raru moe	Tapeke
Inu kawhe	68	54	122
He inu i ngā inu ngoi (engari kaua te kawhe)			
Kāore he inu kawhe, ngā inu ngoi rānei			
Tapeke	143	157	300

- (ii) Mēnā 850 ngā ākonga pakeke i te kura kāore e inu kawhe, ngā inu ngoi rānei, e hia ō rātau e tūmanakohia ana he raru te moe?

Table 1: Coffee drinking and sleep issues for school students (repeated from page 2)

	Sleep issues	No sleep issues	Total
Drink coffee regularly	68	54	122
Don't drink coffee regularly	75	103	178
Total	143	157	300

- (b) It is well known that many of the popular energy drinks consumed by teenagers in New Zealand contain caffeine in even higher doses than coffee.

The same survey also asked about the consumption of energy drinks. It found that:

- 36 students didn't drink coffee but did drink energy drinks.
- Only 7 of these students (who drank energy drinks but not coffee) had no sleep issues.

- (i) Use these facts AND the information given in Table 1 to complete the table below.

Table 2: Effect of caffeine on sleep for school students

	Have sleep issues	No sleep issues	Total
Drink coffee	68	54	122
Drink energy drinks (but not coffee)			
Don't drink either coffee or energy drinks			
Total	143	157	300

- (ii) If there were 850 senior students in the school who don't drink either coffee or energy drinks, how many would be expected to have sleep issues?

TŪMAHI TUARUA

Kua nui ake te hira o "ngā miraka" mai i ngā tipu i Aotearoa i ēnei tau. Whakaratoa anō ai e ngā toa kawhe ngā kōwhiringa maha ki ā rātau kiritaki pērā i te miraka hoi, te miraka aramona, te miraka kokonati rānei.

(a) He toa kawhe tā Jungwoo, ā, kua whakaemihia e ia ngā raraunga o ana hokohoko kawhe i roto i ēnei wiki kua hipa kia mōhio ai ia kia hia te nui o ngā hua miraka kē me whakaputu ia.

- 40% o ana hokohoko kawhe i hokona ki ngā kiritaki tamariki ake.
- He hauwhā o ngā kiritaki tamariki ake i tonono i tētahi momo miraka kē.
- 80% o ngā kiritaki pakeke ake i ota i tētahi kawhe me te miraka kau.
- O ngā kiritaki tamariki ake i ota i tētahi kawhe me te miraka kē, 15% o rātau i ota i te miraka hoi.
- He haurua o ngā kiritaki pakeke ake i ota i tētahi kawhe me te miraka kē, i ota i te miraka hoi.

(i) Tātaihia te tūponotanga he tamariki ake tētahi kiritaki i roto i tēnei toa kawhe, ā, ka ota i tētahi kawhe me te miraka kau.

(ii) Tātaihia te tūponotanga ka otahia e tētahi kiritaki i tīpako matapōkeretia tētahi kawhe me te miraka hoi.

QUESTION TWO

The use of plant-based “milks” in New Zealand has become much more popular in recent years. Cafés also now offer their customers a number of alternative milk options such as soy, almond, or coconut milk.

- (a) Jungwoo owns a café and has collected data of his coffee sales over the last few weeks to find out how much he should stock alternative milk products.
- 40% of his coffee sales were to younger customers.
 - One quarter of younger customers requested an alternative milk type.
 - 80% of older customers ordered a coffee with cow’s milk.
 - Of the younger customers who ordered a coffee with alternative milk, 15% ordered soy milk.
 - Half of the older customers who ordered a coffee with alternative milk, ordered soy milk.

- (i) Find the probability that a customer in this café is younger and orders a coffee with cow’s milk.

- (ii) Find the probability that a randomly chosen customer orders coffee with soy milk.

TŪMAHI TUATORU

Ka kite tētahi kaiwhakahaere toa kawhe he rerekē te wā tatari a ngā kiritaki mō ā rātau kawhe hei hari atu. Ka whakaemihia e ia he raraunga i roto i te wiki ka kite ia ko te wā toharite e tatari ana he 7 meneti, me te ine mahora whakatau tata o te 1.5 meneti.

Me kī ka taea te whakamahi he tuari māori hei whakatauiria i te wā tatari mō tētahi kawhe hari atu i tēnei toa kawhe.

Me whakaatu rawa ngā mahinga, hoahoa hoki/ranei.

- (a) Tātaihia te tūponotanga ka whiwhi tētahi kiritaki i tana kawhe i roto i te 5 meneti.

- (b) I tētahi rā, he 150 ngā kiritaki a tētahi toa kawhe i ota kawhe hei hari atu i tētahi wā ahiahi.

E hia o ēnei ki tāu e tūmanako ana ka tatari mō te 8 ki te 10 meneti mō tā rātau kawhe hei hari atu?

QUESTION THREE

A café manager notices that the amount of time a customer waits to receive their takeaway coffee varies. He collects some data over a week and finds the mean time waited is 7 minutes, with an estimated standard deviation of 1.5 minutes.

Assume that a normal distribution can be used to model the waiting time for a takeaway coffee at this café.

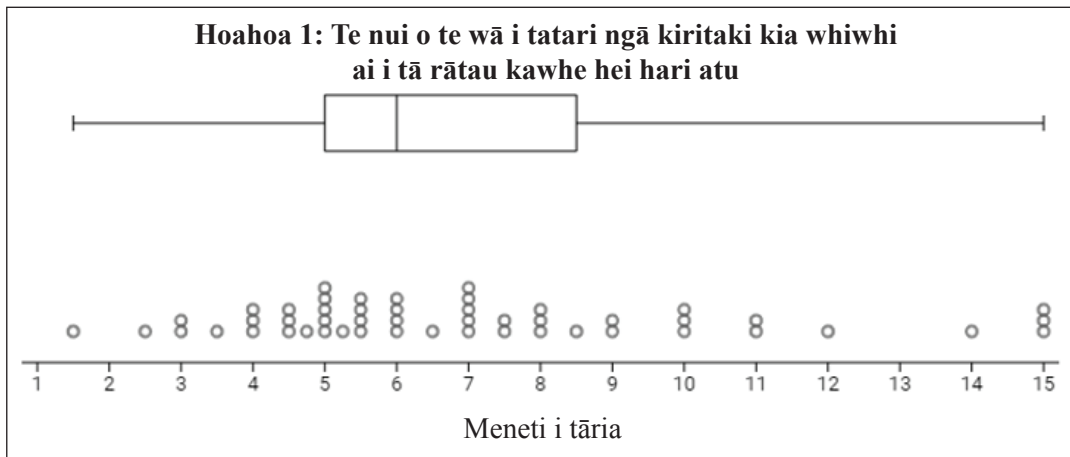
Working and/or diagrams must be shown.

- (a) Find the probability that a customer receives their coffee within 5 minutes.

- (b) One day, the café has 150 customers who order takeaway coffee over the afternoon period.

How many of these would you expect to have to wait for between 8 and 10 minutes for their takeaway coffee?

- (d) E whakaaturia ana ētahi o ngā raraunga i whakaemihia e te kaiwhakahaere toa kawhe i roto i te wiki kua hipa e ai ki te Hoahoa 1 i raro. ($n = 50$)



- (i) Tātaihia te tau waenga, ngā hauwhātanga, me te inenga whānui i waenga hauwhātanga mō ngā raraunga kei te Hoahoa 1, ā, mō tētahi tauira ā-tuari māori he 7 meneti te toharite me te 1.5 meneti te ine mahora.

Tuhia ō whakautu ki te ripanga i raro nei.

Tauanga	Raraunga mai i te Hoahoa 1	Tauira māori
Tau waenga		
Hauwhā raro		
Hauwhā runga		
Inenga whānui i waenga hauwhā		

English translation of the wording on the front cover

Level 2 Mathematics and Statistics 2021

91267M Apply probability methods in solving problems

Credits: Four

91267M

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.

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–MATHMF.

Show ALL working.

If you need more room for any answer, use the extra space provided at the back of this booklet.

Check that this booklet has pages 2–25 in the correct order and that none of these pages is blank.

Do not write in any cross-hatched area () . This area may be cut off when the booklet is marked.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.