

3

91585M



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

SUPERVISOR'S USE ONLY

Te Pāngarau me te Tauanga (Tauanga), Kaupae 3, 2017

91585M Te whakahāngai ariā tūponotanga hei whakaoti rapanga

9.30 i te ata Rāhina 27 Whiringa-ā-rangi 2017
Whiwhinga: Whā

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

Tuhia ō mahinga KATOA.

Tirohia mēnā kei a koe te Pukapuka Tikanga Tātai me ngā Tūtohi L3–STATMF.

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

Tirohia mēnā e tika ana te raupapatanga o ngā whārangi 2–15 kei roto i tēnei pukapuka, ka mutu, kāore tētahi o aua whārangi i te takoto kau.

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

TAPEKE

MĀ TE KAIMĀKA ANAKE

TŪMAHI TUATAHI

I tangohia he tīpako o ngā ākonga e 996 kei ngā Tau 9 ki te 13 mai i te pātengi raraunga Tatauranga i te Kura 2015.

(a) E 78.4% o ēnei ākonga i whānau mai ki Aotearoa.

100% o ēnei ākonga e matatau ana ki te kōrero i tētahi reo.

Ko ngā ākonga i whānau mai ki Aotearoa, e 35.6% e matatau anaki ngā reo neke atu i te kotahi.

Ko ngā ākonga kīhai i whānau mai ki Aotearoa, 69.8% e matatau ana ki ngā reo neke atu i te kotahi.

Ka tīpako matapōkerehia he ākonga mai i ngā ākonga katoa.

(i) Tātaihia te tūponotanga kotahi anake te reo e matatau ai te ākonga.

(ii) Whakamāramahia mai te take ehara i te wehe kē ngā āhuatanga nei “i whānau mai he ākonga i Aotearoa” me “he nui atu i te kotahi te reo e matatau ana he ākonga”.

QUESTION ONE

A sample of 996 students in Years 9 to 13 was taken from the Census at School 2015 database.

- (a) 78.4% of these students were born in New Zealand.

100% of these students can speak at least one language fluently.

Of the students born in New Zealand, 35.6% can speak more than one language fluently.

Of the students not born in New Zealand, 69.8% can speak more than one language fluently.

A student from the sample is chosen at random.

- (i) Calculate the probability that the student can speak only one language fluently.

- (ii) Explain why the events “a student was born in New Zealand” and “a student speaks more than one language fluently” are not independent.

- (b) I hangaia ngā tūtohi e whai ake mā te whakamahi i ngā raraunga atu anō mai i ngā ākonga 996.

Ira Tangata	Kua whai waea pūkoro		Kua whai waea pūkoro	Kua whai pūkete Pukamata		Ira Tangata	Kua whai pūkete Pukamata	
	Āe	Kāo		Āe	Kāo		Āe	Kāo
Wāhine	481	52	Āe	750	139	Wāhine	433	100
Tāne	408	55	Kāo	64	43	Tāne	381	82

Ka tīpakohia matapōkerehia he ākonga mai i te tīpako o ngā ākonga.

- (i) Tātaihia te tūponotanga he wahine te ākonga, ā, kāore he waea pūkoro.

- (ii) He tāuke tētahi i tētahi ngā pāpono “kua whai pūkete Pukamata” me “kua whai waea pūkoro”?

Tautokona tō tuhinga ki ngā tauākī tauanga e tōtika ana.

- (iii) E 349 ngā ākonga o tēnei tīpako he tāne, kua whai pūkete Pukamata, me te whai waea pūkoro.

Tātaihia te tūponotanga he wahine te ākonga, kāore he pūkete Pukamata, ā, kāore he waea pūkoro.

- (b) The following tables were created using further data from the 996 students.

Gender	Owns a cell phone	
	Yes	No
Female	481	52
Male	408	55

Owns a cell phone	Has a Facebook account	
	Yes	No
Yes	750	139
No	64	43

Gender	Has a Facebook account	
	Yes	No
Female	433	100
Male	381	82

A student from the sample is chosen at random.

- (i) Calculate the probability that the student is female and does not own a cell phone.

- (ii) Are the events “has a Facebook account” and “owns a cell phone” mutually exclusive? Support your answer with appropriate statistical statements.

- (iii) 349 students in this sample were male, had a Facebook account, and owned a cell phone.

Calculate the probability that the student is female, does not have a Facebook account, and does not own a cell phone.

TŪMAHI TUARUA

- (a) I tīkina he raraunga mai i ngā rerenga katoa i wehe mai i te tauranga waka rererangi o Te Whanganui-a-Tara i tētahi rā i Kohitātea 2017.

Mō ngā rerenga 83 i wātea mai ai ngā raraunga wā wehe:

- 64 ngā rerenga i te whakahaerehia e Air New Zealand
- 31 ngā rerenga i tōmuri
- 12 ngā rerenga kāore i te whakahaerehia e Air New Zealand, ā, kāore i tōmuri.

- (i) Tērā pea ka tīpakohia matapōkeretia tētahi o ēnei rerenga.

Tātaihia te tūponotanga i tōmuri tēnei rerenga, i te mea kīhai i whakahaerehia te rerenga e Air New Zealand.

- (ii) Homai kia RUA ngā take me tino tūpato te whakamahi i ēnei raraunga hei matapae mēnā ka tōmuri te rerenga whai ake e wehe ana i Te Whanganui-a-Tara.

1. _____

2. _____

QUESTION TWO

- (a) Data was obtained on all flights that departed from Wellington Airport during one day in January 2017.

For the 83 flights that had departure time data available:

- 64 flights were operated by Air New Zealand
- 31 flights were delayed
- 12 flights were not operated by Air New Zealand and were not delayed.

- (i) Suppose one of these flights is chosen at random.

Calculate the probability that this flight was delayed, given that the flight was not operated by Air New Zealand.

- (ii) Give TWO reasons why care should be taken when using this data to predict whether the next flight departing from Wellington Airport will be delayed.

1.

2.

- (iii) Kua whakawhanakehia he tauira tūponotanga mō ngā rerenga e wehe ana mai i tētahi atu tauranga waka rererangi.

Me kī ko A te pāpono “e whakaawetia ana te wā wehe o tētahi rerenga e te whanonga pāhīhī”.

Me kī ko B te pāpono “e whakaawehia ana te wā wehe o tētahi rerenga e ngā āhuatanga huarere”.

I raro i tēnei tauira, $P(A \cup B) = 0.54$ me $P(A' \cup B) = 0.86$.

He aha te tūponotanga e whakaawehia ana te wā wehe o tētahi rerenga e ngā āhuatanga huarere?

- (b) Kua waihangatia e tētahi paetukutuku he tauira e matapae ana i te ira tangata e ai ki te āhua tuhituhi a taua tangata. I muri i te matapae i te ira tangata o ia tangata, ka tonu te paetukutuku i ia tangata ki te tīpako i tōna ira tangata (wahine, tāne rānei). E whakaatu ana te tūtohi i raro i ngā hua mō tētahi tīpako matapōkere o ngā tāngata 400 i whakamahi i te paetukutuku hei matapae i tō rātou ira tangata.

Ira tangata i tīpakohia	Ira tangata i matapaehia	
	Wāhine	Tāne
Wāhine	172	26
Tāne	108	94

- (i) Tātaihia te ōrau o ngā matapae i te tika (he ōrite te ira tangata i matapaetia ki te ira tangata i tīpakohia).

- (ii) Homai kia KOTAHI te raruraru ka taea mō te tōtikatanga o te tauira i whakamahia e te paetukutuku, e ai ki ngā raraunga i tukuna i runga ake.

Tautokona tō tuhinga mā tētahi tātaitanga kotahi i te iti rawa.

- (iii) A probability model has been developed for flights departing from another airport. Let A be the event “a flight’s departure time is affected by passenger behaviour”. Let B be the event “a flight’s departure time is affected by weather conditions”. Under this model, $P(A \cup B) = 0.54$ and $P(A' \cup B) = 0.86$.

What is the probability that a flight’s departure time is affected by weather conditions?

- (b) A website has developed a model that predicts a person’s gender based on a sample of that person’s formal writing. After predicting each person’s gender, the website asks each person to select their gender (female or male). The table below shows the results for a random sample of 400 people who used the website to predict their gender.

Selected gender	Predicted gender	
	Female	Male
Female	172	26
Male	108	94

- (i) Calculate the percentage of the predictions that were correct (the predicted gender was the same as the selected gender).

- (ii) Give ONE potential issue with the appropriateness of the model used by the website, based on the data provided above.

Support your answer with at least one calculation.

TŪMAHI TUATORU

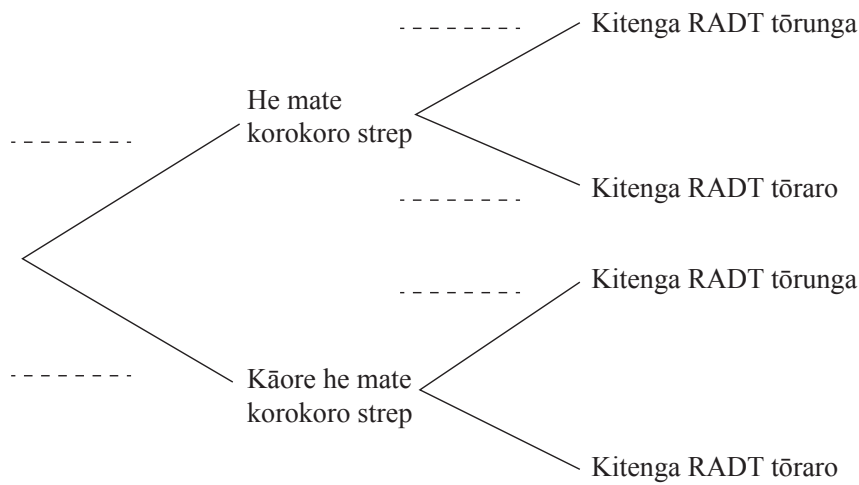
- (a) He whakapokenga te korokoro strep ka pā ki muri o te korokoro me ngā miramira. Ka puta i ngā aromatawai tere rapu aki paturopi (RADT) he kitenga tōruna, kitenga tōraro rānei mō te korokoro strep, engari kāore i te 100% te tika. I whakahaerehia he rangahau me ngā tamariki kura tuatahi 298 he mamae o rātau korokoro. I muri i te whakamahi i te RADT, i whakahaerehia he whakamātautau atu anō hei whakaū mēnā he mate korokoro strep tō ia tamaiti, kāore rānei. E whakaaturia ana ngā raraunga mai i tēnei mātai ki te pouaka i raro.

	He mate korokoro strep	Kāore he mate korokoro strep
Kitenga RADT tōruna	0.074	0.124
Kitenga RADT tōraro	0.131	0.671

- (i) E kī ana tētahi paetukutuku e tuku tohutohu hauora ana ki ngā mātua o Aotearoa “... ko te nuinga o ngā korokoro mamae o ngā tamariki ehara i te korokoro strep”.

Kei te tautoko ngā raraunga mai i tēnei rangahau i taua tauākī?

- (ii) Whakamahia ngā mōhiotia i tukuna mai hei tātai i ngā tūponotanga e hiahiatia ana ki te whakaoti i te rākau tūponotanga e whakaaturia ana i raro, me te whakaawhiwhi i ngā tūponotanga ki te mati whaiira e 3.



QUESTION THREE

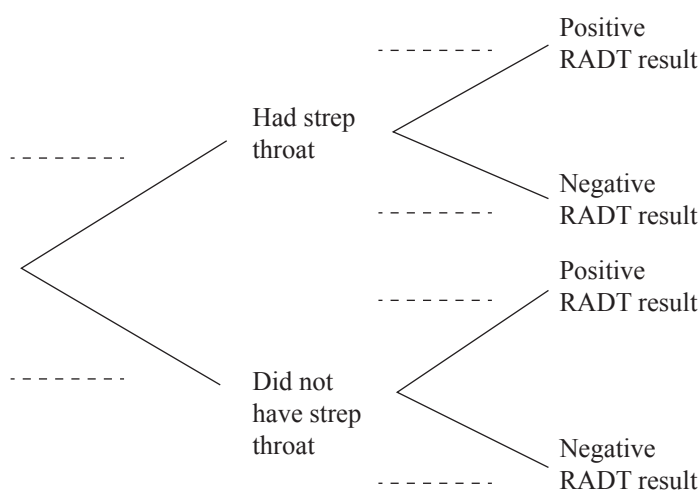
- (a) Strep throat is an infection of the back of the throat and the tonsils. Rapid antigen detection tests (RADTs) give either a positive or negative result for strep throat, but are not 100% accurate. A study was conducted with 298 primary school children who had sore throats. After the RADT was used, another test was used to confirm whether each child had strep throat or not. Data from this study is shown in the table below.

	Had strep throat	Did not have strep throat
Positive RADT result	0.074	0.124
Negative RADT result	0.131	0.671

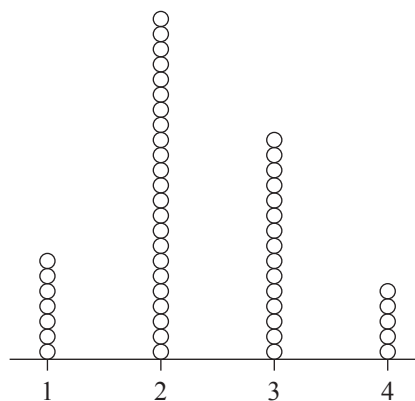
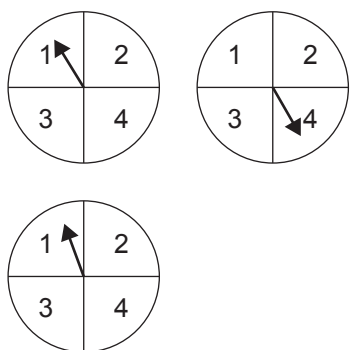
- (i) A website offering health advice for New Zealand parents states that "... most sore throats for children are not strep throat".

Does the data from this study support this statement?

- (ii) Use the information provided to calculate the necessary probabilities to complete the probability tree shown below, rounding probabilities to 3 decimal places.



- (b) Ko tētahi kēmu he hurihuri i ngā tāhurihuri e toru. Ko te tatau mō te kēmu ko te tau waenga o ngā tau e toru i tau atu ai ngā tāhurihuri. 50 ngā kēmu a tētahi tangata. E whakaaturia ana ngā tatau mō ia kēmu ki te tuhi iraira i raro.



He tauira o tētahi kēmu (tatau = 1)

Ngā tatau mai i ngā kēmu 50

- (i) Tātaihia tētahi whakataua tata mō te tūponotanga o te whiwhi i te kotahi hei tatau, mā te whakamahi i ngā raraunga kei te tuhi iraira i raro.

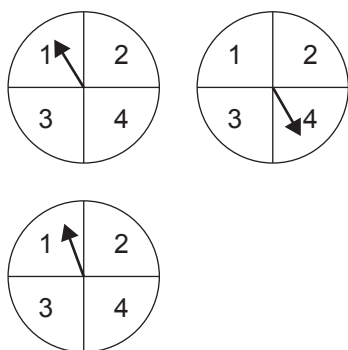
- (ii) Tātaihia te tūponotanga ariā o te whiwhi i te kotahi, i runga i te whakaaro he ōrite te tūpono ka tau te tāhurihuri ki ngā tau e whā katoa e whakaaturia ana.

Tautokona tō tuhinga ki ngā tauākī tauanga, hoahoa rānei e hāngai ana.

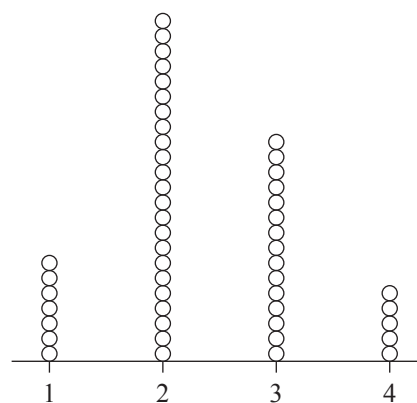
- (iii) Whakaotia te tūtohi tuari tūponotanga ariā mō S , te tatau mō te kēmu.

s	1	2	3	4
$P(S = s)$				

- (b) A game involves spinning three spinners. The score for the game is the median of the three numbers that the spinners land on. A person has played this game 50 times. The score for each game is shown on the dot plot below.



Example of one game (score = 1)



Scores from 50 games

- (i) Calculate an estimate for the probability of gaining a score of one, using the data in the dot plot.

- (ii) Calculate the theoretical probability of gaining a score of one, assuming each spinner is equally likely to land on each of the four numbers shown.

Support your answer with appropriate statistical statements or diagrams.

- (iii) Complete the theoretical probability distribution table for S , the score for the game.

s	1	2	3	4
$P(S = s)$				

English translation of the wording on the front cover

Level 3 Mathematics and Statistics (Statistics), 2017

91585 Apply probability concepts in solving problems

9.30 a.m. Monday 27 November 2017
Credits: Four

91585M

Achievement	Achievement with Merit	Achievement with Excellence
Apply probability concepts in solving problems.	Apply probability concepts, using relational thinking, in solving problems.	Apply probability concepts, 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.

Show ALL working.

Make sure that you have the Formulae and Tables Booklet L3–STATF.

If you need more room for any answer, use the space provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–15 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.