2

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, Kaupae 2, 2017

91267M Te whakahāngai tikanga tūponotanga hei whakaoti rapanga

2.00 i te ahiahi Rāmere 24 Whiringa-ā-rangi 2017
Whiwhinga: Whā

Paetae	Kaiaka	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 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.

Whakaaturia ngā mahinga KATOA.

Mēnā ka hiahia whārangi atu anō mō ō tuhinga, 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 2–27 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

TŪMAHI TUATAHI

He rite tonu te whakahaere i ngā rangahau mō ngā tāngata o Aotearoa kia mōhiotia ai te āhua o tō rātou hauora me te oranga.

I puta ēnei hua mō te tino mōmona mai i tētahi tīpako matapōkere o ngā rangatahi 2500 o ngā tau 15−24.

Tūtohi 1

	Mōmona	**Kore mōmona**	**Tapeke**
Tāne	222	983	1205
Wāhine	285	1010	1295
Tapeke	507	1993	2500

(a) (i) He aha te ōwehenga o ngā rangatahi mōmona i roto i te tīpako he tāne?

(ii) I te wā o te rangahau, he tata ki te 585 000 ngā rangatahi i te rōpū taipakeke 15−24 e noho ana i Aotearoa.

Mai i ngā hua o ēnei rangahau, e hia ngā rangatahi i tēnei rōpū taipakeke e ai ki tō whakatau tata he mōmona?

(iii) Ka whakamahia ngā hua rangahau e tētahi nūpepa i roto i tētahi tuhinga kōrero me te kōrero whakataki e whai ake.

He Mōmona Ake Ngā Kōhine o Aotearoa i Ngā Tama
E whakaatu ana tētahi rangahau i ngā rangatahi 15 – 24 o nā tata nei ko te āhua nei he 20% ake te tūponotanga ka mōmona ngā wāhine i ngā tāne.

Kei te whakaae koe ki te kōrero whakataki o tēnei tuhinga kōrero?

Whakamahia ngā raraunga o te Tūtohi 1 hei tautoko i tō whakautu, me te whakaatu i ngā tātaitanga whānui.

QUESTION ONE

Regular surveys are taken of New Zealanders to find out about the state of their health and well-being.

A random sample of 2500 young adults from the age group 15–24 years gave the following results for obesity.

Table 1

	Obese	**Not Obese**	**Total**
Male	222	983	1205
Female	285	1010	1295
Total	507	1993	2500

(a) (i) What proportion of obese young adults in the sample were male?

(ii) At the time of the survey, there were known to be about 585 000 young adults in the age group 15–24 years in New Zealand.

From the results of this survey, how many young adults in this age group would you estimate to be obese?

(iii) A newspaper uses the survey results in an article with the following introduction.

> **Kiwi Girls More Obese than Boys**
> A recent survey of young adults aged 15 – 24 years shows that females are more than 20% more likely to be obese than their male counterparts.

Do you agree with the article's introduction?

Use the data from Table 1 to support your answer, showing full calculations.

(b)   Ka tuaruatia i raro nei te Tūtohi 1 o te Whārangi 2.

Tūtohi 1

	Mōmona	**Kore mōmona**	**Tapeke**
Tāne	222	983	1205
Wāhine	285	1010	1295
Tapeke	507	1993	2500

I whai mōhiohio anō te rangahau mō ngā ritenga kaipaipa onāianei o te hunga whai wāhi mai.

I kitea, o ngā rangatahi i roto i te rangahau i kīia he mōmona rātou, 103 he kaipaipa, ā, e 53 o te hunga kaipaipa i tēnei wā he tāne.

(i)   He aha te ōwehenga o ngā rangatahi mōmona i roto i te tīpako he wāhine auahi-kore?

(ii)   E tuku mōhiohio atu ana anō te Tūtohi 2 mō te hunga whai wāhi mai ki te rangahau i roto i te rōpū taipakeke 15–24 tau.

Tūtohi 2

	Mōmona	**Kore mōmona**	**Tapeke**
Kaipaipa i tēnei wā	103	317	420
Kaipaipa auahi-kore	404	1676	2080
Tapeke	507	1993	2500

Ko te whakapae he nui ake te tūpono ka mōmona te hunga kaipaipa rangatahi tēnā i te hunga rangatahi kaipaipa auahi-kore.

Kei te tautoko ngā hua o te rangahau i tēnei whakapae?

Tautokona tō whakautu ki ngā tātainga tōtika.
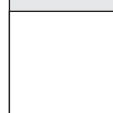
(b) Table 1 from Page 4 is repeated below.

Table 1

	Obese	Not Obese	Total
Male	222	983	1205
Female	285	1010	1295
Total	507	1993	2500

The survey also obtained information about the current smoking habits of participants.

It was found that of the young adults in the survey who were defined as obese, 103 were current smokers, and that 53 of the current smokers were male.

(i) What proportion of obese young adults in the sample were female non-smokers?

(ii) Table 2 below gives further information on the participants in the survey who were in the age group 15–24 years.

Table 2

	Obese	Not Obese	Total
Current smoker	103	317	420
Non-smoker	404	1676	2080
Total	507	1993	2500

It is claimed that young adult smokers are more at risk of being obese than young adult non-smokers.

Do the results of the survey support this claim?

Support your answer with appropriate calculations.

TŪMAHI TUARUA

(a)   Ko te tikanga ka whakawhānau reme māhanga, tautahi rānei ngā uwha Marina. He tino rerekē rawa atu ki te nui atu i te māhanga ka whānau mai.

Kua kitea i tētahi mātai wā-roa e 65% o ngā uwha Marina ka whakawhānau reme ka whai reme tautahi, ā, o aua reme, e 86% ka ora kia wehea rā anō mai i te whāereere.

O ngā hipi uwha ka whai māhanga, kotahi i roto i te rima ka mate ngā reme e rua i mua i te wehenga mai i te whāereere. Tata ki te ōrite te tūponotanga ka ora atu tētahi o ngā māhanga, ngā mea e rua rānei, tae rā anō ki te wehenga mai i te whāereere.

https://milligansganderhillfarm.wordpress.com/2013/06/06/merino-sheep/

(i)   Whiriwhiria te tūponotanga ka whakawhānau reme kotahi tētahi hipi uwha ka ora tae rā anō ki te wehenga mai i te whāereere.

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_____

_____

(ii)   He aha te hautanga o ngā hipi uwha ka whakawhānau māhanga ka ora tae rā anō ki te wehenga mai i te whāereere.

_____

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_____

(iii) He aha te tūponotanga o tētahi reme i tīpakohia matapōkeretia ka ora tae rā anō ki te wehenga mai, nā tētahi hipi uwha i whakawhānau reme tautahi?

He āwhina: Kia maumahara he ōrite te maha o te ora o tētahi māhanga kotahi, ngā mea e rua rānei, tae rā anō ki te wehenga i te whāereere.

(iv) Ko te 'ōrau whakawhānau reme' te maha o ngā **reme** ka ora tae rā anō ki te wehenga mai i ngā whāereere tēnā i te maha o ngā **hipi uwha whakaputa uri**, ka whakaaturia hei ōrau.

E mōhiotia ana tata ki te 85% o ngā uwha Marina ka whai reme.

He aha te ōrau whakawhānau reme mō tēnei mātai wā-roa?

QUESTION TWO

(a) Merino ewes that produce lambs usually have either single lambs or twins. Multiple births other than twins are extremely rare.

A long-term study has shown that 65% of Merino ewes that produce a lamb will have a single lamb, and of those lambs, 86% survive until they are weaned (separated from their mothers).

Of the ewes that produce twins, about one in five lose both lambs before they are weaned. Approximately equal numbers of one twin or both twins survive until they are weaned.

https://milligansganderhillfarm.wordpress.com/2013/06/06/merino-sheep/

(i) Find the probability that a ewe gives birth to a single lamb that survives until it is weaned.

(ii) What proportion of ewes give birth to twins that both survive until they are weaned?

(iii)   What is the probability that a randomly selected lamb that survives until it is weaned
will be from a ewe that produced a single lamb?

Hint: Remember that there is an equal number of one twin or both twins surviving until
they are weaned.

(iv)   'Lambing percentage' is the number of **lambs** that survive until they are weaned
compared to the number of **breeding ewes**, expressed as a percentage.

It is known that about 85% of breeding Merino ewes actually produce lambs.

What was the lambing percentage for this long-term study?

(b) I te Teihana o Highbrook e rua ngā momo hipi, te Marina me te Romene.

E whakaatu ana te Tūtohi 3 i raro i ngā mōhiohio mō ngā reme i whānau mai i te wā whakawhānau reme o te tau 2016. E whakaatu ana i te hautanga o ngā hipi uwha kāore i whai reme, i whai reme tautahi, he nui atu rānei i whānau mai, mō ia momo hipi.

Tūtohi 3

	Kore reme	**Tautahi**	**Maha**
Marina	0.13	0.62	0.25
Romene	0.06	0.48	0.46

I muri i te wehenga o ngā reme i te whāereere, i kōmakatia ngā hipi uwha. I tukuna (kīhai i puritia) ētahi, ā, i puritia ētahi hei whakaputa uri mō te wā whakawhānau reme o te tau 2017.

E whakaatu ana te Tūtohi 4 i te hautanga o ngā hipi uwha Romene i tukuna, i puritia rānei mō te wā whakawhānau reme o te tau 2017.

Tūtohi 4

	Kore reme	**Tautahi**	**Maha**
Ngā uwha Romene i tukuna	0.88	0.68	0.40
Ngā uwha Romene i puritia	0.12	0.32	0.60

Ko te ōwehenga o ngā hipi uwha whakaputa uri Romene ki te Marina i te Teihana o Highbrook i te tīmatanga o te wāhanga tau he tata ki te 3:2.

E ai ki ngā raraunga i ngā tūtohi 3 me te 4, i te mutunga o te wāhanga whakawhānau reme o te 2016, he aha te hautanga o te tapeke o ngā hipi uwha whakaputa uri i te Teihana o Highbrook he Romene kore uri (kāore i puta he reme), ka mutu i tukuna?

(b)   On Highbrook Station there are two breeds of sheep, Merino and Romney.

Table 3 below gives information about the lambs born in the 2016 lambing season. It shows the proportion of ewes that did not produce a lamb, had a single birth, or had multiple births, for each breed of sheep.

Table 3

	No lamb	**Single**	**Multiple**
Merino	0.13	0.62	0.25
Romney	0.06	0.48	0.46

After the lambs were weaned, the ewes were sorted. Some were culled (not kept) and others were kept for breeding in the 2017 lambing season.

Table 4 shows the proportion of Romney ewes that were either culled or kept for the 2017 lambing season.

Table 4

	No lamb	**Single**	**Multiple**
Romney ewes culled	0.88	0.68	0.40
Romney ewes kept	0.12	0.32	0.60

The ratio of Romney to Merino breeding ewes on Highbrook Station at the beginning of the season was approximately 3:2.

According to the data in tables 3 and 4, at the end of the 2016 lambing season, what proportion of the total breeding ewes on Highbrook Station were Romneys that were 'empty' (did not produce a lamb) and were culled?

TŪMAHI TUATORU

(a)   Whakatipuhia ai ngā hāmana i ngā pākorokoro moana. E hia tini mano hāmana kei ia pākorokoro.

I te ekenga o te kotahi tau i ngā pākorokoro, he tuari māori te tuaritanga o ngā taumaha o ngā hāmana toa, me te toharite o te 4125 karamu me te ine mahora o te 65 karamu.

www.technologybloggers.org/wp-content/uploads/2013/06/big-glory-bay.jpg

(i)   Kimihia te tūponotanga i te ekenga o te kotahi tau i te pākorokoro, kei waenga i te 4125 me te 4200 karamu te taumaha o tētahi toa i tīpakohia matapōkerehia.

(ii)   He aha te taumaha mōrahi o te 10% tino māmā rawa o ngā hāmana?

(iii) I te ekenga o te kotahi tau i te pākorokoro, he tuari māori te tuaritanga o ngā taumaha o ngā hāmana uwha me te 3975 karamu te toharite.

Mēnā i hipa atu te 40% o ngā hāmana uwha i te 4000 karamu, he aha te ine mahora?

(iv) He tata ōrite te maha o ngā hāmana toa me ngā uwha i roto i ngā pākorokoro.

Ina haohia mai, he tata ki te tuari māori te tuaritanga o ngā taumaha, ā, he 4050 karamu te taumaha toharite me te ine mahora o te 84 karamu.

Ina haohia ngā hāmana, e rua ngā hāmana ka whakawhiwhia ki ia kaihao hei whakahoki ki te kāinga.

Ki te tīpakohia matapōkerehia ēnei hāmana e rua, he aha te tūponotanga ka neke atu ia hāmana o aua hāmana e **rua** i te 4025 karamu?

QUESTION THREE

(a) Salmon are grown in sea pens. Each pen contains several thousand salmon.

After one year in the pens, male salmon have weights that are approximately normally distributed, with mean 4125 grams and standard deviation 65 grams.

www.technologybloggers.org/wp-content/uploads/2013/06/
big-glory-bay.jpg

    (i)   Find the probability that after one year in a pen, a randomly selected male will weigh between 4125 and 4200 grams.

    (ii) What is the maximum weight of the lightest 10% of salmon?

(iii)   After one year in the pens, female salmon have weights that are approximately normally distributed with mean 3975 grams.

If 40% of female salmon exceed 4000 grams, then what would be the standard deviation?

(iv)   The pens contain approximately equal numbers of male and female salmon.

When they are harvested, the weights of all the salmon are approximately normally distributed, with mean 4050 grams and standard deviation 84 grams.

When the salmon are harvested, each member of the harvest team is given two salmon to take home.

If these two salmon are selected at random, what is the probability that **both** of the salmon will each weigh more than 4025 grams?
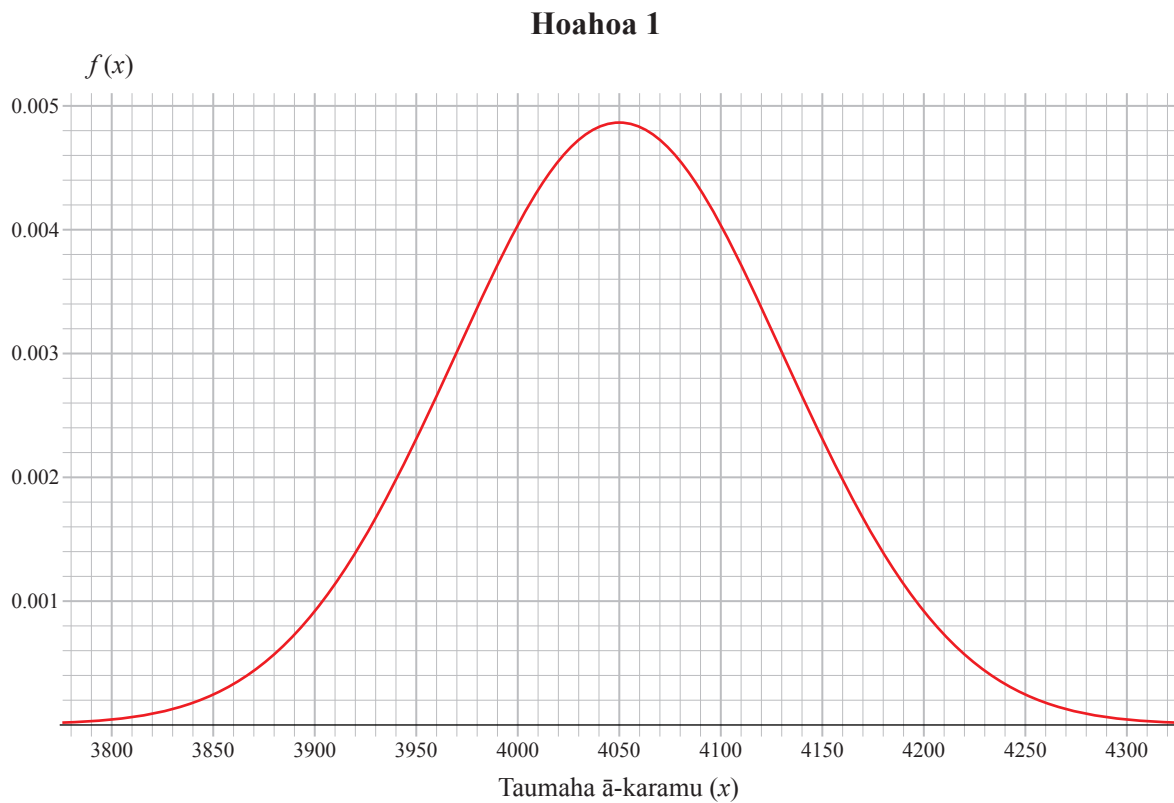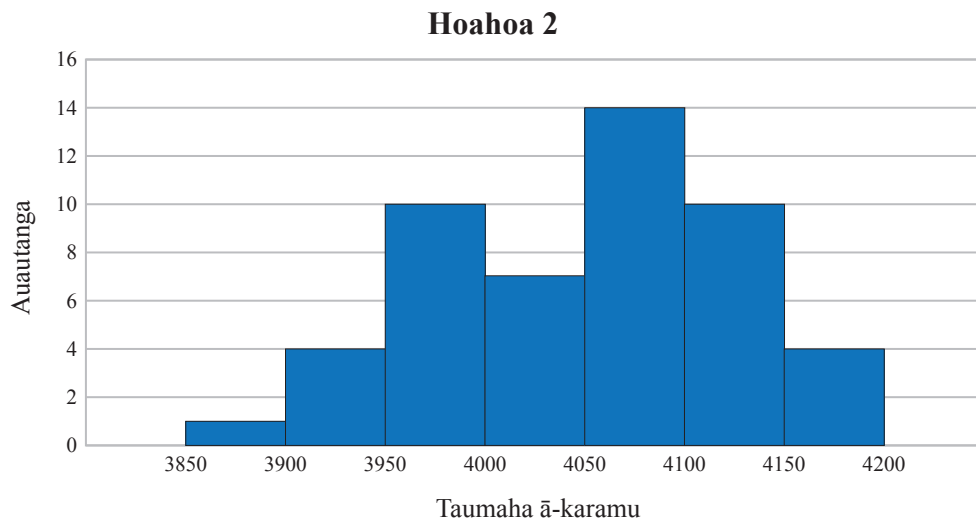
(b) Ina haohia he pākorokoro hāmana, ko te tūmanako ka whai ngā hāmana i te tuari tūponotanga e ai ki te Hoahoa 1 i raro.

Hoahoa 1

Taumaha ā-karamu (*x*)

Ina haohia, i tangohia he tīpako matapōkere o ngā hāmana e 50, ā, ka inea te taumaha.

E whakaaturia ana he kauwhata pouhere o nga hāmana i tīpakohia ki te Hoahoa 2 i raro.

Hoahoa 2

Taumaha ā-karamu

(i) He aha te hautanga o ngā hāmana i roto i te tīpakonga he neke atu te taumaha i te 4000 karamu?

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_____

(ii) Whakatauritea te tuari tūponotanga ki te kauwhata pouhere ka ahu mai i ngā hua tīpako.

I tō whakautu, me whai whakaaro koe ki te hanga, pokapū, te tuari hoki o ngā tuaritanga e rua me te tuku taunakitanga tau ina tika ana.
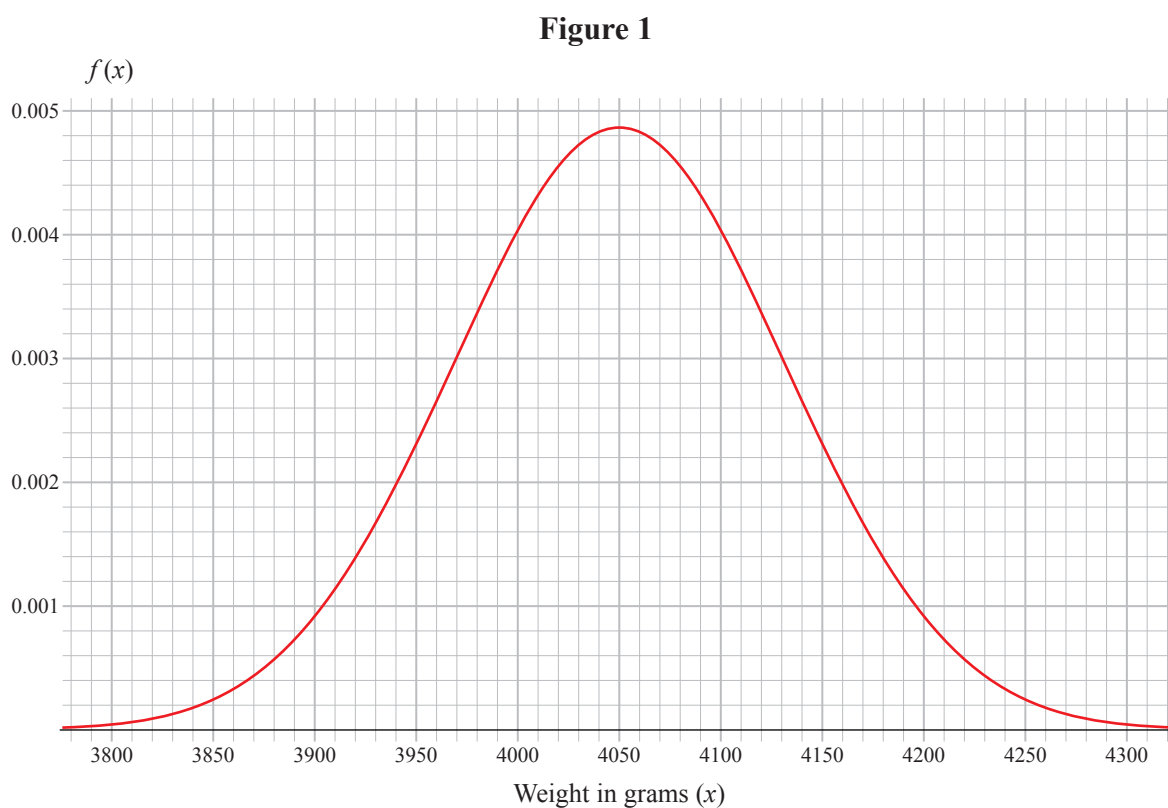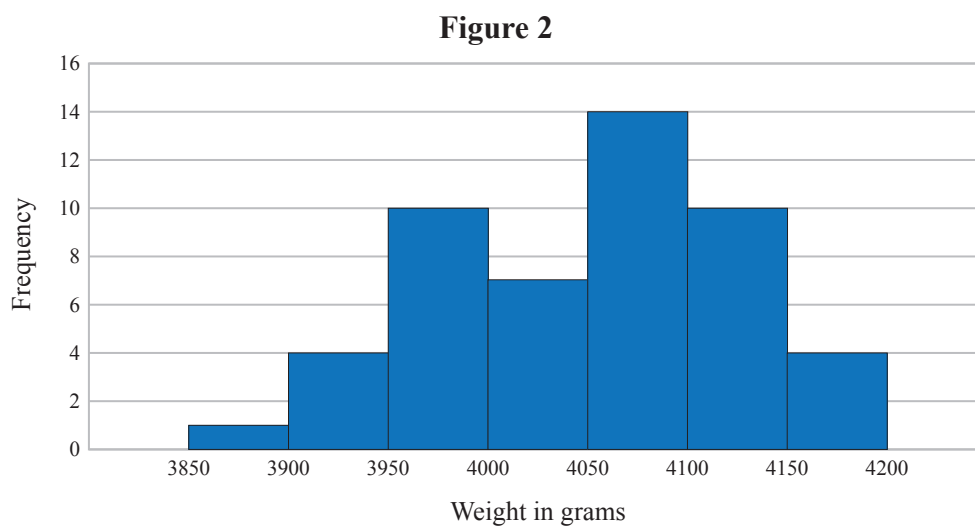
(b) When a pen of salmon is harvested, the weights of the salmon are expected to have the probability distribution shown in Figure 1 below.

Figure 1

Once harvested, a random sample of 50 salmon was taken and weighed.

A histogram of the weights of the sampled salmon is shown in Figure 2 below.

Figure 2

(i) What proportion of salmon in the sample had weights which exceeded 4000 grams?

(ii) Compare the probability distribution and the histogram that resulted from the sample results.

In your answer you should consider the shape, centre, and spread of both distributions, and should provide numerical evidence where appropriate.

TAU TŪMAHI

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

TAU TŪMAHI

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

QUESTION
NUMBER

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.	ASSESSOR'S USE ONLY

91267M

Level 2 Mathematics and Statistics, 2017

91267 Apply probability methods in solving problems

2.00 p.m. Friday 24 November 2017
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.

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–MATHF.

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 2–27 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.