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91267M



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MANA TOHU MĀTAURANGA O AOTEAROA

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Te Pāngarau me te Tauanga, Kaupae 2, 2016

91267M Te whakahāngai tikanga tūponotanga hei whakaoti rapanga

9.30i te ata Rāpare 24 Whiringa-ā-rangi 2016
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 KATOAA kei roto i tēnei pukapuka.

Tirohia mēnā kei a koe te Puka Tikanga Tātai L2-MATHMF.

Whakaaturia ngā mahinga KATOAA.

Mēnā ka hiahia whārangi atu anō koe mō ō tuinga, whakamahia te (ngā) whārangi wātea kei muri o tēnei pukapuka, ka āta tohu ai i te 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.

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

TAPEKE

MĀ TE KAIMĀKA ANAKE

TŪMAHI TUATAHI

- (a) E rua ngā wā i te tau e hauhakehia ana ngā rākau o te uru huarākau āporo o Brookhaven, ina he rerekē ngā wā e makuru ana ngā āporo.

E ai ki ngā tuhinga o ngā tau o mua e 70% o ngā āporo ka katohia i te hauhake tuatahi, ā, ka waiho te toenga. I te hauhake tuarua, e 35% o te toenga o ngā āporo ka katohia, ā, ka waiho te toenga.

Ka heria katoahia atu ngā āporo i katohia ki te hēte whakamātā. Mai i ia hauhake, e 9% ka tīpakohia hei hoko ki tai; e 31% ka tukuna atu ki ngā māketē o te hau kāinga; ko te toenga ka tukuna atu ki tētahi wheketere kia mahia mai hei wairanu.

- (i) Tātaihia te tūponotanga kāore e katohia tētahi āporo e whiriwhiria matapōkeretia.

- (ii) He aha te ōwehenga o ngā āporo ka tukuna atu ki te wheketere kia mahia mai hei wairanu?

- (iii) Mēnā ka hokona tētahi āporo ki te māketē o te hau kāinga, he aha te tūponotanga i ahu mai taua āporo i te hauhake tuatahi?

- (iv) 120 ngā āporo kei roto i tētahi pāka hoko ki tai.

Mēnā 172 ngā pāka hoko ki tai ka oti mai, e hia katoa ngā āporo o ngā hauhaketanga?

QUESTION ONE

- (a) The trees in Brookhaven apple orchard are harvested twice a year, as the apples ripen at different times.

Records from previous years have shown that during the first harvest, 70% of apples are picked, while the rest are left. At the second harvest, 35% of the remaining apples are picked, while the rest are not picked.

All the apples that are picked go to the packing shed. From each harvest, 9% are selected to be sent for export; 31% are sent for sale on the local market; the rest are sent to a factory to be made into sauce.

- (i) Find the probability that a randomly selected apple will not be picked.

- (ii) What proportion of apples will be sent to the factory to be made into sauce?

- (iii) If an apple is sold on the local market, then what is the probability that it will have been from the first harvest?

- (iv) There are 120 apples in an export carton.

If 172 export cartons are produced, then how many apples were there in the total crop?

- (b) I te uru huarākau Pipsy Galore e rua anake ngā momo āporo ka whakatipuhia, ko te Jazz me te Beauty.

He rua whakareanga ake te maha o ngā āporo Jazz e whakatipuhia ana i ngā āporo Beauty.

E whakaatu ana te Tūtohi 1 i ngā ōwehenga o ia momo āporo i katohia i muri mai i ngā hauhake e rua.

Tūtohi 1

	I katohia	Kāore i katohia
Jazz	0.85	0.15
Beauty	0.95	0.05

E whakaatu ana te Tūtohi 2 i te ōwehenga o ngā āporo i **katohia** mō ia momo ka hokona ki tai, ka hokona i te hau kāinga, ka tukuna rānei ki te wheketere.

Tūtohi 2

	Hoko ki tai	Hau kāinga	Wheketere
Jazz	0.12	0.58	0.3
Beauty	0.15	0.7	0.15

- (i) He aha te tūponotanga mō tētahi āporo ka whiriwhiri matapōkerehia mai i **ngā hauhaketanga katoa** nō te momo Jazz ka mutu ka tukuna atu ki te wheketere?

- (b) At the Pipsy Galore orchard only two varieties of apple, Jazz and Beauty, are grown.
Twice as many Jazz apples as Beauty apples are grown.

Table 1 below shows the proportions of each variety of apple that have been picked after both harvests have been completed.

Table 1

	Picked	Not picked
Jazz	0.85	0.15
Beauty	0.95	0.05

Table 2 shows the proportion of **picked** apples for each variety that are exported, sold locally, or sent to the factory.

Table 2

	Export	Local	Factory
Jazz	0.12	0.58	0.3
Beauty	0.15	0.7	0.15

- (i) What is the probability that an apple selected at random from the **total crop** will be of the Jazz variety and will be sent to the factory?

TŪMAHI TUARUA

E rua ngā poraka whenua o Crisp Orchard e whakatipuhia ana ngā āporo. Ko ngā āporo o te poraka nui ake ka whakatipuhia mā ngā tikanga whānui noa, ā, i tētahi atu poraka ka whakatipuhia pararopitia.

Ka tangohia he tīpako matapōkere o ngā āporo 1200 mai i ngā poraka e rua me te aromatawai mō ngā tahumaero. Kua whakarāpopototia ngā otinga ki te Tūtohi 3 i raro nei.

Tūtohi 3

	Tikanga whānui	Pararopi	Tapeke
Tahumaero	122	58	180
Tahumaero-kore	518	502	1020
Tapeke	640	560	1200

(a) (i) He aha te ōwehenga o ngā āporo i te tīpakotanga i riro i te tahumaero?

(ii) He aha te ōwehenga o ngā āporo tahumaero i whakatipuhia mā ngā tikanga whānui?

(iii) Mēnā 171 000 te katoa o ngā āporo i whakatipuhia pararopitia, ā, e ai ki tēnei tīpako, e hia ngā āporo e tūmanakohia ana ka whakatipuhia mā ngā tikanga whānui, ā, ka pāngia e te tahumaero?

QUESTION TWO

Crisp Orchard has two blocks of land where apples are grown. Apples from the larger block are grown by conventional methods, while in the other block they are grown organically.

A random sample of 1200 apples is taken over both blocks and tested for disease. The results are summarised in Table 3 below.

Table 3

	Conventional	Organic	Total
Diseased	122	58	180
Not diseased	518	502	1020
Total	640	560	1200

- (a) (i) What proportion of apples in the sample were diseased?

- (ii) What proportion of the diseased apples were conventionally grown?

- (iii) If there was a total of 171 000 organic apples grown, then based on this sample, how many apples would be expected to be grown conventionally and be diseased?

(b) E whakatipuhia ana ngā momo Jazz me Beauty i ngā poraka e rua.

Mai i te tīpako o ngā āporo 1200 i te wāhanga (a), 890 ngā āporo nō te momo Jazz.

I kitea anō 182 o te momo Beauty kāore i te pāngia e te tahumaero.

E tuaruahia ana te Tūtohi 3 mai i te wāhanga (a) i konei hei āwhina i a koe ki te whakatutuki i ngā tūmahi e whai ake nei.

Tūtohi 3

	Tikanga whānui	Pararopi	Tapeke
Tahumaero	122	58	180
Tahumaero- kore	518	502	1020
Tapeke	640	560	1200

(i) He aha te ōwehenga o ngā āporo o te tīpako nō te momo Jazz, ka mutu, ka pāngia e te tahumaero?

- (b) Jazz and Beauty varieties are grown in both blocks.

From the same sample of 1200 apples in part (a), 890 apples were of the Jazz variety.

It was also found that 182 of the Beauty variety were not diseased.

Table 3 from part (a) is repeated here to help you answer the questions that follow.

Table 3

	Conventional	Organic	Total
Diseased	122	58	180
Not diseased	518	502	1020
Total	640	560	1200

- (i) What proportion of apples in the sample were of the Jazz variety and diseased?

TŪMAHI TUATORU

Ka tukuna atu ngā āporo ki te wheketere kia mahia mai hei wairanu, kātahi ka pounamutia.

Kua kitea i ngā aromatawai, ina mahi tika te mīhini pounamu, he tuari māori te tuaritanga o te taumaha o te wairanu ka whakaratohia ki tētahi pātara, me te 310 karamu te tau toharite me te ine mahora o te 4.5 karamu.

- (a) (i) Kimihia te tūponotanga mō tētahi pātara ka whiriwhiri matapōkerehia ko tana wairanu kei waenga i te 310 me te 316 karamu.

- (ii) E kī ana te tapanga o te pātara wairanu he 300 karamu te taumaha o ngā kai i roto. Ko ngā pātara he iti ake i te 300 karamu ngā kai i roto ka kīia he kōmāmā rawa.

He aha te ōrau o ngā pātara e tūmanakohia ana kei te kōmāmā rawa?

QUESTION THREE

Apples are sent to a factory to be made into sauce, then bottled.

Testing has shown that, when the bottling machine is operating correctly, the weight of sauce dispensed into a bottle can be taken to be normally distributed, with mean 310 grams and standard deviation 4.5 grams.

- (a) (i) Find the probability that a randomly selected bottle will contain between 310 and 316 grams of sauce.

- (ii) The label on the sauce bottle states that the contents weigh 300 grams. Bottles that contain less than 300 grams are considered to be under-weight.

What percentage of bottles would be expected to be under-weight?

- (iii) Ka tautuhia e tētahi tukanga whakaū kounga ngā pātara he taumaha rawa ngā kai i roto. Ina mahi tika te mīhini, kāore e nui atu i te 1 o ngā pātara 20 i te taumaha rawa. Mēnā ka nui atu i te 1 i roto i te 20 ngā pātara taumaha rawa, me whakatika te mīhini. E hia ngā karamu wairanu i roto i te pātara i mua i te whakataunga he taumaha rawa?

- (iv) Ko te tukanga whakaū kounga he tango i tētahi tīpako o ngā pātara piritahi e toru me te ine i te taumaha o ngā kai i roto. Mēnā ka nui atu i te kotahi ngā pātara ka kitea kei te taumaha rawa, he kōmāmā rawa rānei, ka tirohia te mīhini kia whakatikahia mai.

I muri i te tango i tētahi tīpako matapōkere, he aha te tūponotanga ka tirohia te mīhini?

- (iii) A quality control process identifies bottles of sauce that have contents that are over-weight.

When the machine is functioning correctly, no more than one bottle in 20 is over-weight.

If more than one in 20 bottles are over-weight, then the machine must be adjusted.

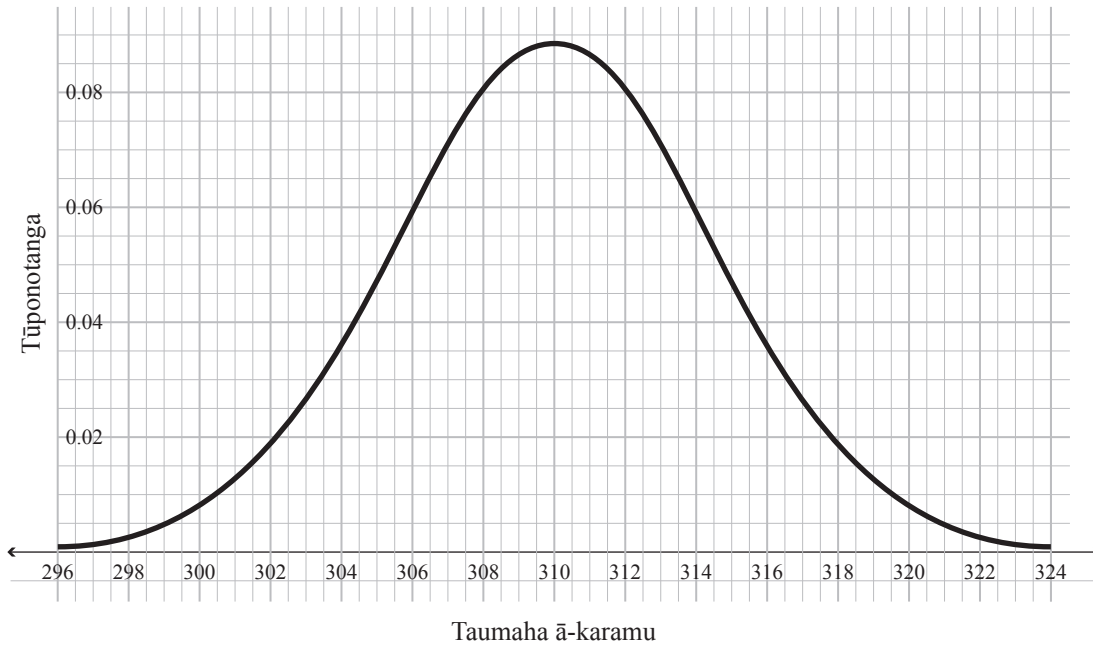
How many grams of sauce will a bottle contain before it is considered over-weight?

- (iv) The quality control process involves taking a random sample of three successive bottles and measuring the weights of their contents. If more than one of the bottles is found to be over-weight or under-weight, then the machine is checked for possible adjustment.

After taking a random sample, what is the probability that the machine is checked?

- (b) Mēnā i te mahi tika te mīhini pounamu, ka ōrite te tuari tūponotanga o te taumaha o te wairanu e whakaratohia ana ki tētahi pātara ōrite te āhua ki te mea kei te Whakaahua 1 i raro.

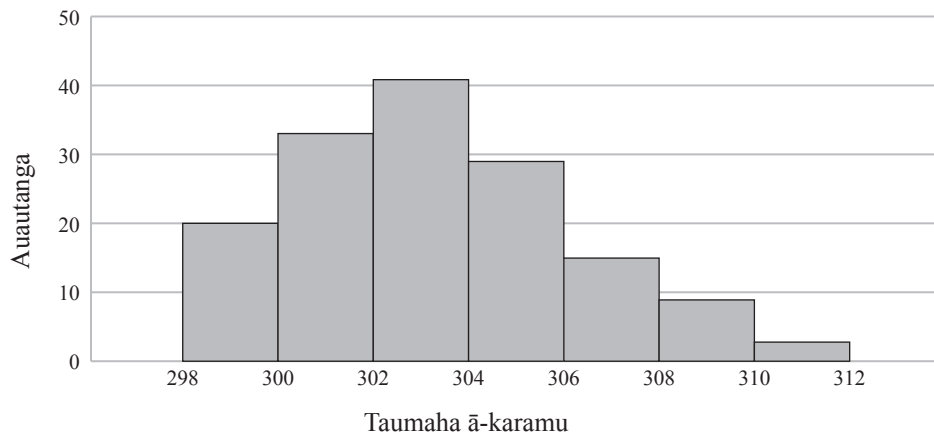
Whakaahua 1



Ka whakaurua he mīhini pounamu hou.

Ka tangohia he tīpako matapōkere o ngā kai o ngā pātara 150 hei aromatawai i te mīhini hou. E whakaaturia ana ngā otinga ki te kauwhata pouhere auau i te Whakaahua 2 i raro.

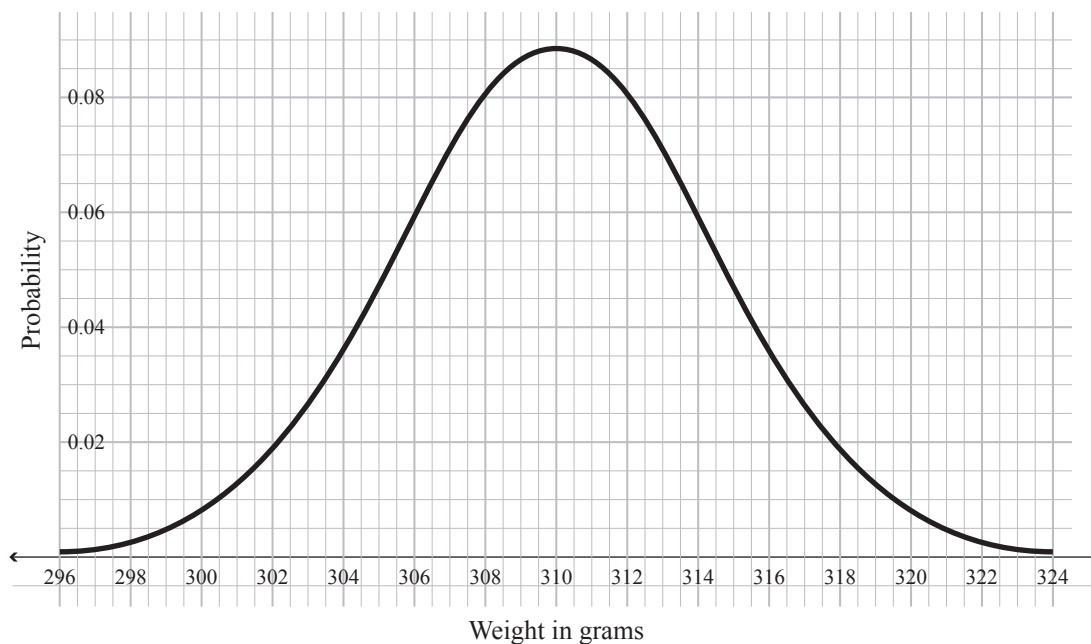
Whakaahua 2 Ngā Otinga Tīpako



- (i) He aha te ōwehenga o ngā pātara i roto i te tīpako he kōmāmā rawa ngā kai i roto (arā, he iti ake ngā kai i te 300 karamu)?

- (b) If the bottling machine was operating correctly, the weight of sauce dispensed into a bottle would have a probability distribution similar in shape to the one in Figure 1 below.

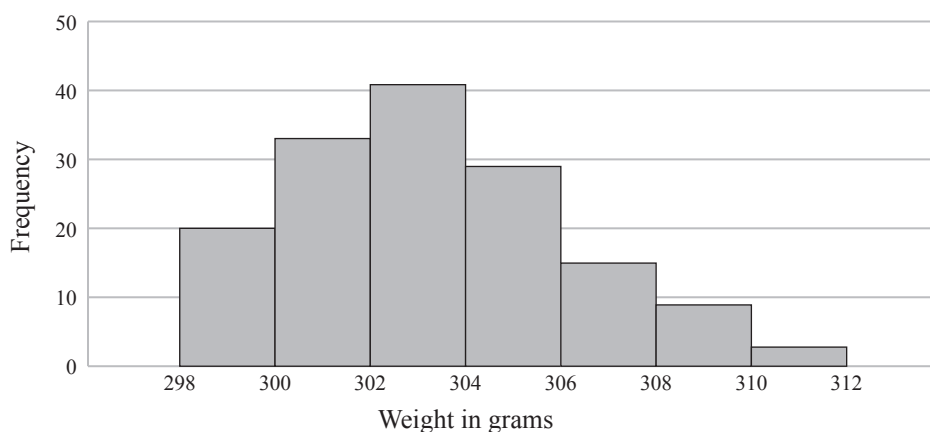
Figure 1



A new bottling machine is installed.

A random sample is taken of the contents of 150 bottles to test the new machine. The results are shown in the frequency histogram in Figure 2 below.

Figure 2
Sample Results



- (i) What proportion of bottles in the sample had contents that were under-weight (i.e. the contents weighed less than 300 grams)?

English translation of the wording on the front cover

Level 2 Mathematics and Statistics, 2016

91267M Apply probability methods in solving problems

9.30 a.m. Thursday 24 November 2016

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 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.°