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2

91267M



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

SUPERVISOR'S USE ONLY

Te Pāngarau me te Tauanga, Kaupae 2, 2013

91267M Te whakahāngai tikanga tūponotanga hei whakaoti rapanga

2.00 i te ahiahi Rāhina 18 Whiringa-ā-rangi 2013
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 Ākongā 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 ngā mahinga KATOA.

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

Tirohia mehemea kei roto nei ngā whārangi 2–27 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.

PĀTAI TUATAHI

Kua uru tētahi kapa nō kura A me tētahi kapa nō kura B ki te whiringa-toa o tētahi whakataetae hākinakina kura.

Ka tākarohia e ēnei kapa e rua tētahi whiringa kēmu e toru kia kitea ko wai ka toa i roto i ēnei kēmu.

Ka haere tonu ēnei kēmu kia whiwhi rā anō tētahi kapa i tētahi kaute toa.

Ko te kapa ka toa i ngā kēmu e rua ka toa i te whakataetae.

(a) He ōrite te pai o ngā kapa e rua.

(i) Kimihia te tūponotanga ka toa a kapa A i te whakataetae i te mutunga o ngā kēmu e rua tuatahi.

(ii) He aha te tūponotanga kāore e kitea te kapa toa kia tākarohia rā anō ngā kēmu e toru?

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

QUESTION ONE

A team from school A and a team from school B are in the final of a school sport competition.

The two teams take part in a best-of-three game series.

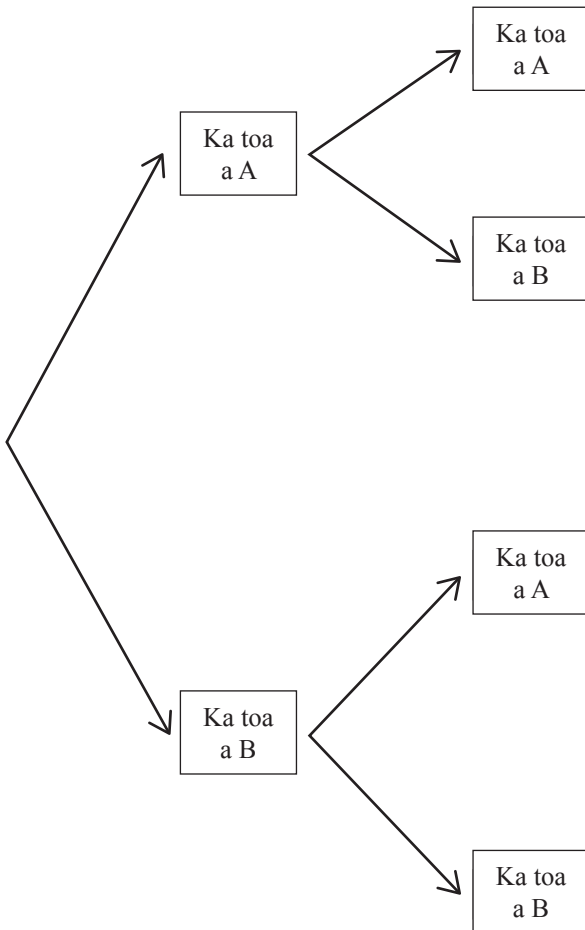
Each game continues until one team has a winning score.

The team that wins two games wins the competition.

- (a) The teams are evenly matched.
- (i) Find the probability that team A will win the competition at the end of the first two games.

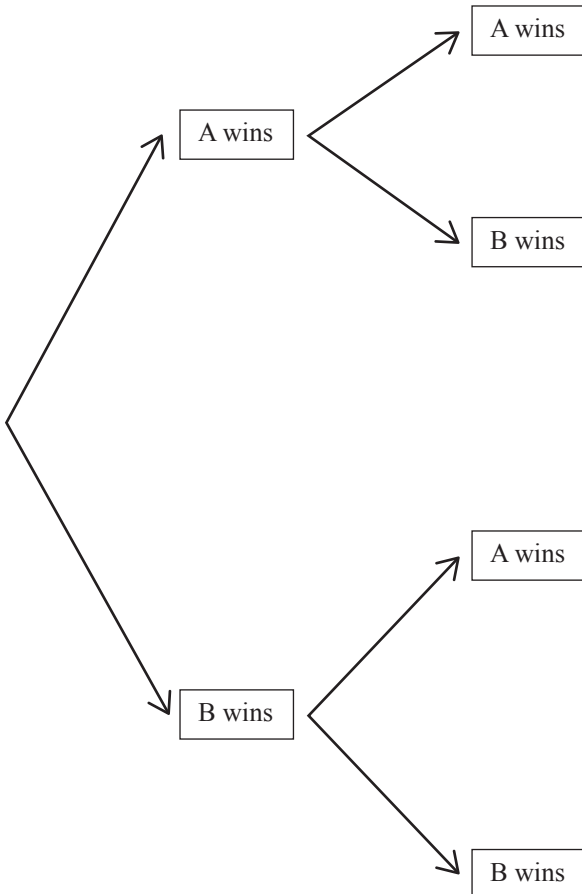
- (ii) What is the probability that the winner cannot be decided until three games have been played?

- (b) E hiahia ana a Bhavik ki te kite mēnā ka whiwhi painga te kura kei tōna kura ngā tākaro e rua. Ko te kēmu tuatahi kei kura A, ko te kēmu tuarua kei kura B, ā, ko te kēmu tuatoru kei kura A. Mai i ngā pūkete, ka kitea e ia ko te tūponotanga ka toa ia kapa i tō rātou ake kura he $\frac{3}{4}$. Ka tīmata ia ki te waihanga i tētahi hoahoa rākau, e ai ki te whakaaturanga i raro.



- (i) He aha te tūponotanga ka toa a kapa A i te whakataetae?

- (b) Bhavik wants to see if the team that has the game at their own school twice has an advantage. The first game is played at school A, the second at school B, and the third at school A. From the records, he finds that the probability of either team winning at their own school is $\frac{3}{4}$. He begins to make a tree diagram as shown below.



- (i) What is the probability that school A wins the competition?

- (ii) Mēnā ka toa a kapa A i te whakataetae, he aha te tūponotanga hei te mutunga o te kēmu tuatoru rā anō ka kitea te toa?

- (iii) Hei tā Bhavik e rua whakareatanga ake te tūponotanga ka toa a kapa A i te whakataetae tēnā i a kapa B.

Ka taea te parahau te whakapae a Bhavik?

Āta whakaaturia ō whakaaro whaitake.

- (ii) If team A wins the competition, what is the probability that the winner would not have been decided until the end of the third game?

- (iii) Bhavik said that team A is almost twice as likely to win the competition as team B.

Is Bhavik's claim justified?

Show your reasoning clearly.

PĀTAI TUARUA

E ine ana te pēhanga toto mōrahi i te pēhanga o te toto i roto i ngā iatuku i te wā e mokowhiti ana te manawa, ā, e inea ana ki te mm Hg (mirimita o te konuoi).

I roto i tēnei pātai ko te “pēhanga toto” ko te “pēhanga toto mōrahi”.

Ko te pēhanga toto o ngā ākonga katoa i roto i tētahi kura e mahi nēhi ana a Alice, he mea tuari noa pea, me te toharite o te 113 mm Hg, me te ine mahora o te 10.3 mm Hg.

- (a) (i) He aha te ōwehanga o ngā ākonga, kua kōwhiria matapōkeretia mai i te kura o Alice, e tūmanakohia ana tō rātou pēhanga toto kei waenga i te 113 mm Hg me te 120 mm Hg?

- (ii) E 719 ngā ākonga kei te kura o Alice.

E hia ngā ākonga e tūmanakohia ana he iti ake tō rātou pēhanga toto i te 115 mm Hg?

QUESTION TWO

Systolic blood pressure measures the pressure of blood in the arteries as the heart beats and is measured in mm Hg (millimetres of mercury).

In this question “blood pressure” refers to “systolic blood pressure”.

The blood pressure of all the students in a school where Alice is the nurse, is approximately normally distributed, with mean 113 mm Hg, and standard deviation 10.3 mm Hg.

- (a) (i) What proportion of the students, chosen at random from Alice’s school, would be expected to have blood pressure between 113 mm Hg and 120 mm Hg?

- (ii) There are 719 students at Alice’s school.

How many students would be expected to have blood pressure less than 115 mm Hg?

- (iii) He aha te tūponotanga o ētahi whakaaturanga pēhanga toto e rua ka tīpakohia matapōkeretia mai i ngā ākonga o te kura o Alice kei runga ake i te 110 mm Hg?

- (iv) Ka whakataua a Alice ki te whakamātau anō i te 10 ōrau o ana ākonga nō rātou ngā pēhanga toto teitei rawa i te rā tuatahi o te wāhanga.

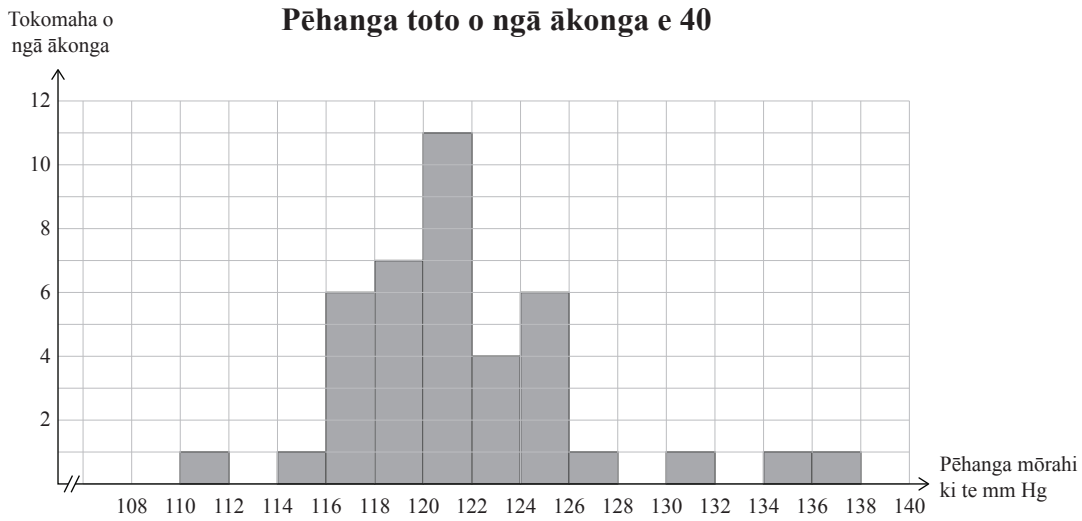
He aha te uara pēhanga toto iti rawa o tētahi ākonga e hiahiatia kia whakamātauhia anō e Alice?

- (iii) What is the probability that two randomly selected blood pressure readings from students at Alice's school are both over 110 mm Hg?

- (iv) Alice decides to retest the 10% of her students who have the highest blood pressures on the first day of term.

What is the lowest blood pressure value of a student that Alice will need to retest?

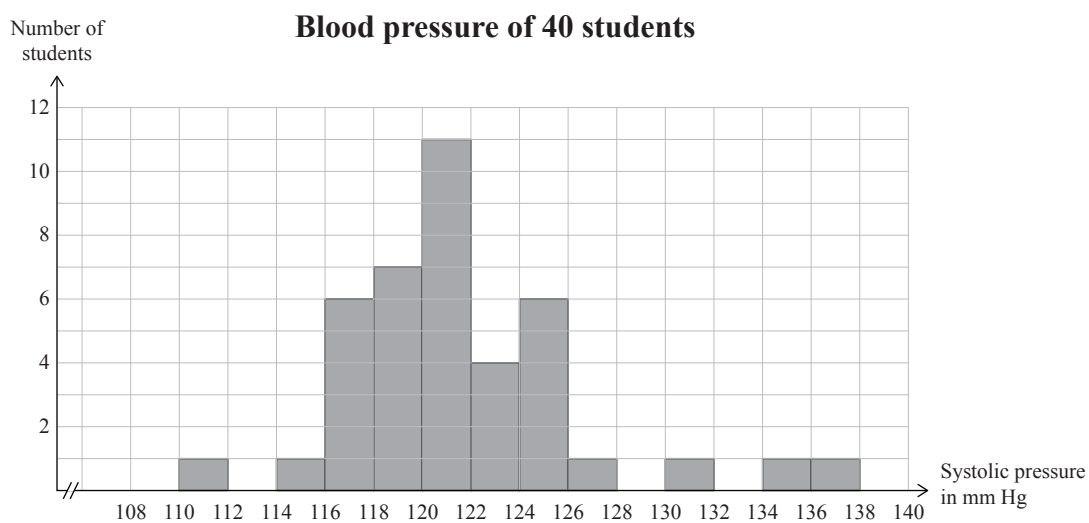
- (b) I muri tonu i te Akoranga Koiri i tētahi rangi, ka hopukia e Alice ngā whakaaturanga pēhanga toto o ngā ākonga e 40. E whakaaturia ana ngā hua o te whakamātau ki te kauwhata pouhere e whai ake.



- (i) He aha te ōwehenga o ngā whakaaturanga pēhanga toto o ēnei ākonga kei waenga i te 110 me 122 mm Hg?

- (ii) Whakatauritea ngā hua mō ēnei ākonga ki te tuaritanga o ngā hua mō ngā ākonga katoa i te kura o Alice.

- (b) Immediately after Physical Education one day, Alice takes blood pressure readings of 40 students. The results are shown in the following histogram.



- (i) What proportion of the blood pressure readings of these students lies between 110 and 122 mm Hg?
-
-
-
-
- (ii) Compare the results for these students with the distribution of results for all the students at Alice's school.
-
-
-
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PĀTAI TUATORU

- (a) Ko te pēhanga toto i roto i tēnei pātai e kōrero ana mō te pēhanga toto mōrahi.

He tohu anō pea te pēhanga toto teitei i te mate manawa.

Ko tētahi tikanga mō te whakamātau mō te mate manawa he ine i te pēhanga toto o te tangata kia kitea mēnā he teitei, arā kia 140 mm Hg i te itinga rawa.

I kitea i ngā whakamātau o ngā tāngata 8 825 o ngā tāngata 10 300 i raro o rātou pēhanga toto i te 140 mm Hg.

O tēnei hunga, he 8 625 kāore i te mate manawa.

E 1 339 o ngā tāngata i tīpakohia he mate manawa tō rātou.

E whakarāpopotohia ana ngā mōhiohio i runga i roto i te papatau e whai ake.

	Pēhanga toto iti	Pēhanga toto teitei	Tapeke
Kāore i te mate manawa	8 625	336	8 961
He mate manawa	200	1 139	1 339
Tapeke	8 825	1 475	10 300

Mō ngā tāngata i whakamātauhia:

- (i) He aha te ōwehenga o ngā tāngata he iti o rātou whakaaturanga pēhanga toto?

- (ii) He aha te ōwehenga o ngā tāngata he teitei o rātou whakaaturanga pēhanga toto, he mate manawa rānei tō rātou?

QUESTION THREE

- (a) Blood pressure in this question refers to systolic blood pressure.

High blood pressure can indicate heart disease.

One way to test for heart disease is by measuring a person's blood pressure and seeing if it is high, ie at least 140 mm Hg.

Tests showed that 8 825 of 10 300 people sampled had blood pressure under 140 mm Hg.

Of these, 8 625 did not have heart disease.

1 339 of the people sampled had heart disease.

The information above is summarised in the following table.

	Low blood pressure	High blood pressure	Total
Did not have heart disease	8 625	336	8 961
Have heart disease	200	1 139	1 339
Total	8 825	1 475	10 300

For the people who were tested:

- (i) What proportion of the people had a blood pressure reading that was low?

- (ii) What proportion of people had a high blood pressure reading or heart disease ?

Ka whakamahia te pēhanga toto teitei hei tohu i te mate manawa.

- (iii) He aha te ōwehenga o ngā tāngata mate manawa i roto i te tīpakotanga he teitei ō rātou whakaaturanga pēhanga toto?

- (iv) Nā runga i tēnei tīpakotanga, he aha te mōreareatanga o tētahi tangata whai pēhanga toto teitei e pāngia ana ki te mate manawa?

- (b) Ko te pēhanga toto i roto i tēnei pātai e kōrero ana mō te pēhanga toto mōrahi.

Ka pāngia te tangata kotahi i roto i te 100 tāngata e tētahi momo mate manawa.

Ka puta i tētahi whakamātau pēhanga toto he kitenga tōrunga tika i te 95% o te wā me te kitenga tōraro tika i te 90% o te wā. Arā, mēnā e pāngia ana te tangata e tēnei mate, kei te kī te whakamātau he 0.95 te tūponotanga kei te pāngia te tangata e tēnei mate. Mēnā kāore e pāngia ana te tangata e tēnei mate, kei te kī te whakamātau he 0.90 te tūponotanga kāore i te pāngia e te mate.

He kitenga tōrunga tō tētahi tangata i tīpakohia matapōkeretia mō te whakamātau pēhanga toto.

He aha te mōreareatanga ka pāngia te tangata ki te mate?

High blood pressure is used as an indicator of heart disease.

- (iii) What percentage of people in the sample with heart disease actually had a high blood pressure reading?

- (iv) Based on this sample, what is the risk of a person with high blood pressure having heart disease?

- (b) Blood pressure in this question refers to systolic blood pressure.

A form of heart disease affects about one in 100 people.

A blood pressure test for this disease gives a correct positive result 95% of the time and a correct negative result 90% of the time. That is, if a person has this disease, then the test says the person has the disease with probability 0.95. If a person does not have the disease, then the test says the person does not with probability 0.90.

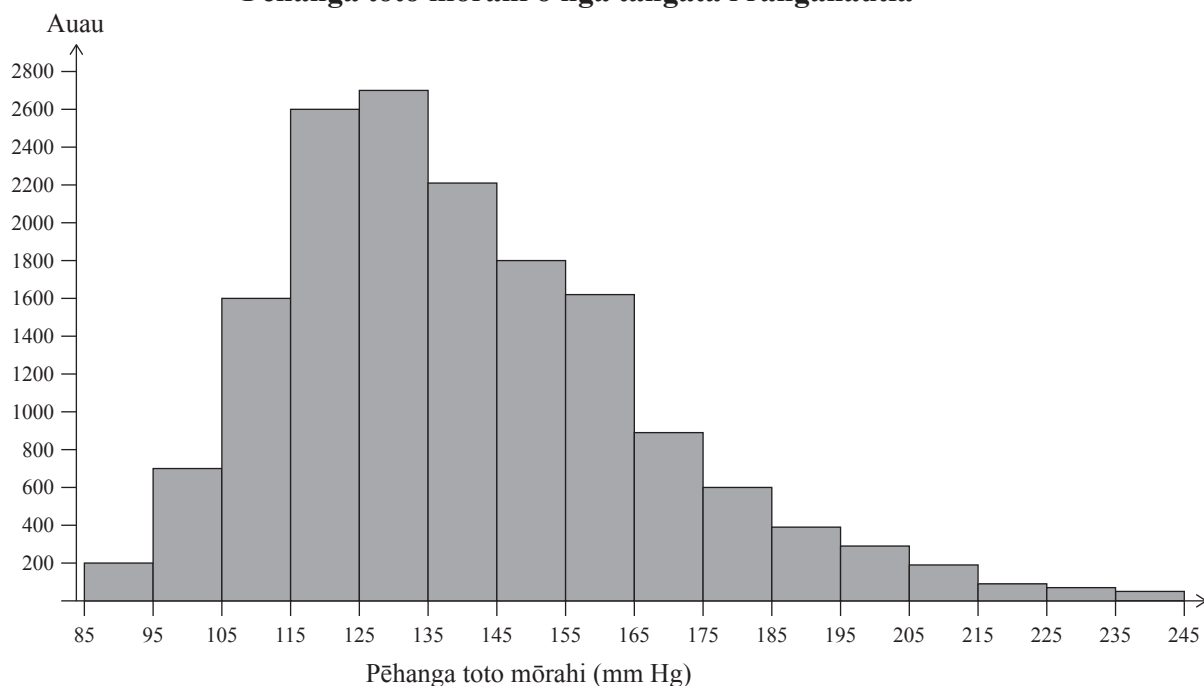
A randomly selected person has a positive result for the blood pressure test.

What is the risk of the person actually having the disease?

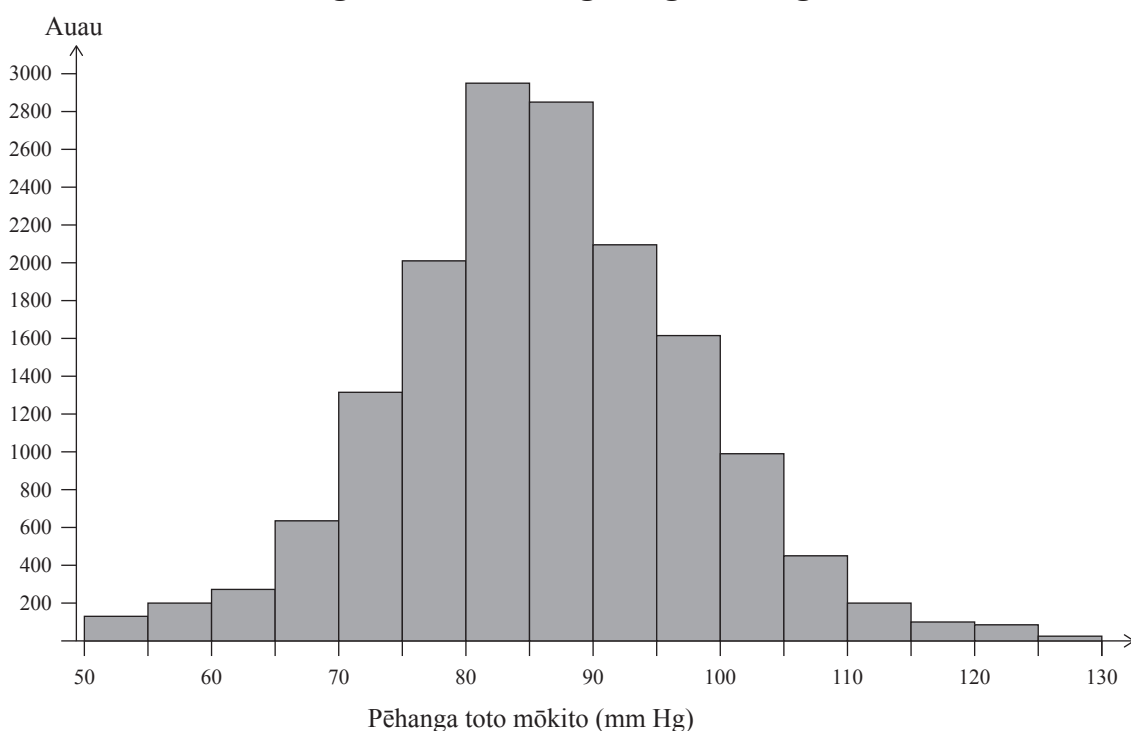
- (c) Ko te pēhanga toto mōrahi te pēhanga i te wā e mokowhiti ana te manawa, ā, ko te pēhanga toto mōkito te pēhanga i te wā e pārohe ana ngā uaua manawa. He mea nui ngā whakaaturanga e rua ina tirohia te pēhanga toto.

E whakaatu ana ngā kauwhata i raro i ngā pēhanga toto mōrahi me te mea mōkito i roto i tētahi taupori mai i tētahi rangahau o ngā tāngata neke atu i te 16 000.

Pēhanga toto mōrahi o ngā tāngata i rangahautia

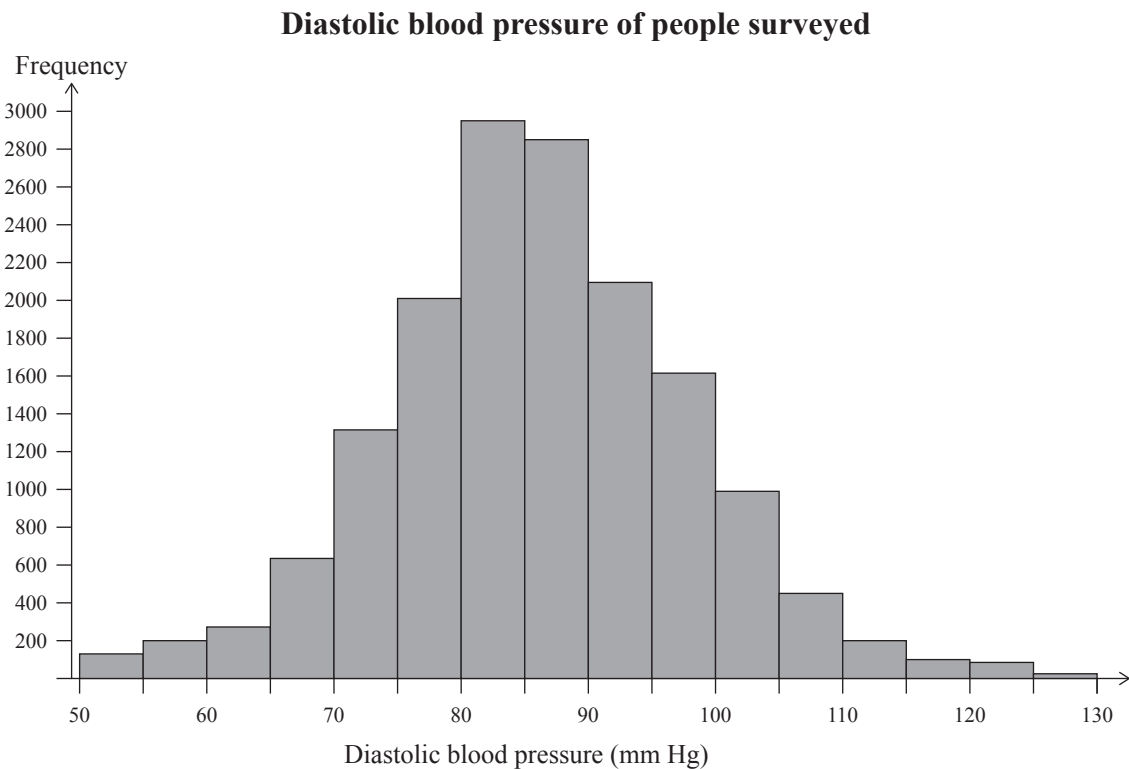
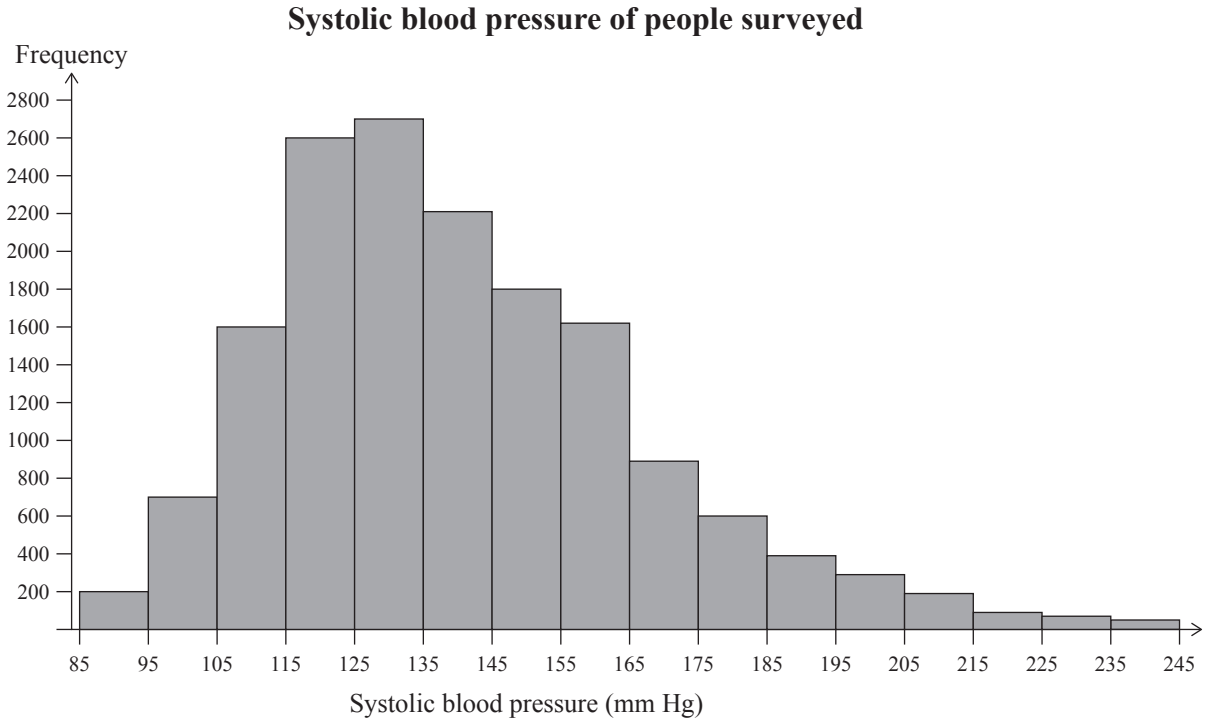


Pēhanga toto mōkito o ngā tāngata i rangahautia



He mea urutau ngā tatauranga mai i *The Blood Pressure "Uncertainty Range" – a pragmatic approach to overcome current diagnostic uncertainties(II)* nā C Pate, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1087497/>

- (c) Systolic blood pressure is the pressure as the heart beats, and diastolic blood pressure is the pressure as the heart muscles relax. Both readings are important when blood pressure is taken. The graphs below show the systolic and diastolic blood pressure in a population taken from a survey of over 16 000 people.



Figures adapted from *The Blood Pressure "Uncertainty Range" – a pragmatic approach to overcome current diagnostic uncertainties(II)* by C Pate, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1087497/>

English translation of the wording on the front cover

Level 2 Mathematics and Statistics, 2013
91267 Apply probability methods in solving problems

2.00 pm Monday 18 November 2013
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 2–27 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.