RERERERERERERERERERERERE

91267M





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

### Te Pāngarau me te Tauanga, Kaupae 2, 2015

## 91267M Te whakahāngai tikanga tūponotanga hei whakaoti rapanga

2.00 i te ahiahi Rātū 10 Whiringa-ā-rangi 2015 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 Rau Rauemi L2-MATHF.

Whakaaturia ngā mahinga KATOA.

Mēnā ka hiahia whārangi atu anō koe mō ō tuhinga, whakamahia 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 2–29 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.

#### TŪMAHI TUATAHI

MĀ TE KAIMĀKA ANAKE

(i)	Whiriwhiria te tūponotanga ka tatari tētahi tūroro i waenga i te 34 meneti me te 40 meneti.								
(ii)	E hia ngā meneti ka pau e tirohia ana te 90% o ngā tūroro e tētahi tākuta?								

Ka whakatauhia kia huria ngā wā tatari e tirohia ai te 95% o ngā tūroro e tētahi tākuta i roto i te 40 meneti.								
Nā te whakahaerenga, kāore e taea te wā toharite te huri, ēngari e mōhiotia ana mō ia tākuta ka tāpirihia ki ngā rōpū mahi, ka iti ake te ine mahora mā te 0.4 meneti.								
E hia ngā tākuta me tāpiri kia ū ai te whakaritenga hōu?								

#### **QUESTION ONE**

ASSESSOR'S	
HOE ONLY	

(i)	Find the probability that a patient will wait between 34 and 40 minutes.
\ <i>/</i>	
(ii)	After how many minutes will 90% of patients have begun being seen by a doctor?

(iii)	It is decided that waiting times must be changed so that at least 95% of patients will be seen by a doctor within 40 minutes.	ASSESSOR'S USE ONLY							
	Because of the administration required, the mean time cannot change, but it is known that for each doctor added to the duty teams, the standard deviation will reduce by 0.4 minutes.  How many doctors must be added to meet the new requirement?								

(b) I te taupaepae, ka aromatawaihia ngā tūroro e ai ki te taumaha o tō rātau raruraru. Ka oti tēnei i roto i te rua meneti mai o te taenga atu.

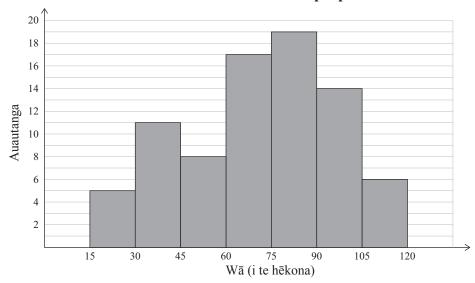
MĀ TE KAIMĀKA ANAKE

Ko te whakaaro mō te wā i mua i tētahi aromatawai ka oti he mea tuari māori āwhiwhi me te tau toharite o te 60 hēkona me te ine mahora o te 20 hēkona.

(i) He aha te hautanga o ngā tūroro ka aromatawaihia i te taupaepae i roto i te 90 hēkona o te taenga atu?

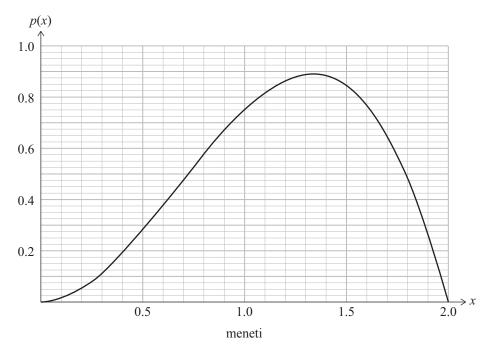
(ii) Ka whakahaerehia he rangahau mō ngā tūroro 80 ka tae atu ki te taupaepae. Ka tīpakohia matapōkeretia ngā tūroro i tētahi rangi. E whakaaturia ana ngā otinga ki te kauwhata pouhere auautanga i raro.

Te wā aromatawai i te taupaepae



He aha te hautanga o ngā tūroro i roto i te rangahau i aromatawaihia i te taupaepae i roto i te 90 hēkona o te taenga atu?

(iii) E kī ana tētahi kaitatau kāore i te tuari māoritia ngā wā aromatawai, ēngari ko te āhua nei ka āwhiwhitia te tuaritanga p(x) i raro.



Ko ngā tūponotanga hāngai ka whakaaturia ki te tūtohi i raro (kua whakawhitia ngā meneti ki te hēkona):

Wā Aromatawai (hēkona)	0 –	15 –	30 –	45 –	60 –	75 –	90 –	105 – 120
Tūponotanga	0.01	0.05	0.10	0.16	0.21	0.22	0.17	0.08

Whakatauritehia te kauwhata pouhere auautanga mō te rangahau o ngā tūroro 80 me te ānau tuaritanga p(x).

Me	kōrero	koe m	ō te ā	hua (	o te	hanga,	te pō	kapū	me to	e hora	o ngā	tuari	tanga	e rua

He mea nui te homai i ngā uara ā-tau hei taunaki i ō tauākī ina taea ana.

He wāhi anō mō tō

tuhinga mō tēnei tūmahi

kei te whārangi 10.

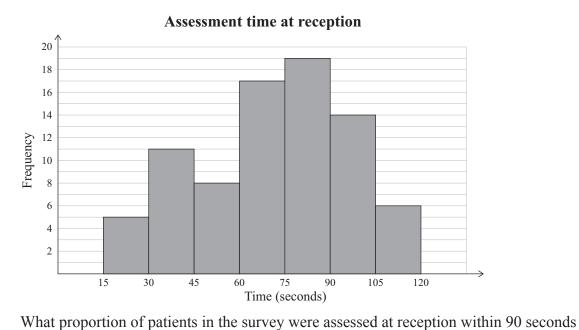
(b) At reception, patients are assessed on the urgency of their condition. This is done within two minutes of arrival.

ASSESSOR'S USE ONLY

It is thought that the waiting time before an assessment is done is approximately normally distributed with a mean of 60 seconds and standard deviation of 20 seconds.

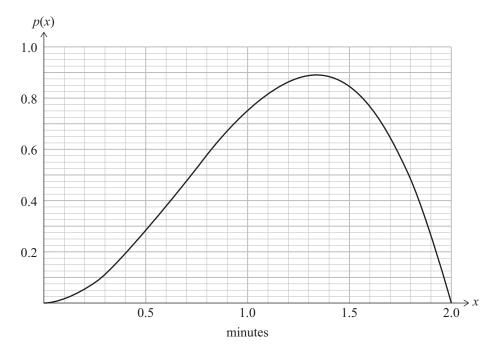
i)	What proportion of patients would be assessed at reception within 90 seconds of arrival

(ii) A survey is carried out on 80 patients who arrive at reception. Patients are selected at random on a particular day. The results are shown in the frequency histogram below.



of arrival?

(iii) A statistician states that the assessment times are not normally distributed, but are more likely to approximate the distribution p(x) below.



The associated probabilities (with minutes converted to seconds) are given in the following table:

Assessment Time (seconds)	0 –	15 –	30 –	45 –	60 –	75 –	90 –	105 – 120
Probability	0.01	0.05	0.10	0.16	0.21	0.22	0.17	0.08

Compare the frequency histogram for the survey of 80 patients with the distribution curve p(x).

It is important to give numerical values to support your statements where possible.

You should comment on the comparative shape, centre, and spread of the two distributions.

There is more space for your answer on page 11.

	MĀ T KAIMĀ
	ANA

ASSESSOR
ASSESSOR USE ONLY
-

#### TŪMAHI TUARUA

MĀ TE KAIMĀKA ANAKE

Ka whakahaerehia he rangahau o ngā kaitono 1500 mō tētahi whakamātautau ā-ao i tīpakohia matapōkeretia hei tūhura mēnā i momoho ake ngā kaitono Tau 12 ki ērā o te Tau 13.

Kua tuhia ngā otinga ki te tūtohi i raro nei:

	Tau 12	Tau 13	Tapeke
Hipa	347	853	1200
Hinga	33	267	300
Tapeke	380	1120	1500

(a)	(i)	He aha te hautanga o ngā kaitono i roto i tēnei rangahau i hipa i te whakamātautau?
	(ii)	He aha te hautanga o ngā kaitono i hinga i roto i te whakamātautau nō te Tau 12?
	(iii)	Tata ki te 52 500 ngā kaitono nō te Tau 12 me te Tau 13 i whakauru ki te whakamātautau.
		Mā te whakamahi i ngā otinga o tēnei rangahau, e hia ngā kaitono e tūmanakohia ana nō te Tau 13, ā, i hipa i te whakamātautau?

Tuhia mai mēnā ke	ei te whakaae, kei te wh	akahē rānei koe i tēnei w	hakapae, me
vhakaatu e koe nga	ā tātaitai katoa hei tauto	oko i tō whakaaro.	

#### **QUESTION TWO**

ASSESSOR'S USE ONLY

A study is conducted of 1500 randomly selected candidates for an international examination to investigate whether Year 12 candidates were as successful as those from Year 13.

The results are summarised in the table below:

	Year 12	Year 13	Total
Passed	347	853	1200
Failed	33	267	300
Total	380	1120	1500

(a)	(i)	What proportion of candidates in the study passed the examination?
	(ii)	What proportion of candidates who failed the examination were from Year 12?
	(iii)	There were about 52 500 candidates from Year 12 and Year 13 who attempted the examination.
		Using the results of this study, how many candidates would be expected to be from Year 13, and pass the examination?

State whether or not you agree with this claim, showing full calculations to support your view.	r
now.	
	-
	-
	-
	-
	-
	-
	-
	-
	-
	-
	-

(b) I whakaarohia anō e taua rangahau te maha o ngā marau i te whai ngā kaitono i roto i ā rātau akoranga. I kitea, o ngā kaitono 1500 o te tīpako ōrite, e 682 i te whai i ngā marau e ono, ā, ko te nuinga atu e rima ā rātau marau. O ngā kaitono e whai ana i ngā marau e rima, 192 i hinga i roto i te whakamātautau.

MĀ TE KAIMĀKA ANAKE

E tuaruahia ana te tūtohi o te whārangi 12 i konei hei āwhina i a koe ki te whakatutuki i ngā tūmahi e whai ake nei.

	Tau 12	Tau 13	Tapeke
Hipa	347	853	1200
Hinga	33	267	300
Tapeke	380	1120	1500

(i) He aha te hautanga o ngā ākonga i roto i te rangahau i whai i ngā marau e ono me te hipa anō?

ngā marau e o		
	itai ā-tau tō whakautu e whai whakaaro ana ki ngā tūpono pūrawa, pānoa nia anō pea ki te kōrero mō te whai tikanga o te whakatau otinga mai i ēr ga.	

(b) The same study also considered the number of subjects the candidates were taking in their normal academic courses. It found that of the same sample of 1500 candidates, 682 were taking six subjects, while the rest were taking five subjects. Of the candidates who were taking five subjects, 192 failed the examination.

ASSESSOR'S USE ONLY

The table from page 14 is repeated here to help you answer the questions that follow.

	Year 12	Year 13	Total
Passed	347	853	1200
Failed	33	267	300
Total	380	1120	1500

(i)	What proportion of candidates in the study took six subjects and passed?

	n the evidence of this study, would you recommend that candidates take six subjects? upport your answer with numerical calculations that consider the absolute and relative
ris	sks. You may also wish to comment on the sensibility of drawing any conclusions on is evidence.

#### **TŪMAHI TUATORU**

MĀ TE KAIMĀKA ANAKE

(a) Ina whānau mai ngā kāwhe ki tētahi kāhui kau horomata, ka puta ngā whakatau ina eke ki te kotahi marama, ā, me te toru marama, mēnā ka puritia ki te kāhui, ka hokona atu rānei.55% o ngā kāwhe he toa. I te kotahi marama te pakeke, 70% o ngā kāwhe toa me te 20% o ngā uwha ka hokona atu. O te toenga, i te toru marama te pakeke, 80% o ngā kāwhe toa me te 35% o ngā uwha ka hokona atu.

	nihia te tūponotanga o tētahi kāwhe ka tīpakohia matapōkeretia i whānau mai k ui he uwha, ā, ka hokona atu i te toru marama te pakeke.
Неа	aha te ōrautanga o ngā kāwhe ka puritia ki te kāhui horomata?

MĀ TE KAIMĀKA ANAKE

ga o ngā kāvuho too ki ngā uvuho ko nun	
ga o maž kāvyho too ki maž vyyho ko myr	
ga o ngā kāvuho too ki ngā uvuho ko nun	
ga o ngā kāvuho too ki ngā uvuho ko nun	
ga a maž kāvyha tao ki maž vyyha ka myn	
ca a naā kāvuha taa ki naā uvuha ka nun	
aa a naā kāvuha taa ki naā uvuha ka num	
ga o nga kawne toa ki nga uwha ka pur a ki te kotahi kāwhe toa mō ngā uwha o ngā uwha tekau.	itia ki te kāhui i muri i te toru e whitu. Ka huria tēnei ki ia kāwh
u te maha o ngā kāwhe toa, he aha te ha	autanga o ngā uwha ka hokona atu
	au te maha o ngā kāwhe toa, he aha te ha

#### **QUESTION THREE**

ASSESSOR'S USE ONLY

(a)	When calves are born into a pedigree beef herd, decisions are made after they are one month
	old, and again when they are three months old, as to whether they will be kept in the herd or
	sold.

55% of calves born are male. At age one month, 70% of male and 20% of female calves are sold. Of the remainder, at age three months, 80% of males and 35% of females are also sold.

(1)	at age one month.
(ii)	Find the probability that a randomly chosen calf born into the herd will be female and sold at age three months.
(iii)	What percentage of calves will eventually be kept in the pedigree herd?

ASSESSOR'S USE ONLY

How many male calves can be expected to be kept in the pedigree herd?				
The ratio of male to female calves being kept in the herd after three months is about o male to every seven females. This is to be changed to one male to every ten females.				
If the number of male calves remains the same, what proportion of females would have been sold?				

(b) Ko ngā tīrairaka o Aotearoa he manu ōpurepure, pango rānei.

MĀ TE KAIMĀKA ANAKE

I runga i ngā here manatārua, kāore e whakaaetia te whakaaturanga o tēnei rauemi i konei. I runga i ngā here manatārua, kāore e whakaaetia te whakaaturanga o tēnei rauemi i konei.

Pīwaiwaka

Tīrairaka pango

Cherryl Mariner, www.nzbirdsonline.org.nz/species/new-zealand-fantail

Ka whakaputa uri ngātahi rāua, ā, ko ngā takirua he whai kōhanga momoho ka kitea i ngā ōwehenga e whai ake:

Takirua	E rua ngā pīwaiwaka	Kotahi te pīwaiwaka, ā, kotahi te tīrairaka pango	E rua ngā tīrairaka pango
Ōwehenga	0.75	0.2	0.05

Ko ng $\bar{a}$  k $\bar{o}$ hanga momoho mai i te kotahi me te wh $\bar{a}$  ana hua. Kei te t $\bar{u}$ tohi i raro nei ng $\bar{a}$   $\bar{o}$ wehenga o ng $\bar{a}$  hua.

Takirua	E rua ngā pīwaiwaka	Kotahi te pīwaiwaka, ā, kotahi te tīrairaka pango	E rua ngā tīrairaka pango
1 hua	0.15	0.2	0.3
E rua ngā hua	0.3	0.35	0.5
E toru ngā hua	0.4	0.35	0.15
E whā ngā hua	0.15	0.1	0.05

(1)	He aha te owehenga o ngā takırua pīwaiwaka ka whai kohanga momoho e nui atu ngā hua i te kotahi?

Whakamahia ngā tātai	itai hei whakaatu ke	i te narahan te whak	anae a te kairanoaha	n
vv nakamama nga tatai	itai nei whakaata ke	re paramaa te whak	apae a te kantangana	u.

(b) New Zealand fantails are birds which are either pied or black.

ASSESSOR'S USE ONLY

For copyright reasons, this resource cannot be reproduced here.

For copyright reasons, this resource cannot be reproduced here.

Pied fantail

Black fantail

Cherryl Mariner, www.nzbirdsonline.org.nz/species/new-zealand-fantail

They interbreed, and pairs with successful nests are found in the following proportions:

Pair	Two pied fantails	One pied and one black fantail	Two black fantails
Proportion	0.75	0.2	0.05

Successful nests have between one and four eggs. The proportions of eggs are given in the table below.

Pair	Two pied fantails	One pied and one black fantail	Two black fantails
One egg	0.15	0.2	0.3
Two eggs	0.3	0.35	0.5
Three eggs	0.4	0.35	0.15
Four eggs	0.15	0.1	0.05

(1)	what proportion of pairs with two pied fantails will have a successful nest with more than one egg?

Jse calculations to show	w that the researcher	's claim is justified	
	,, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	2 <b>- 1</b>	

	He whārangi anō ki te hiahiatia.	
TAU TŪMAHI	Tuhia te (ngā) tau tūmahi mēnā e tika ana.	
TAO TOMATI		
		_
		-
		-
		-
		_
		-
		-
		-
		-
		-
		_
		-
		-
		-
		-
		-
		_
		-
		-
		-
		-
		_
		_
		-

	Extra paper if required.	ASSESSOR'S USE ONLY
QUESTION NUMBER	Write the question number(s) if applicable.	302 31121

#### English translation of the wording on the front cover

# Level 2 Mathematics and Statistics, 2015 91267 Apply probability methods in solving problems

2.00 p.m. Tuesday 10 November 2015 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 Resource 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 2–29 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.