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91585M



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

SUPERVISOR'S USE ONLY

Te Pāngarau me te Tauanga (Tauanga), Kaupae 3, 2013

91585M Te whakahāngai i ngā ariā tūponotanga hei whakaoti rapanga

9.30 i te ata Rāapa 20 Whiringa-ā-rangi 2013
Whiwhinga: Whā

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

Tirohia mehemea e ōrite ana te Tau Ākonga 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.

Me mātua riro mai i a koe te pukaiti o ngā Tikanga Tātai me ngā Tūtohi L3–STATMF.

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

Tirohia mehemea kei roto nei ngā whārangi 2–17 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: NGĀ HĀKINAKINA

- (a) Kua whakarite tētahi kura o te takiwā ki te whakatū i tētahi wiki hākinakina. I uiuihia ngā ākonga o ngā tau rerekē e rua (Tau 9 me te 13) i mua o te wiki hākinakina, ā, i pātaihia ngā ākonga mēnā i tākaro hākinakina rātou:
- 52% o ngā ākonga i uiuihia he ākonga Tau 9
 - 84% o ngā ākonga Tau 9 kua uiuihia i kī kotahi te hākinakina i te itinga rawa e tākarohia ana e rātou
 - 62% o ngā ākonga Tau 13 kua uiuihia i kī kotahi te hākinakina i te itinga rawa e tākarohia ana e rātou.
- (i) He aha te ōrautanga o ngā ākonga kua uiuihia i kī kotahi te hākinakina i te itinga rawa e tākarohia ana e rātou?

- (ii) Mēnā i kī tētahi ākonga i whiriwhiri matapōkeretia mai i te hunga i uiuihia kāore ia i tākaro hākinakina, ko te tūponotanga he ākonga Tau 9, Tau 13 rānei?
Tautokohia tō whakautu ki ngā tauākī tauanga hāngai.

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

QUESTION ONE: SPORTS

- (a) A local school has decided to hold a sports week. Two different year levels of students (Years 9 and 13) were surveyed before the sports week, and students were asked if they played any sports:
- 52% of the students surveyed were Year 9 students
 - 84% of the Year 9 students surveyed said that they played at least one sport
 - 62% of the Year 13 students surveyed said that they played at least one sport.
- (i) What percentage of the students surveyed said that they played at least one sport?

- (ii) If a student randomly selected from those surveyed said that they played no sports, are they more likely to be a Year 9 or a Year 13 student?
Support your answer with appropriate statistical statements.

(b) Ko ngā hākinakina tino hira ka tākarohia i te kura ko te poitarawhiti, te tēnehi me te kilikiti.

O ngā ākonga 195 kei te kura:

- 45 ngā ākonga kāore e tākaro poitarawhiti, tēnehi, kilikiti rānei
- 5 ngā ākonga he tākaro poitarawhiti, tēnehi me te kilikiti
- 8 ngā ākonga he tākaro tēnehi anake
- 20 ngā ākonga he tākaro tēnehi me te poitarawhiti, ā, tērā pea he tākaro kilikiti hoki
- 12 ngā ākonga he tākaro tēnehi me te kilikiti, ā, tērā pea he tākaro poitarawhiti hoki
- 35 ngā ākonga he tākaro poitarawhiti me te kilikiti, ā, tērā pea he tākaro tēnehi hoki
- 50 ngā ākonga he tākaro kilikiti.

(i) Tātaihia te ōrautanga o ngā ākonga i te kura he tākaro tēnehi.

(ii) Mēnā ka whiriwhiri matapōkeretia kia rua ngā ākonga rerekē o te kura, me te kore whakakapinga, tātaihia te tūponotanga he tākaro poitarawhiti rāua.

(b) The three most popular sports played at the school are netball, tennis and kilikiti.

Of the 195 students at the school:

- 45 students do not play netball, tennis, or kilikiti
- 5 students play netball, tennis, and kilikiti
- 8 students play tennis only
- 20 students play both tennis and netball, and may also play kilikiti
- 12 students play both tennis and kilikiti, and may also play netball
- 35 students play both netball and kilikiti, and may also play tennis
- 50 students play kilikiti.

(i) Calculate the percentage of students at the school who play tennis.

(ii) If two different students from the school are selected at random, without replacement, calculate the probability that they both play netball.

PĀTAI TUARUA: NGĀ WHARANGA

- (a) Ko ngā hua o Te Rangahau Korikori o Aotearoa o te tau 2007/08, me ngā raraunga i kohia e Te Kaporeihana Āwhina Hunga Whara (ACC) i te wā mai i te 1 Hōngongoi 2007 ki te 30 Pipiri 2008, i whakamahia ki te waihanga i te tūtohi e whai ake:

Ngā whakatau tata mō te hunga pakeke o Aotearoa	Tēnehi	Poitarawhiti
Te tokomaha e tākaro ana i tēnei hākinakina	311 662	123 994
Te tokomaha o te hunga ka whara i tēnei hākinakina	7 354	15 143

- (i) He nui ake te tūpono o te whara ki tētahi pakeke o Aotearoa i te tākaro tēnehi, i te tākaro poitarawhiti rānei?

Tautokona tō whakautu ki ngā tauākī tauanga hāngai.

- (ii) E ai ki te **ariā tūponotanga**, whakamāramahia te take e kore e taea te whakamahi ēnei mōhiohio hei tātai i te tūponotanga o te wharanga o tētahi pakeke o Aotearoa i te tākaro tēnehi, poitarawhiti RĀNEI.

QUESTION TWO: INJURIES

- (a) The results of the 2007/08 Active NZ Survey, and data collected by the Accident Compensation Corporation (ACC) during the period 1 July 2007 to 30 June 2008, have been used to create the following table:

Estimates for New Zealand adults	Tennis	Netball
Number who played this sport	311 662	123 994
Number of players injured while playing this sport	7 354	15 143

- (i) Is a New Zealand adult more likely to be injured while playing tennis or while playing netball?

Support your answer with appropriate statistical statements.

- (ii) With regards to **probability theory**, explain why it is not possible to use this information to calculate the probability of a New Zealand adult being injured while playing tennis OR netball.

(b) I te wā o te wiki hākinakina i tētahi kura o te rohe, i tuhia e te nēhi o te kura ngā mōhiohio mō ngā wharanga.

- (i) Waiho ko A te takahanga “i whara tētahi ākonga i te tākaro tēnehi”.
Waiho ko B te takahanga “i whara tētahi ākonga i te tākaro poitarawhiti”.

Mai i ngā mōhiohio i tuhia e te nēhi o te kura, ka whakatauria ko:

$$P(A \cup B) = 0.35 \text{ me } P(A \cup B') = 0.90.$$

Whakatauhia te ōwehenga o ngā ākonga i whara i te tākaro tēnehi i te wiki hākinakina.

- (ii) Ka whakaatu anō ngā whakaaturanga a te nēhi:

- 12% o ngā wharanga he kino
- o ngā ākonga i whara kinotia, 52% i whara i te tākaro whutupōro
- e rua whakareanga ake te tūponotanga ka tākaro whutupōro tētahi ākonga mēnā ka whara kinotia, tēnā i te kore e whara kinotia.

Tātaihia te tūponotanga ka whara tētahi ākonga i te purei whutupōro i te wiki hākinakina.

(b) During sports week at a local school, the school nurse recorded information about injuries.

- (i) Let A be the event “a student is injured playing tennis”.
Let B be the event “a student is injured playing netball”.

From the information the school nurse has recorded, it can be deduced that:

$$P(A \cup B) = 0.35 \text{ and } P(A \cup B') = 0.90.$$

Determine the proportion of students who were injured playing tennis during sports week.

- (ii) The nurse’s records also show that:

- 12% of the injuries obtained were serious
- of the students who were seriously injured, 52% were injured while playing rugby
- students were twice as likely to be have been playing rugby if they were seriously injured than if they were not seriously injured.

Calculate the probability of a student being injured while playing rugby during sports week.

PĀTAI TUATORU: NGĀ KĒMU

- (a) E kaha tohutohuhia ana ngā kaitākaro ki te whakamahana i ō rātou tinana i mua i te tākaro hākinakina hei whakaiti i te tūpono wharanga mai i te kēmu.

Mō tētahi kapa hākinakina ake o ngā kaitākaro 20:

- 14 o ngā kaitākaro i whakamahana i mua o te kēmu whakamutunga
- e 5 ngā kaitākaro i whara i te kēmu whakamutunga
- e 2 ngā kaitākaro kāore i whakamahana ka mutu kāore i whara i te kēmu whakamutunga.

Mā te whakamahi i ēnei mōhiohio, tātaihia te tūponotanga ka whara tētahi kaitākaro i whiriwhiri matapōkeretia, ina kāore taua kaitākaro i whakamahana i mua i te kēmu whakamutunga.

**E haere tonu ana te Pātai
Tuatoru i te whārangi 12.**

QUESTION THREE: GAMES

- (a) Players are strongly advised to warm up before playing sports games to reduce their risk of injury from playing the game.

For a particular sports team of 20 players:

- 14 of the players warmed up before the last game
- 5 of the players were injured during the last game
- 2 of the players did not warm up and were not injured during the last game.

Using this information, calculate the probability that a randomly chosen player from the team was injured, given that the player did not warm up before the last game.

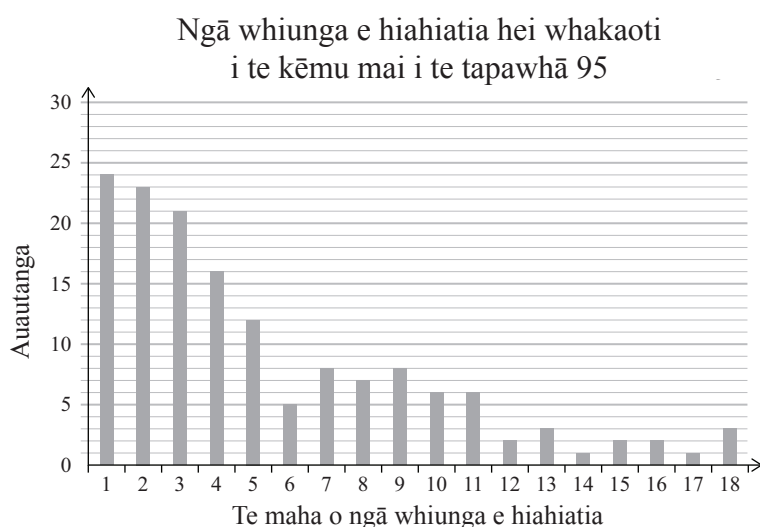
**Question Three continues
on page 13.**

- (b) I tētahi kura o te rohe, he poripori te kēmu ka tākarohia i te wā tina. Me whiu te whangaono¹ mō ia wā. Mā te mata o runga o te whangaono e tohu kia hia te maha o ngā nekehanga i ngā tapawhā a te kaitākaro. Hei whakatutuki i te kēmu, me rite pū te whiu ki te tau e hiahiatia e tau atu ai ki te tapawhā whakamutunga, te tau 100. Mēnā he nui ake te whakaatu a te whangaono i ngā tapawhā e toe ana, tē taea e te kaitākaro te neke, ā, me tatari rawa ia mō tōna wā anō hei whakamātau ki te whakaoti i te kēmu.

Hei tauira, mēnā kei te tapawhā 97 te kaitākaro, ka oti te kēmu mā te whiwhi i te 3 i te whiunga kotahi. Ka oti pea i a ia te kēmu mā ngā whiu e rua, mā te whiu pea i te 2 i te wā tuatahi, ā, ka whiua he 1 i te wā tuarua, mā te whiu rānei i te 5 i te wā tuatahi (e kore ia mō te neke i tēnei wā), ā, ka whiua he 3 i te wā tuarua.

- (i) I waihangahia e tētahi ākonga he whakaaritanga ā-rorohiko hei tūhura i te tohatohatanga o te maha o ngā wā e hiahiatia hei whakaoti i te kēmu mai i te **tapawhā 95**.

150 ngā whakamātautanga i whakahaerehia. E kauwhatatia ana ngā hua i raro.



Whakamahia ēnei hua hei whakatau tata i te tūponotanga o te whakaoti i te kēmu mai i te **tapawhā 95** i roto i ngā whiunga e 5, iti ake rānei.

- (ii) Whakamāramahia te take o te tūponotanga ariā mō te whakaoti i te kēmu mai i te **tapawhā 95** ki ngā whiunga e rua tonu he $\frac{5}{36}$.

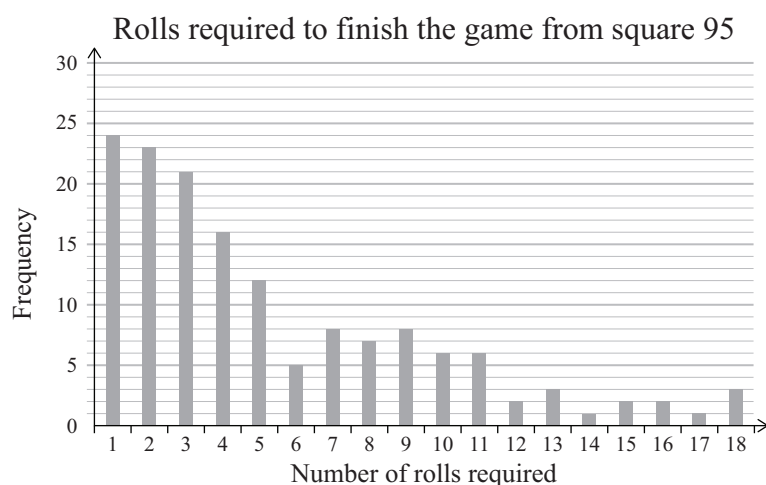
¹ mataono tau

- (b) At a local school, a board game is played during lunch break. Each turn consists of rolling a single six-sided die. The player moves as many squares as shown on the top face of the die. To finish the game, a player must roll the exact number required to land on the final square, numbered 100. If the die shows a number greater than the remaining number of squares, the player cannot move, and must wait until their next turn to try and finish the game.

For example, if a player is on square 97, they could finish the game in one roll by rolling a 3. They could finish the game in two rolls, either by rolling a 2 on the first turn, and then rolling a 1 on the second turn, or by rolling a 5 on the first turn (which means they cannot move for that turn), and then rolling a 3 on the second turn.

- (i) A student designed a computer simulation to investigate the distribution of the number of turns needed to finish the game from **square 95**.

150 trials are carried out. The results are graphed below.



Use these results to estimate the probability of finishing the game from **square 95** in 5 or fewer rolls.

- (ii) Explain why the theoretical probability of finishing the game from **square 95** in exactly two rolls is $\frac{5}{36}$.

English translation of the wording on the front cover

Level 3 Mathematics and Statistics (Statistics), 2013

91585 Apply probability concepts in solving problems

9.30 am Wednesday 20 November 2013

Credits: Four

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.

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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 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 2–17 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.