

See back cover for an English translation of this cover

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91037M



NEW ZEALAND QUALIFICATIONS AUTHORITY  
MANA TOHU MĀTAURANGA O AOTEAROA

SUPERVISOR'S USE ONLY

## Te Pāngarau me te Tauanga, Kaupae 1, 2012

### 91037M Te whakaatu māramatanga mō te tūponotanga, raraunga hoki

9.30 i te ata Rāapa 14 Whiringa-ā-rangi 2012  
Whiwhinga: Whā

| Paetae  | Paetae Kaiaka   | Paetae Kairangi   |
|---|---|---|
| Te whakaatu māramatanga mō te tūponotanga, raraunga hoki. | Te whakaatu māramatanga mō te tūponotanga, raraunga hoki me te parahau i ngā kīanga me ngā kitenga. | Te whakaatu māramatanga mō te tūponotanga, raraunga hoki me te whakaatu i te matatau ki te tauanga. |

Tirohia mehemea e ōrite ana te Tau Ākonga ā-Motu (NSN) kei tō puka 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 te (ngā) whārangi kei muri i te pukapuka nei, ka āta tohu ai i ngā tau pātai.

Tirohia mehemea kei roto nei ngā whārangi 2–19 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

Ko ngā pātai i tēnei pepa e pā ana ki ngā wā urupare ā-tinana.

Ka inea ngā wā urupare ā-tinana mā te hākonamano (1000 hākonamano = 1 hākona).

Ko te wā urupare ā-tinana te wā e nuku ai tō tinana i muri i te kitenga o ngā whatu i tētahi mea.

Ka uia koe e ngā whakamātautau urupare ā-tinana i te ipurangi kia pāwhiri i tētahi pātene i te mata kia tere rawa ki tāu e taea ai i muri i te huringa o te pātene ki te kākāriki.

Kia 60 meneti hei whakautu i ngā pātai o tēnei pukapuka.

## PĀTAI TUATAHI

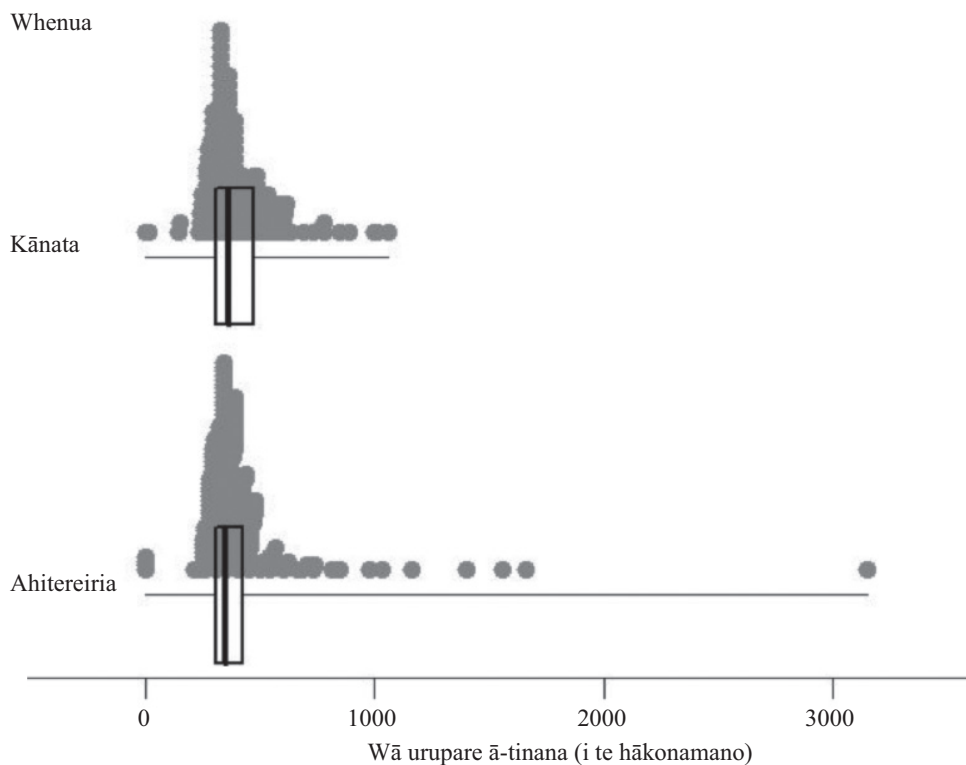
Kei te tūhura a Ella i ngā wā urupare ā-tinana.

Ka toko ake te pātai: He poto ake ngā wā urupare ā-tinana o ngā tāngata o Kānata (he tere ake te ohonga) i ō ngā Ahitereiriana?

Ka whakamahia e ia ngā paetukutuku aowhānui CensusAtSchools kia tīpako matapōkeretia he 200 ākonga mai i Kānata, ā, he 200 mai i Ahitereiria hoki.

Kei raro iho te tātaritanga raraunga a Ella:

### He poto iho te wā urupare o ngā Kanehiana i ō ngā Ahitereiriana?



| Te Tauanga                       | Te wā urupare ā-tinana<br>mō Kānata | Te wā urupare ā-tinana<br>mō Ahitereiria |
|----------------------------------|-------------------------------------|--|
| Mōkito                           | 0                                   | 0  |
| Hauwhā Raro                      | 306                                 | 310                                      |
| Tau Waenga                       | 359                                 | 350                                      |
| Hauwhā Runga                     | 468                                 | 420                                      |
| Mōrahi                           | 1062                                | 3150                                     |
| Toharite                         | 400                                 | 409                                      |
| Whānuitanga i Waenga Hauwhātanga | 162                                 | 110                                      |

I runga anō i ōna kauwhata me ōna tauanga, ka whakapae a Ella he **roa ake** te wā urupare ā-tinana o ngā Kanehiana i ō ngā Ahitereiriana.

(a) (i) He aha te rerekētanga i waenganui i ngā tau waenga?

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(ii) Ki te whakaarohia ngā **tau waenga**, ka whakaae rānei koe ki te whakatau a Ella?  
Homai ngā take tauanga e hāngai ana ki tō whakautu.

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(b) Ki te whakaarohia ngā **toharite me ngā tau waenga**, ka whakaae rānei koe ki te whakatau a Ella?

Homai ngā take tauanga e hāngai ana ki tō whakautu.

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(c) Ki te whakaarohia ngā **kauwhata**, ka whakaae rānei koe ki te whakatau a Ella?

Homai ngā take tauanga e hāngai ana ki tō whakautu.

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The questions in this paper are about reaction times.

Reaction times are measured in milliseconds (1000 milliseconds = 1 second).

A reaction time is the time it takes for your body to move after your eyes see a signal.

The reaction time tests on the internet ask you to click on a button on the screen as quickly as you can after the button turns green.

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

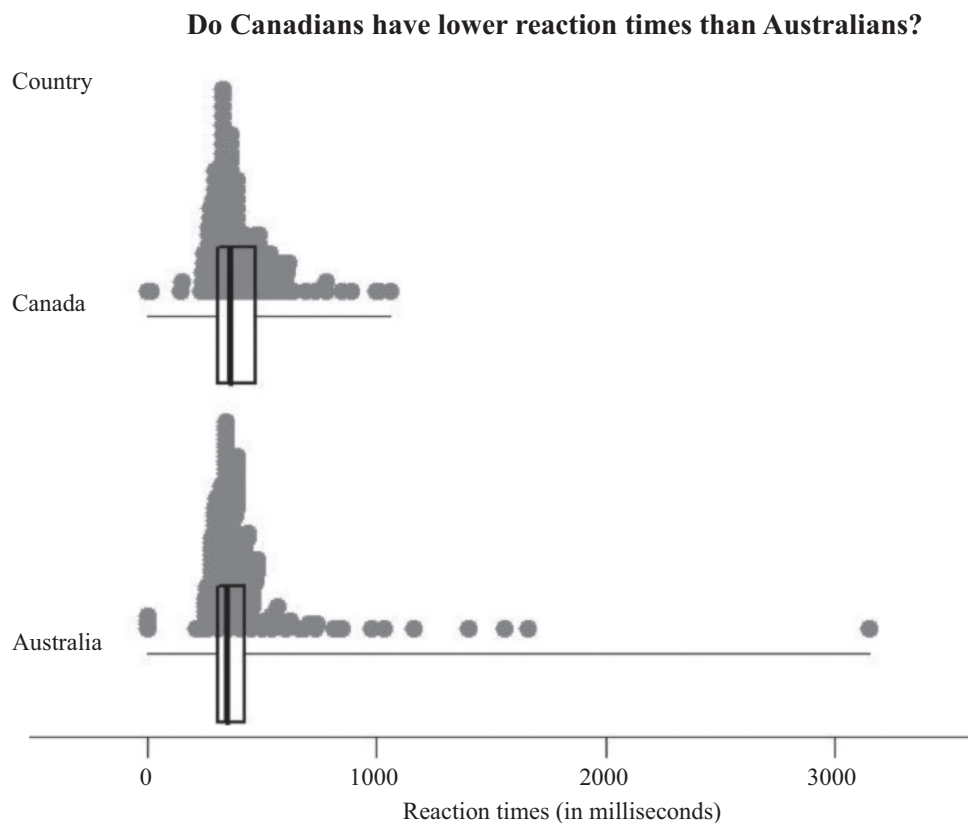
## QUESTION ONE

Ella is investigating reaction times.

She poses the problem: Do Canadians have lower reaction times (react faster) than Australians?

She uses international CensusAtSchools websites to randomly select 200 students from Canada, and 200 from Australia.

Ella's analysis of her data is below:



| Statistic            | Reaction Times for Canadians | Reaction Times for Australians |
|----------------------|------------------------------|--------------------------------|
| Minimum              | 0                            | 0                              |
| Lower Quartile       | 306                          | 310                            |
| Median               | 359                          | 350                            |
| Upper Quartile       | 468                          | 420                            |
| Maximum              | 1062                         | 3150                           |
| Mean                 | 400                          | 409                            |
| Inter-Quartile Range | 162                          | 110                            |

From her graphs and statistics, Ella thinks that Canadians have **higher** reaction times than Australians.

(a) (i) What is the difference between the medians?

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(ii) When you consider the **medians**, do you agree with Ella's conclusion?  
Give statistical reasons for your answer.

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(b) When you consider the **means and medians**, do you agree with Ella's conclusion?

Give statistical reasons for your answer.

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(c) When you consider the **graphs**, do you agree with Ella's conclusion?

Give statistical reasons for your answer.

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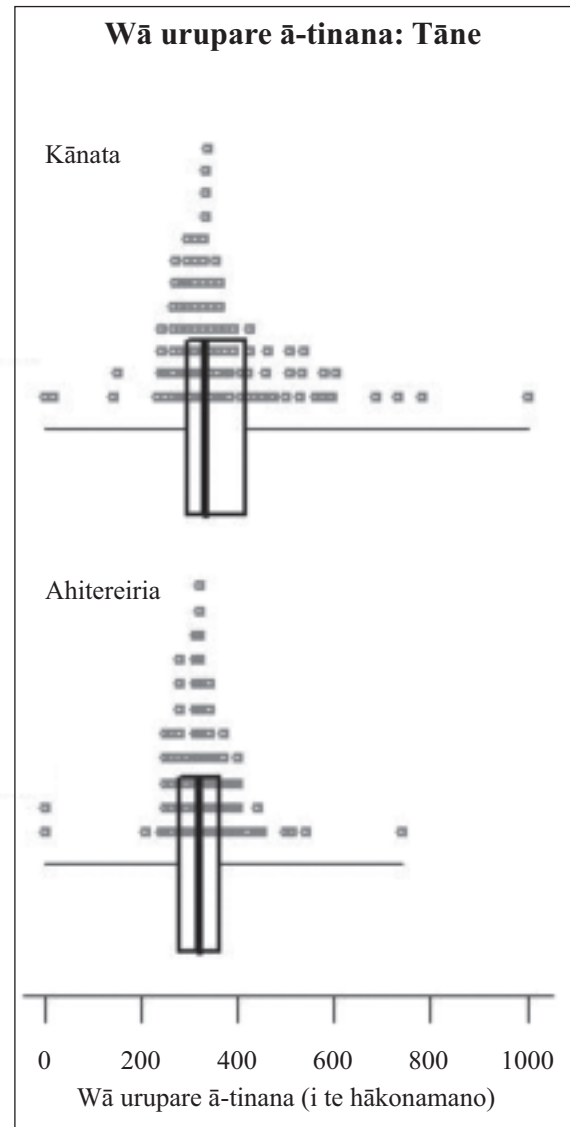
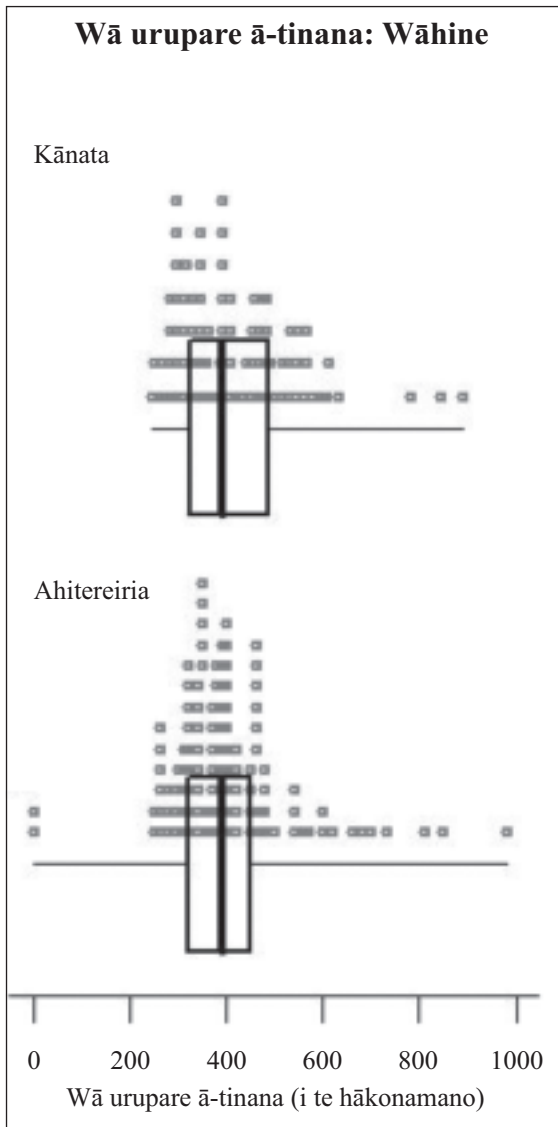
## PĀTAI TUARUA

- (a) Ka toko ake he pātai hōu i a Ella: He rerekē rānei ngā wā urupare ā-tinana o ngā tāne me ngā wāhine?

Ka whakamahi anōtia e ia tērā huinga raraunga, heoi ka whakapaitia mā te tango i ngā kaute nui ake i te 1000 hākonamano.

Ka whakapae ia he take i roa ai ētahi o ngā wā (tērā pea i te raru te kiore).

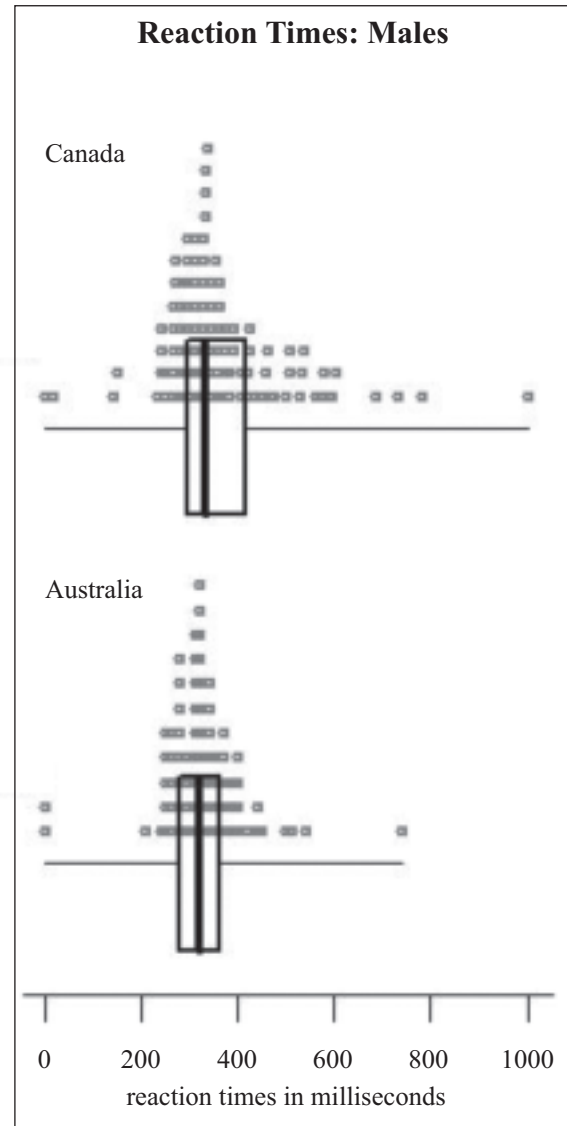
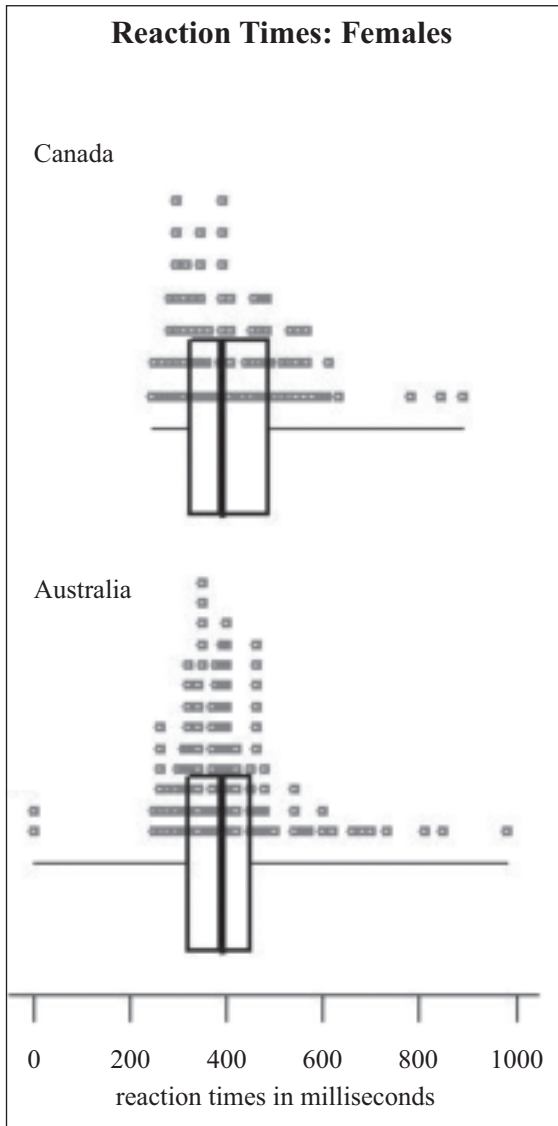
Kātahi ka whakarōpūhia e ia ngā raraunga mā te ira tangata me te whenua hoki. Kei raro nei tōna tātaritanga:





## QUESTION TWO

- (a) Ella now poses a new problem: Do males and females have different reaction times? She uses the same set of data, but cleans it by removing any scores over 1000 milliseconds. She thinks there might have been some reason for some of the long times (such as the mouse not working properly). Then she groups the data by gender and by country. Her analysis is below:





- (i) Out of the groups shown on the graphs opposite, which group has the most **consistent** times?

Give statistical reasons for your answer.

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- (ii) How could Ella improve her investigation further?

Give at least TWO suggestions that are based on statistical considerations.

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- (b) Ka tātari a Ella i ngā raraunga kia kite e hia ngā ākonga Ahitereiriana i tētahi tautauira i a rātou tētahi wā urupare ā-tinana iti iho i te 500 hākonamano.

Ka whakarāpopotohia e ia ngā raraunga i te papatau kei raro nei.

| Wā (hākonamano)  | Wahine | Tāne |
|------------------|--------|------|
| Iti iho i te 500 | 97     | 77   |
| Nui ake i te 500 | 18     | 8    |

- (i) He aha te tūponotanga he iti iho i te 500 hākonamano te wā urupare ā-tinana o tētahi ākonga kua tīpako matapōkeretia i tēnei tautauira?

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- (ii) He aha te tūponotanga ko tētahi ākonga kua tīpako matapōkeretia i tēnei tautauira he wahine, ā, ko tōna wā urupare ā-tinana he poto iho i te 500 hākonamano?

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- (iii) He aha te tūponotanga he poto iho i te 500 hākonamano te wā urupare ā-tinana o tētahi ākonga tāne kua tīpako matapōkeretia i tēnei tautauira?

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- (iv) Mēnā i tīpako matapōkeretia ētahi ākonga tokorua i tēnei tautauira, he aha te tūponotanga he poto iho **ō rāua** wā urupare ā-tinana i te 500 hākonamano?

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- (b) Ella analyses the data to see how many Australian students in a sample had a reaction time under 500 milliseconds.

She summarises the data in the table below.

| Time (milliseconds) | Female | Male |
|---------------------|--------|------|
| Under 500           | 97     | 77   |
| Over 500            | 18     | 8    |

- (i) What is the probability that a student, chosen randomly from this sample, had a reaction time of under 500 milliseconds?

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- (ii) What is the probability that a student, chosen randomly from this sample, was a female with a reaction time of under 500 milliseconds?

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- (iii) What is the probability that a male student, chosen randomly from this sample, had a reaction time of under 500 milliseconds?

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- (iv) If two students were randomly chosen from this sample, what is the probability that **both** of them had reaction times of under 500 milliseconds?

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## PĀTAI TUATORU

Kei te raraunga taketake Ahitereiriana ngā wā urupare ā-tinana o ngā ākonga kua whakamahi i tō rātou ringa ngoi ki te pāwhiri i te kiore kātahi ka whakamahi i tō rātou ringa kē.

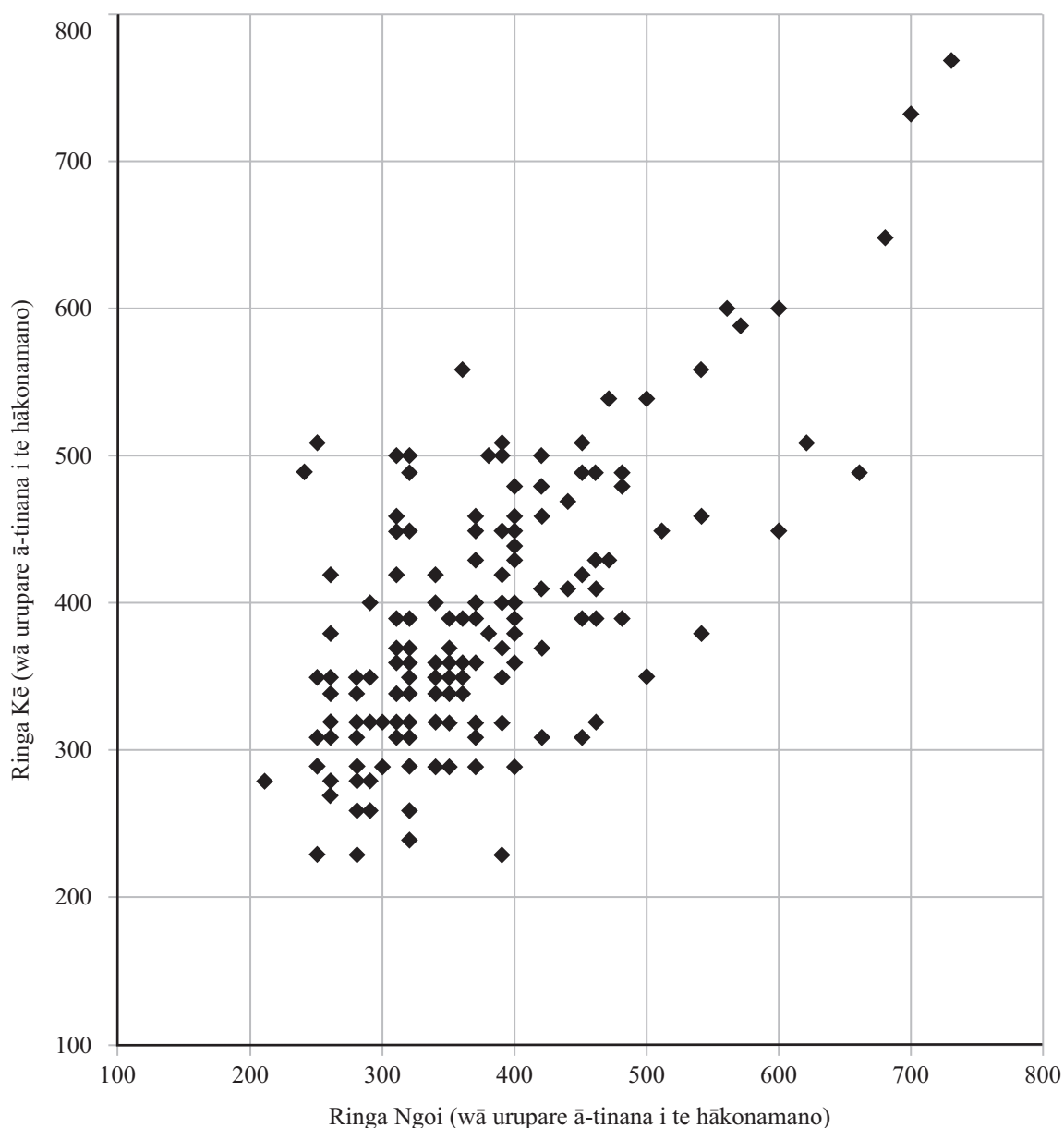
Ko te tikanga o te “Ringa Ngoi” ko te ringa ka whakamahia e koe mō te kiore.

Ko te tikanga o te “Ringa Kē” ko te ringa kāore e whakamahia e koe mō te kiore.

Ka whakaaro a Ella mēnā rānei he pānga i waenganui i ngā wā e rua i mau mō ia ākonga, nā reira ka tuhi ia i te kauwhata marara kei raro nei.

*Ki te hiahia  
koe ki te tuhi anō i  
ō whakautu mō te  
(a) me te (b), tuhia  
ki te kauwhata i te  
whārangi 16.*

### He Pānga i waenganui i ngā Wā Urupare ā-Tinana o tō Ringa Ngoi me tō Ringa Kē?



- (a) I runga i te kauwhata marara, whakaaturia te rōpū pūwahi ina **he poto iho, he ōrite rānei** te wā urupare ā-tinana o te Ringa Kē ki te wā urupare ā-tinana o te Ringa Ngoi.
- (b) Tuhia he rārangi uru tau rawa i runga i te kauwhata marara.



**QUESTION THREE**

The original Australian data contained reaction times where the students used their dominant hand and then their other hand to click the mouse.

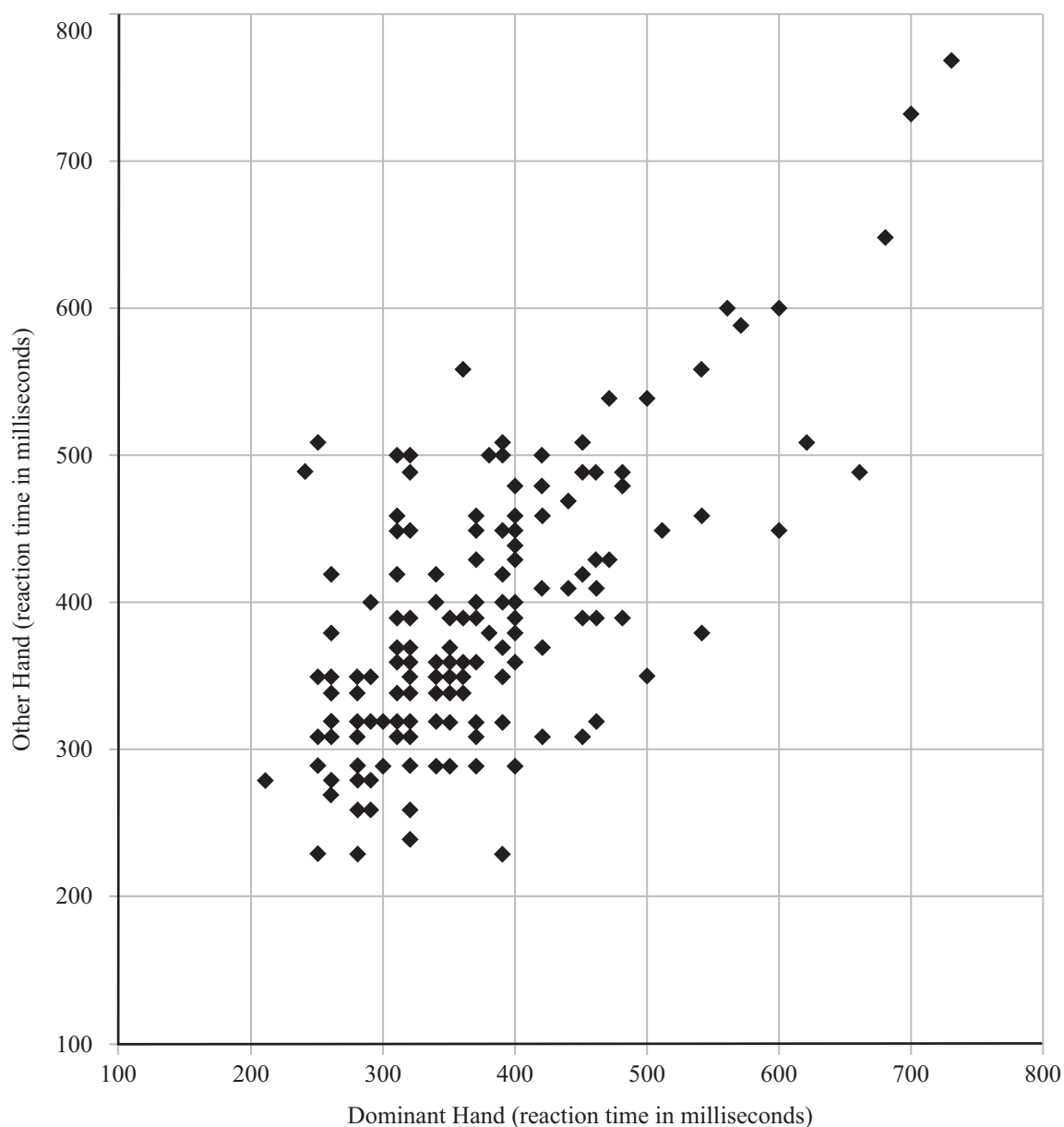
“Dominant Hand” means the hand you usually use the mouse with.

“Other Hand” means the hand you do not usually use the mouse with.

Ella wondered if there was some relationship between the two times each student recorded so she drew the scatterplot given below.

**Is there a Relationship between Reaction Times for your Dominant Hand and for your Other Hand?**

*If you need to redraw your answers to (a) and (b), use the graph on page 17.*



- (a) On the scatterplot, show the group of points where the reaction time with the Other Hand is **less than or equal to** the reaction time with the Dominant Hand.
- (b) Draw a line of best fit on to the scatterplot.

- (c) (i) What relationship, if any, does the scatterplot show between the reaction time recorded with the Dominant Hand and the reaction time recorded with the Other Hand?

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- (ii) How confident can you be in your answer to part (i)?  
Give statistical reasons for your answer.

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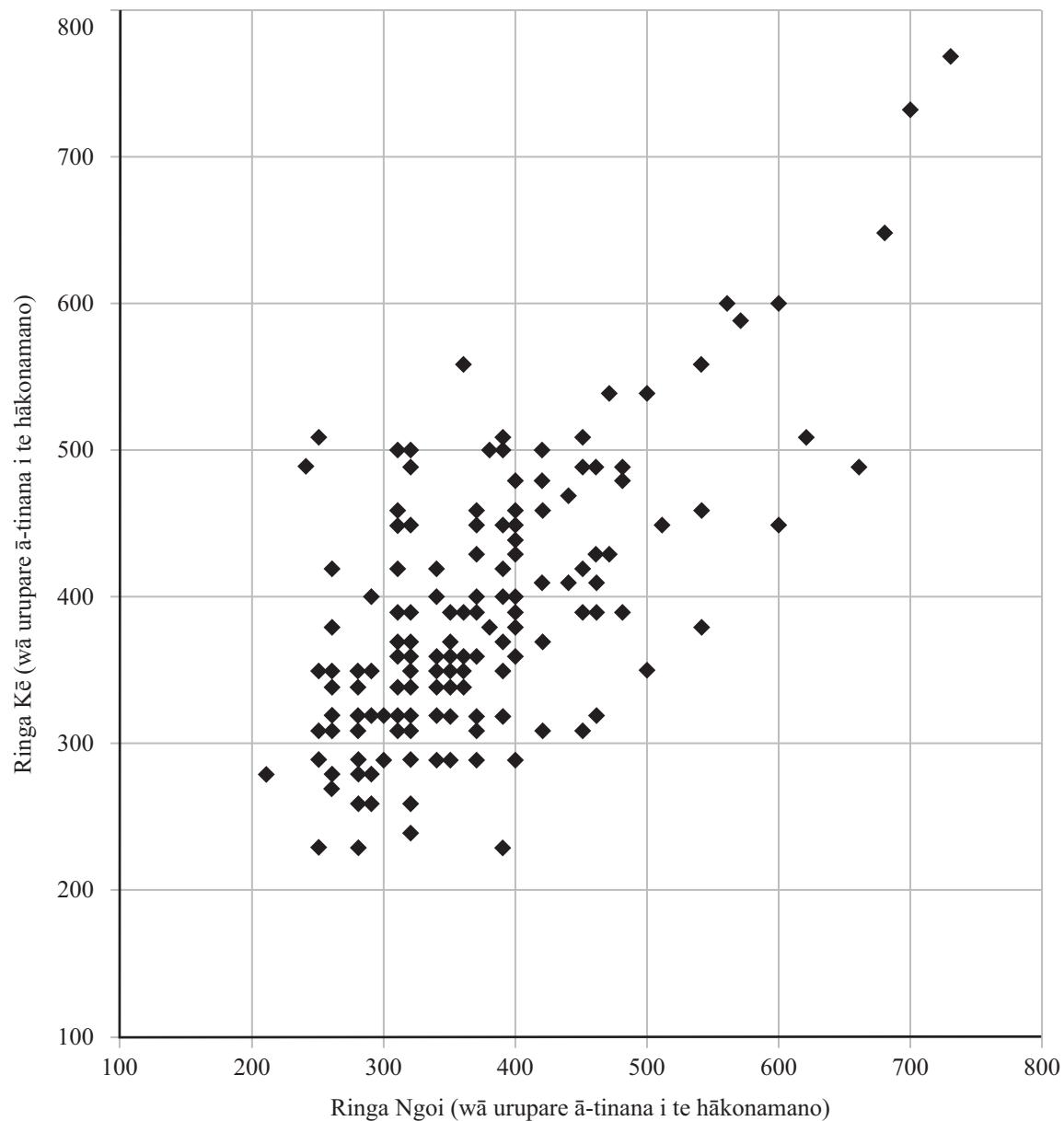
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Ki te hiahia koe ki te tuhi anō i ō whakautu mō te Pātai Tuatoru (a) me te (b), tuhia ki te kauwhata i raro nei. Kia mārama te tohu ko tēhea te kauwhata ka hiahia koe kia mākahia.

**He Pānga i waenganui i ngā Wā Urupare ā-Tinana  
o tō Ringa Ngoi me tō Ringa Kē?**

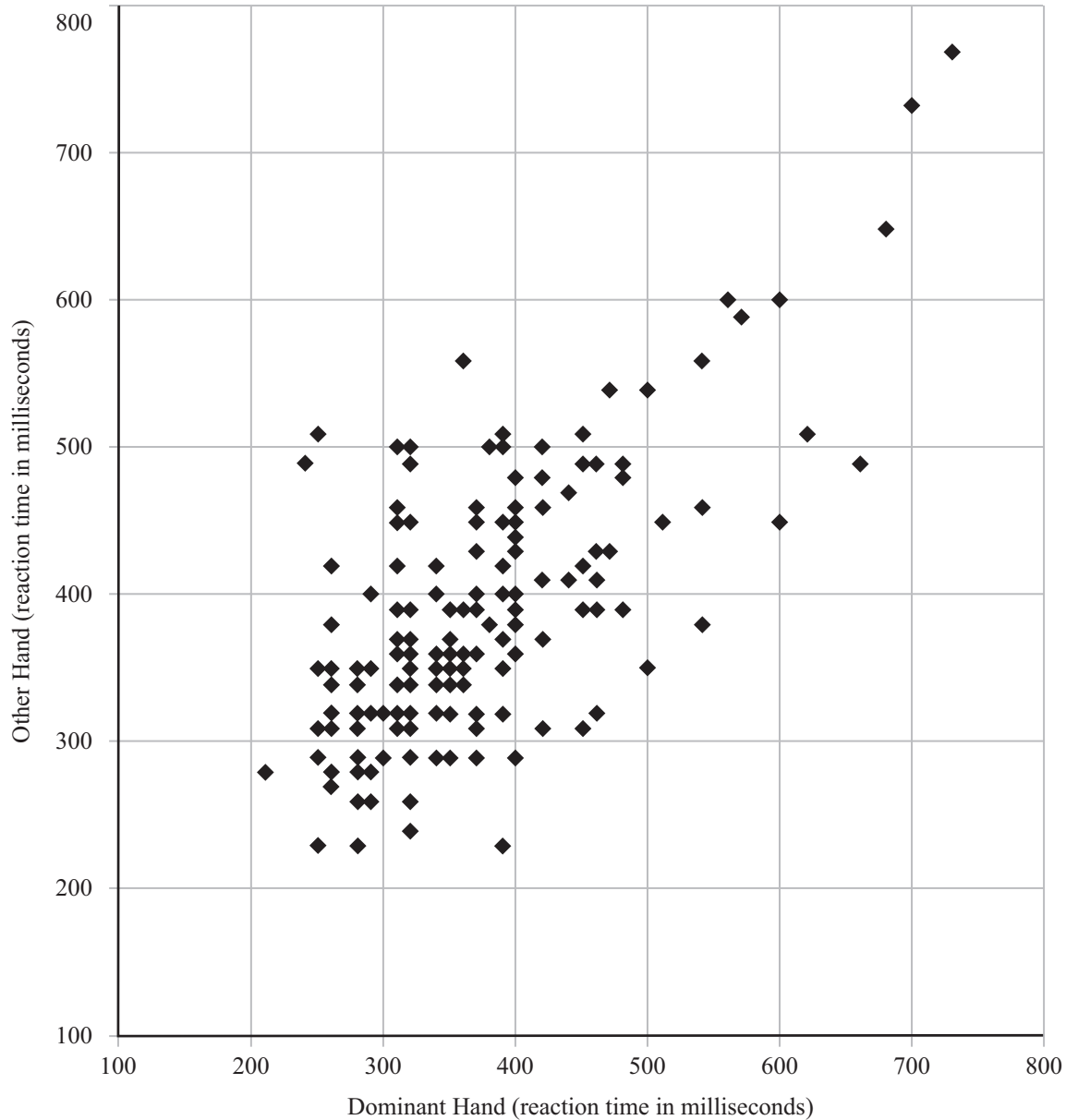




If you need to redraw your answers to Question Three (a) and (b), draw them on the graph below. Make sure it is clear which graph you want marked.

ASSESSOR'S  
USE ONLY

**Is there a Relationship between Reaction Times for  
your Dominant Hand and for your Other Hand?**







*English translation of the wording on the front cover*

## Level 1 Mathematics and Statistics, 2012

### 91037 Demonstrate understanding of chance and data

9.30 am Wednesday 14 November 2012

Credits: Four

| Achievement                                   | Achievement with Merit  | Achievement with Excellence  |
|---|---|--|
| Demonstrate understanding of chance and data. | Demonstrate understanding of chance and data, justifying statements and findings. | Demonstrate understanding of chance and data, showing statistical insight. |

91037M

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 2–19 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.**