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NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Level 1 Mathematics and Statistics, 2013

91037 Demonstrate understanding of chance and data

9.30 am Wednesday 13 November 2013
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.

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 2–11 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.

TOTAL

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

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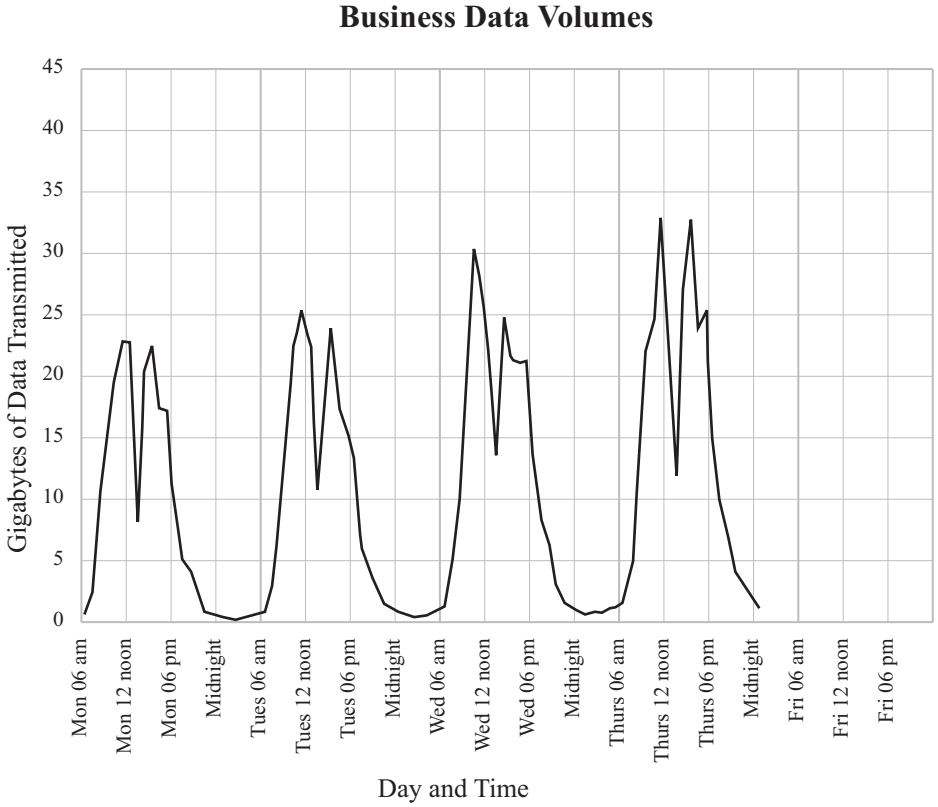
QUESTION ONE

Metua has been researching the amount of data being transmitted by local businesses near his home. The graph for the amount of data transmitted each hour over 4 days is given below.



(a) Describe any overall trends that the graph shows over the space of these 4 days.

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(b) Describe any repeating patterns visible in this graph.

(c) (i) On the graph, sketch your prediction for the amount of business data transmitted on Friday.

(ii) How confident are you in your prediction for Friday?

Give statistical reasons for your answer.

QUESTION TWO

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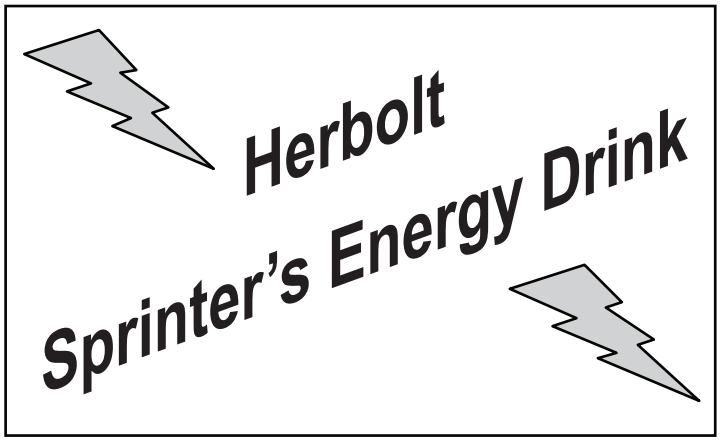
Nikita saw the following advertisement in a sports magazine.



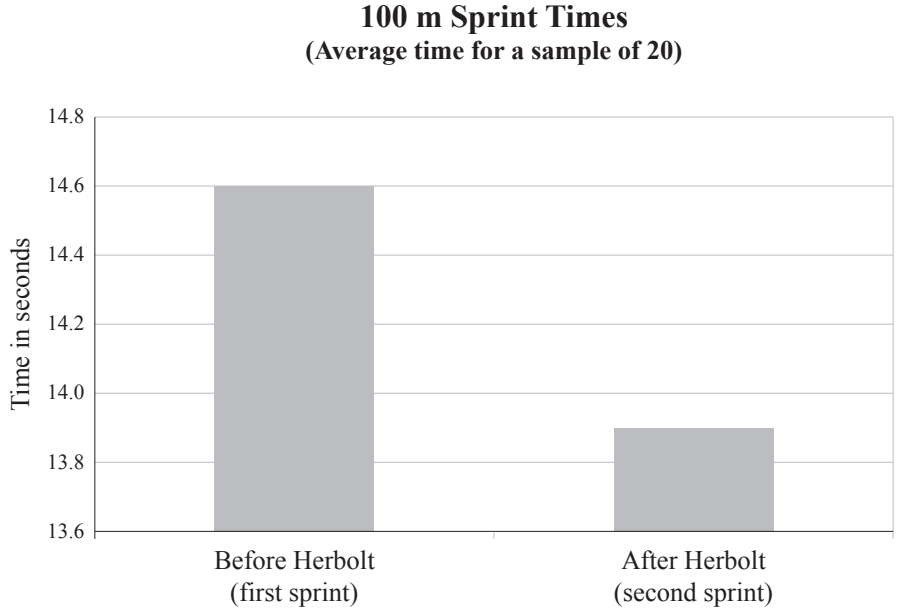
The company claims that Herbolt helps sprinters to lower their sprint times.

The company tested 20 sprinters and recorded each sprinter's first sprint time to run 100 m.

Each sprinter then drank some Herbolt Energy Drink.

Finally, after 2 hours, each sprinter ran a second 100 m sprint, and the time was recorded.

The advertisement included the following graph, and claimed that this showed how well the product worked to help sprinters to lower their sprint times.



(a) How much difference did the Herbolt Energy Drink make to the times, according to this graph?

(b) Nikita is not confident that the claim in this advertisement is true.

Give at least two statistical reasons why Nikita might not trust the claims until she found out more about the testing.

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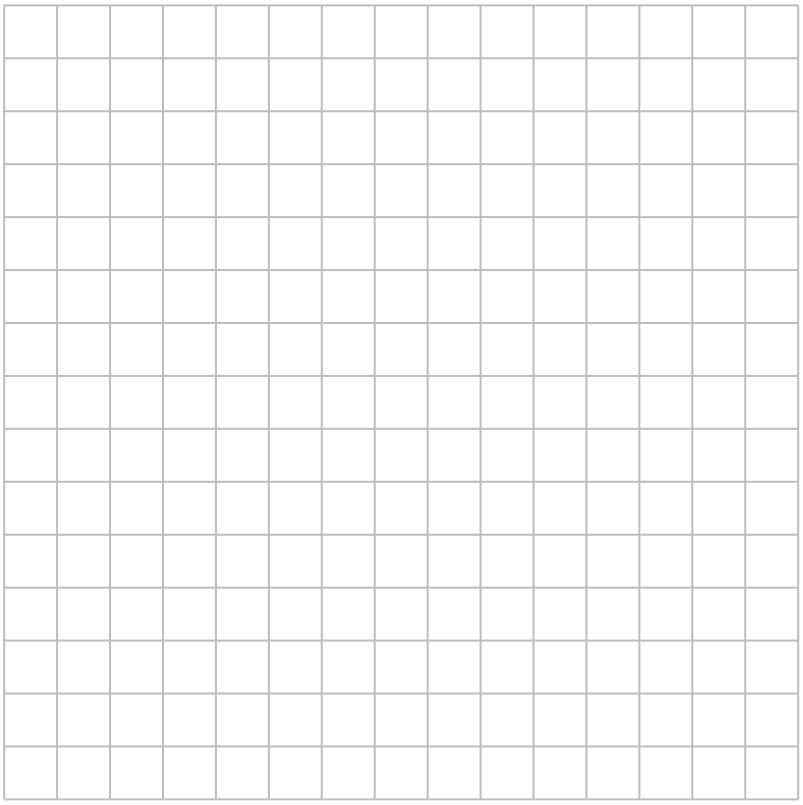
Nikita did some research on the internet and found more results from the testing. The data is summarised in the table below.

100 m average times (seconds)

	First Sprint	Second Sprint
Sprinters drinking Herbolt Energy Drink after first sprint (20 sprinters)	14.6	13.9
Sprinters NOT drinking Herbolt Energy Drink (15 sprinters)	14.9	14.6

(c) Draw a graph to clearly and accurately compare how the 100 m average times changed from the first test to the second test.

Use the grid below, and be sure to label your graph clearly.



If you need to redraw this graph, use the grid on page 10.

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(d) From this data, do you think that it is true that Herbolt Energy Drink helps sprinters to lower their time to run 100 m?

Give reasons for your conclusion.

(e) This research has used average times for 100 m races. The researchers wonder if they should use the median or the mean as their average.

What would you recommend?

Give statistical reasons for your answer.

QUESTION THREE

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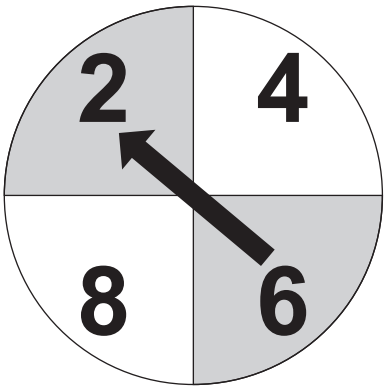
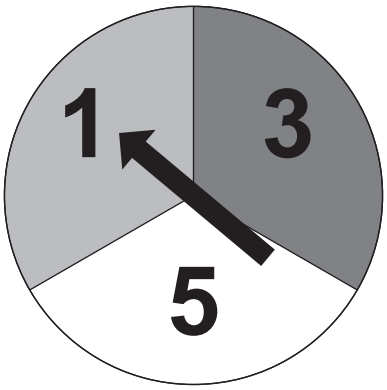
Marino is helping to organise a gala at his school. He is going to use the two spinners drawn below:



Spinner A



Spinner B

(a) If Marino spins the Spinner A, what is the probability that the arrow points to 2 or 6?

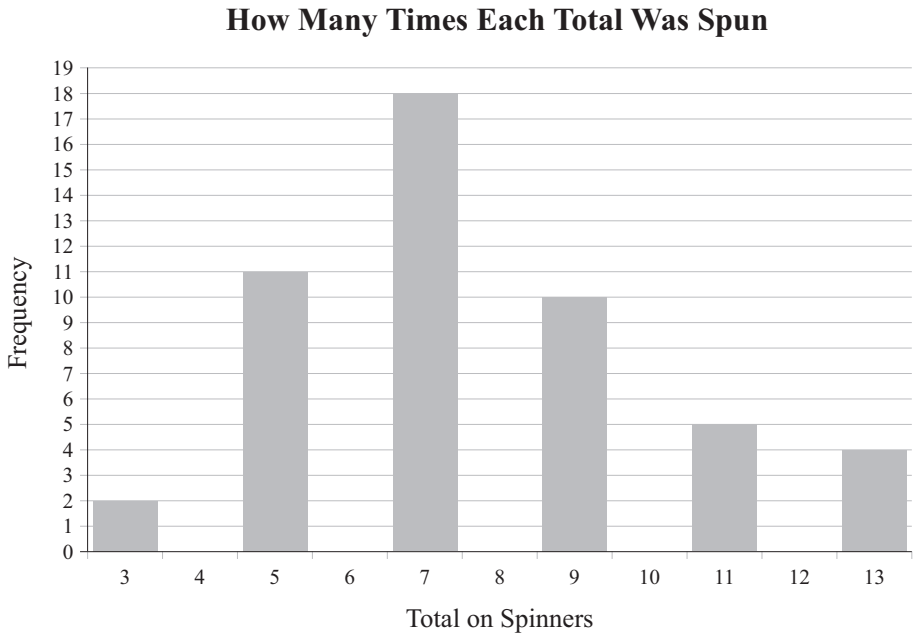
Marino plans to offer a game where the player can win $10.

The player will spin each spinner once only.

If the total from the 2 spinners is more than 10, the player will win $10.

He plans to charge players $2 to play the game.

To test the game, Marino plays it and draws the following graph of his results:



(b) From Marino's results, what is the probability that a player will spin a total of more than 10?

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(c) Should Marino trust the results from his experiment?
Give statistical reasons for your answer.

(d) Will Marino make a profit after 100 games?
Use theoretical probability to support your answer.

If you need to redraw your answer to Question Two (c), draw it on the graph below. Make sure it is clear which graph you want marked.

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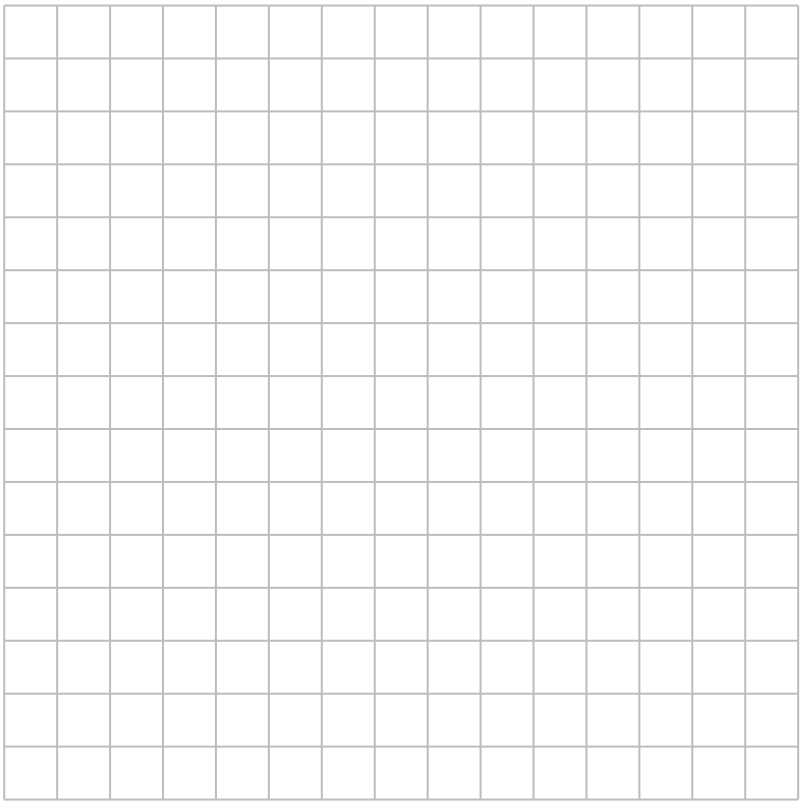

Extra paper if required.
Write the question number(s) if applicable.

QUESTION NUMBER

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