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NZQA

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Level 1 Mathematics and Statistics, 2017

91037 Demonstrate understanding of chance and data

9.30 a.m. Monday 20 November 2017
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 2–16 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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TRANSPORTATION

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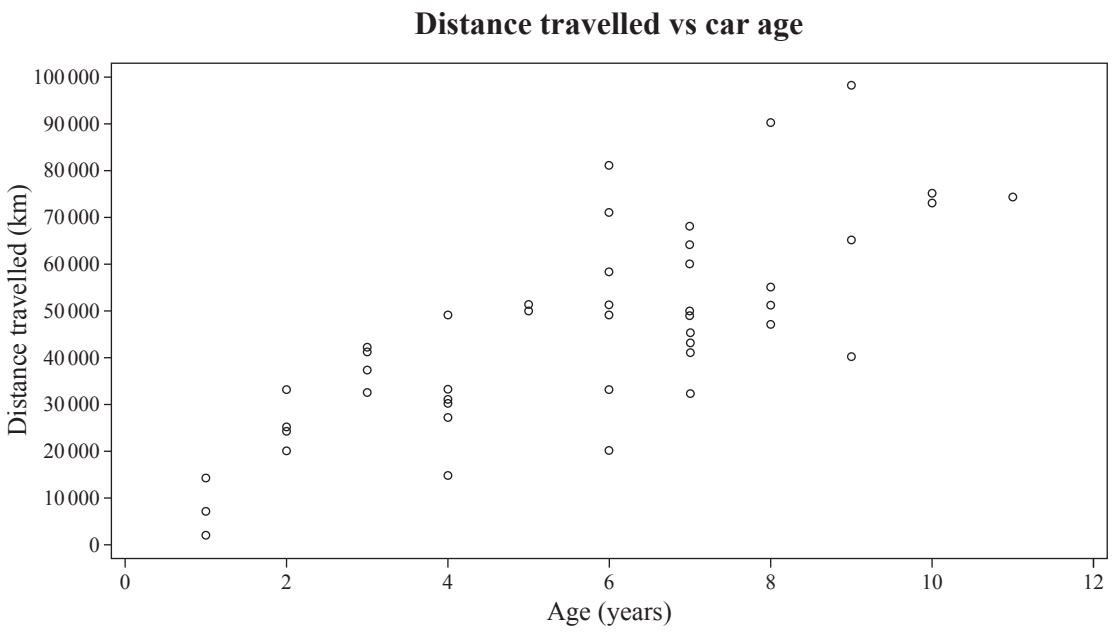
http://www.trademe.co.nz/motors/news-reviews/20161005-local-corolla-offers-extra-value/

QUESTION ONE

(a) Ngaire wants to buy a car. She took a sample of cars and drew a graph of the age of the cars (in years) and the distance they had travelled (in kilometres).



State the relationship that exists between the age of cars and the distance they have travelled AND find the average change in distance travelled by a car each year as the age increases.

Justify your answer.

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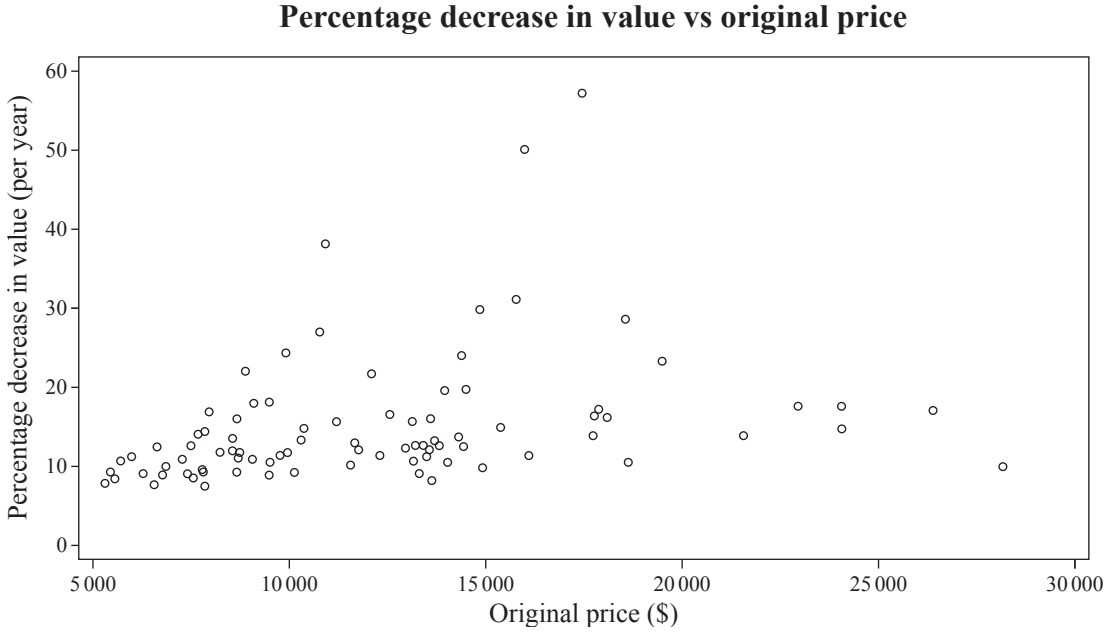
(b) Ngaire produced another graph which compared a car's original price ($) with its percentage decrease in value per year (depreciation).



(i) Describe any features visible in the graph of the original price and percentage decrease in value per year.

(ii) In terms of percentage decrease in value, is it better to buy a cheaper or more expensive car?

Justify your answer.

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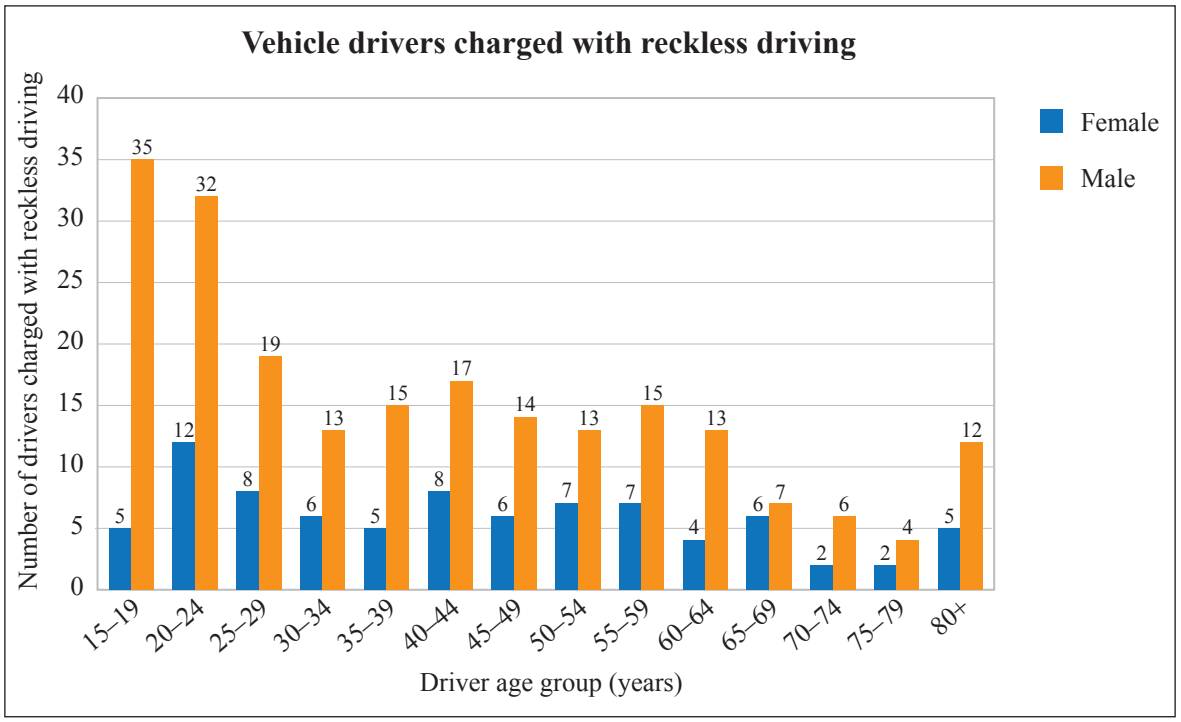
(c) In 2016, the Ministry of Transport released a report.

It looked at a sample of 298 drivers charged by police with reckless driving, and displayed it as shown below:



(i) What was the probability that a randomly selected driver from the sample of drivers charged with reckless driving in 2016, was a male aged 20–24?

(ii) What was the probability that a randomly selected driver from the sample of female drivers charged with reckless driving in 2016, was in the 15–24 age group?

(iii) Based on the 2016 sample, how many times more likely was it that, chosen at random, a vehicle driver who was charged with reckless driving, would be a male than a female?

QUESTION TWO

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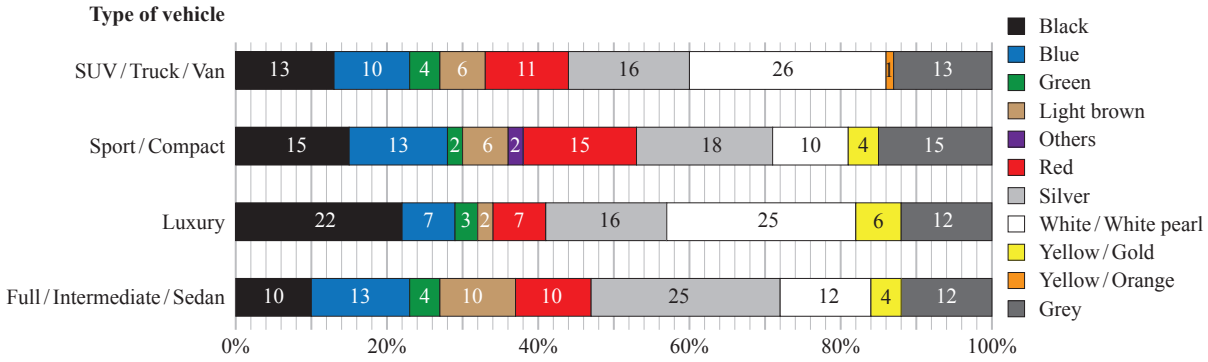
(a) The popularity of colours for different types of vehicles is shown below. The numbers shown are a percentage.



(i) What is the most popular colour in luxury vehicles?

Justify your answer.

(ii) What other ways could you display this data?

State the advantages and disadvantages of each method.

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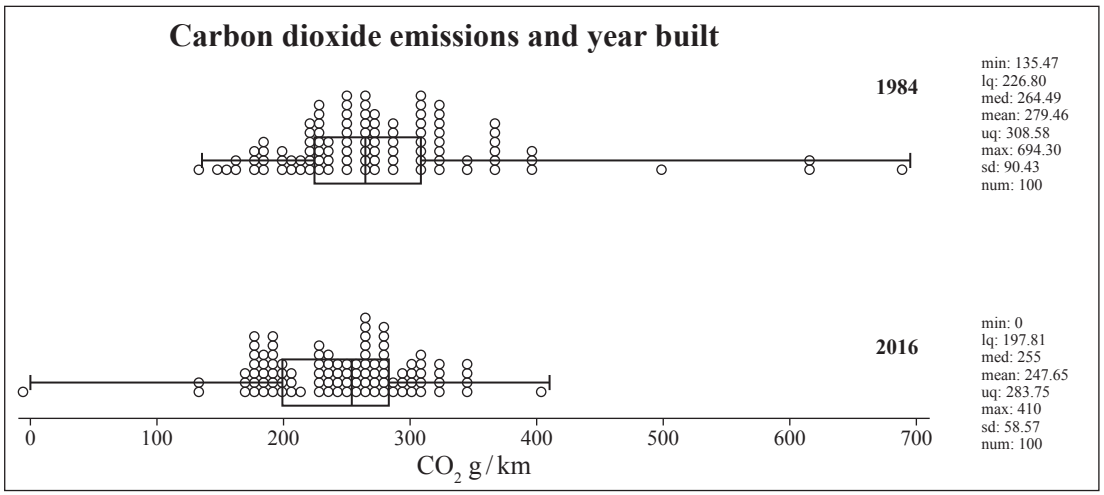
(b) The display below compares the carbon dioxide emissions (in g / km) of a sample of 100 cars made in 1984 compared to the carbon dioxide emissions of a sample of cars made in 2016.



(i) What is the difference between the median amounts of carbon dioxide emissions in g / km of cars built in 1984 and those built in 2016?

(ii) Which year of build has the greatest variation in carbon dioxide emissions?

Justify your answer.

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(iii) Comment on the distribution of carbon dioxide emissions for both 1984-built and 2016-built cars.

Note any similarities and differences as well as any unusual features.

(iv) Car manufacturers claim that 'cars produced in 2016 tend to produce less carbon dioxide than cars made in 1984.'

Use statistical reasoning, based on this sample of cars, to comment on the car manufacturers' claim.

Justify your answer clearly.

QUESTION THREE

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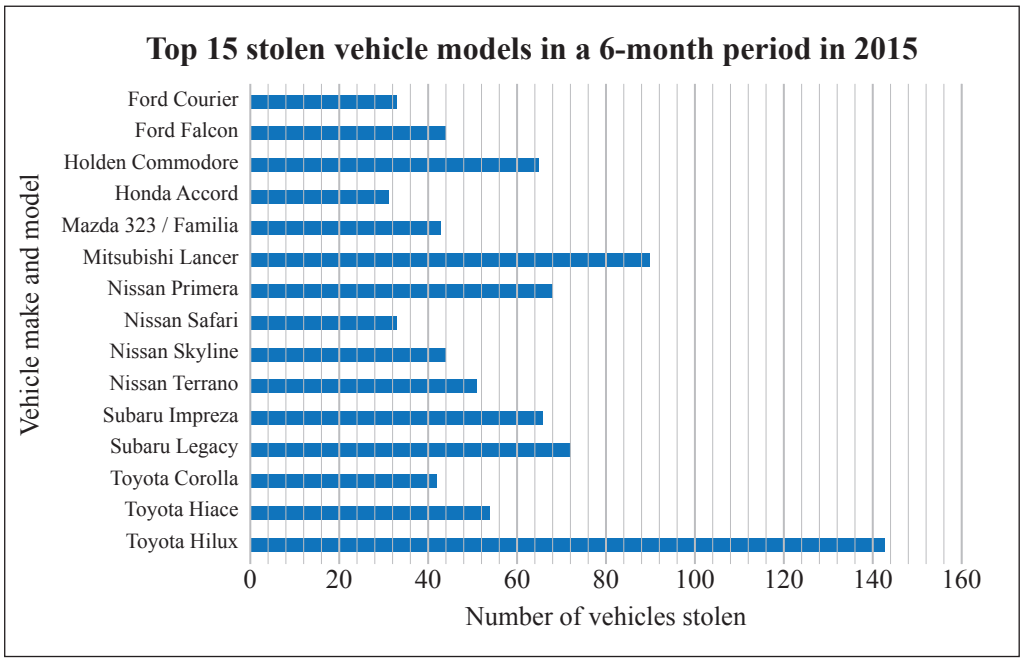
(a) The New Zealand police record the details of all vehicles stolen.

The top 15 vehicle models stolen in a 6-month period in 2015 are shown below.



(i) How many Nissan Primeras were stolen in this 6-month period?

(ii) "Nissan was the most stolen make of vehicle in the 6-month period in 2015."

State whether you think this sentence is true, giving statistical reasons for your answer.

(iii) AA Insurance released its top 10 stolen vehicle models from 1 May 2013 to 30 April 2014:

1. Honda Torneo
2. Subaru Impreza
3. Mazda Premacy
4. Mazda Familia
5. Subaru Forester
6. Mazda Atenza
7. Subaru Legacy
8. Mazda MPV
9. Nissan Sunny
10. Nissan Cefiro

This list is quite different from the police data.

Give statistical reasons for these differences.

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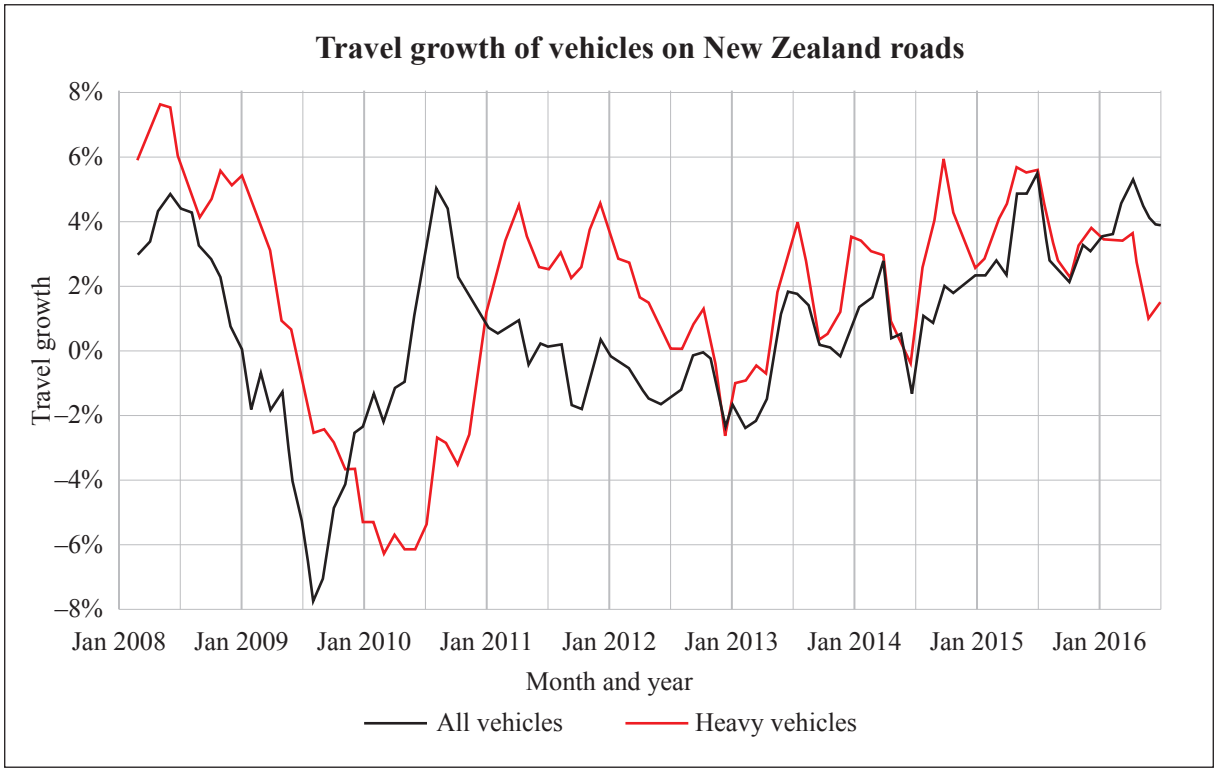
(b) The New Zealand Transport Agency (NZTA) counts the number of vehicles using major roads. It then compares the results from the same period in the previous year. The information below shows the travel growth of All Vehicles and the travel growth of Heavy Vehicles only.



(i) In what year did travel growth reach its lowest point for Heavy Vehicles?

Justify your answer.

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(ii) Based on the results shown, what could possibly happen to the travel growth in 2017 and 2018 for All Vehicles?

State at least two possibilities, giving statistical reasons for your answers.

(iii) When analysing the results, the NZTA takes the mean of the previous 3 months' data and plots that result on the graph (e.g. the January 2016 result that is plotted comes from the mean of the November 2015, December 2015, and January 2016 results).

Give statistical reasons why you think the NZTA does this.

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

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