

3

91584



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

SUPERVISOR'S USE ONLY

Level 3 Mathematics and Statistics (Statistics), 2014

91584 Evaluate statistically based reports

9.30 am Thursday 20 November 2014

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Evaluate statistically based reports.	Evaluate statistically based reports, with justification.	Evaluate statistically based reports, with 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.

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 2–12 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

ASSESSOR'S USE ONLY

QUESTION ONE

Uncertain future for landlines – new telco

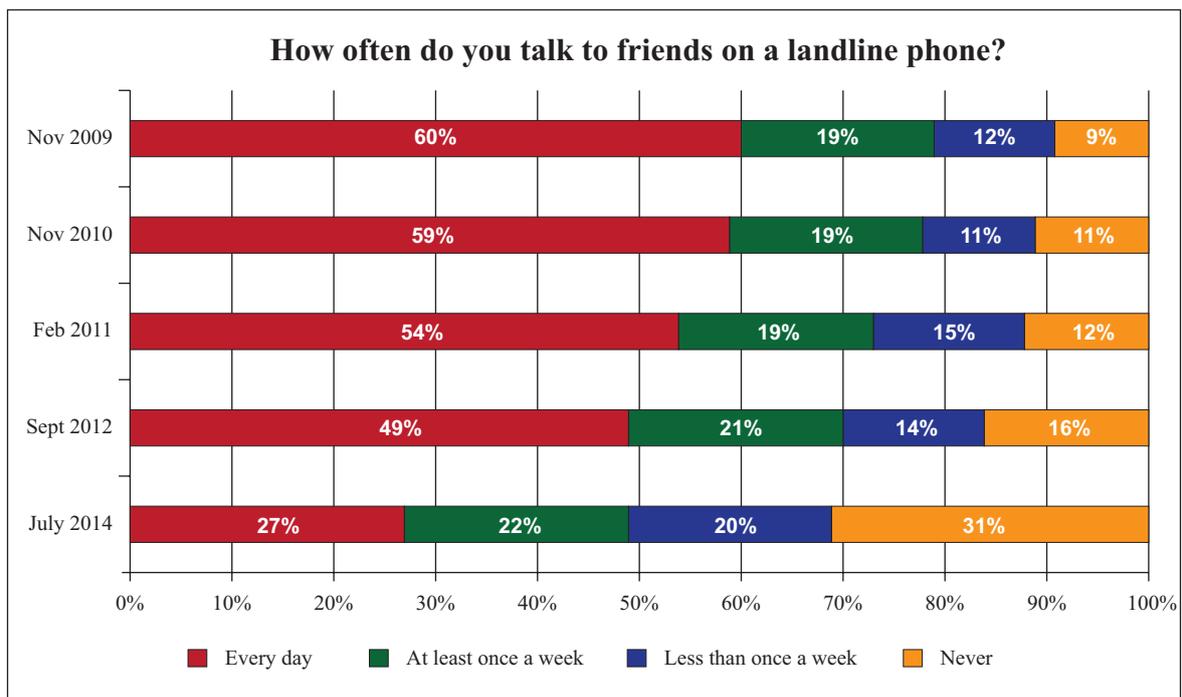
*NZ Times**, 9 August 2014

New Zealand's newest telecommunication company, targeting the younger market, is set to launch in less than six months, but it might not offer the full range of services it originally intended.

Promising lower calling and data charges as well as better customer service, the joint US-Canadian owned *3's Company* is set to launch early in 2015 and plans to shake up the established telcos in New Zealand. However, after indicating for several years it wanted to acquire as much of the landline market as possible, the company now says it will offer only mobile and internet services.

Chief executive Rob Chaney said the extensive research the company had commissioned over the past five years provided "strong evidence landline voice calls were diminishing". Spending money to offer landline services might prevent the company from fully meeting its aim to provide New Zealanders with better communication products, he said. Mr Chaney claimed that his company's research had shown that fewer than half of young New Zealanders are now talking to friends on landlines regularly each week, and because of this, the company would instead focus on providing the very best internet and mobile products.

The company investigated phone usage over a five-year period. The results for the frequency of talking to friends on a landline phone for each of these years are shown in the graph below.



In each year's survey, 600 New Zealanders aged 12 to 17 were interviewed. Interviews were conducted using landlines and cell phones, and each year's survey has a margin of error of 4.1%.

* *NZ Times* is a fictional newspaper.

(a) The article states that the margin of error for each survey is 4.1%.

(i) Show how this margin of error was calculated, and explain why the margin of error should be included in statistical survey reports.

(ii) Explain why it would be inappropriate to use the reported margin of error to construct a confidence interval for the percentage of respondents from the November 2009 survey who never talk to their friends on a landline.

- (b) The article reports a claim that fewer than half of young New Zealanders are now talking to friends on landlines regularly each week.
- (i) For the July 2014 survey, the response categories “Every day” and “At least once a week” have a total of 49% of interviewees.

Is this combined survey percentage sufficient statistical evidence to support the claim?
Justify your answer.

- (ii) The question about frequency of talking to friends on a landline phone and the related response categories were the same in each year’s survey.

Discuss potential difficulties with the wording of this question and the wording of the response categories used.

QUESTION TWO

Internet company rebrands*NZ Times*, 23 April 2014

The country's oldest provider of home-based internet services, *SuperInfo*, has announced a raft of changes aimed at reviving its ailing fortunes. Among the measures is a new name – *Beam*. The name change has not been well received by market analysts, 75% of whom claimed when contacted by email that the name change would be seen as a “last-minute panic measure and reduce the company's fortunes even further”.

SuperInfo's head of marketing, Dale Nind, said yesterday the new measures were aimed at recapturing customers, and also attracting a new group of younger clients. His marketing team had reached this conclusion after surveying random samples of customers from airports and universities around New Zealand.

At two of Auckland's biggest malls yesterday, *NZ Times* reporters asked shoppers what they thought of the name change. In some good news for *SuperInfo*, at the mall surveyed in West Auckland, 56% of 210 *SuperInfo* customers surveyed agreed with the name change. However, in another mall in South East Auckland, only 42% of 175 *SuperInfo* customers surveyed agreed with the name change. However, more than half in each mall complained about poor customer service and slow broadband over the past few years, and said this was the reason why they were thinking of leaving.

(a) The article describes surveys carried out at a West Auckland mall and a South East Auckland mall.

(i) Calculate the margin of error for each survey.

(ii) Can a claim be made that a higher percentage of *SuperInfo* customers in West Auckland agree with the name change than *SuperInfo* customers in South East Auckland, based on the survey percentages presented in the report?

Construct a confidence interval, and interpret this interval as part of your answer.

QUESTION THREE

Study shows social media affects fitness*NZ Times*, 2 October 2014

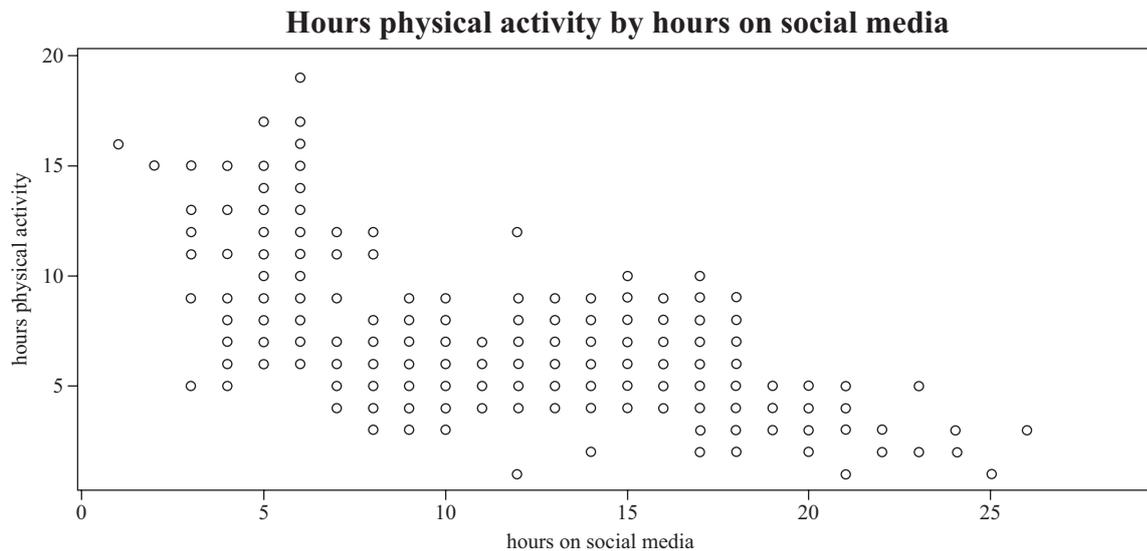
Scientists have found a strong link between the time youngsters spend on physical activity and the time they spend on social media.

Researchers from New Zealand, Australia, and the UK interviewed a total of 150 secondary school aged students across the three countries once over a period of six weeks in 2014. Students were asked how long they had spent on social media websites and other forms of electronic communication, such as texting, in the previous week. The results showed that 61% spent more than 14 hours a week on such activities – an average of two hours a day.

Authors of the report *Changing communication habits among young people* say their findings suggest the time spent on social media is having a big impact on time spent on physical activity.

“The students who used social media spent less time doing physical activity,” lead researcher Dr Bolton from the University of Enzed, said.

The findings suggest that for every extra hour spent on social media per week, students tend to spend half an hour less on physical activity per week, as shown in the graph below:



- (a) Identify the explanatory and response variables for the study.
