

91584R



NEW ZEALAND QUALIFICATIONS AUTHORITY  
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## Level 3 Mathematics and Statistics (Statistics) 2021

91584 Evaluate statistically based reports

Credits: Four

### RESOURCE BOOKLET

Refer to this booklet to answer the questions for Mathematics and Statistics (Statistics) 91584.

Check that this booklet has pages 2–4 in the correct order and that none of these pages is blank.

**YOU MAY KEEP THIS SHEET AT THE END OF THE EXAMINATION.**

## REPORT 1

### Many farmers still stuck on connectivity slow lane, Feds survey finds

The vast majority of urban New Zealanders can get on the internet at speed, but the latest connectivity survey by Federated Farmers shows that too many rural families and businesses are still “stuck in second gear on a potholed back road.”

“We had nearly 900 responses from our members from every farm type and geographical spread, but a problem was that several more couldn’t complete the online questions because they didn’t have internet access or connectivity was too patchy or slow,” a Federated Farmers spokesperson said. Federated Farmers of New Zealand Incorporated is an organisation in New Zealand that lobbies on behalf of its member farmers. Membership of the organisation is voluntary, and it currently has over 13 000 members.

Around 70% of respondents have download speeds of 20 Mbps or less.

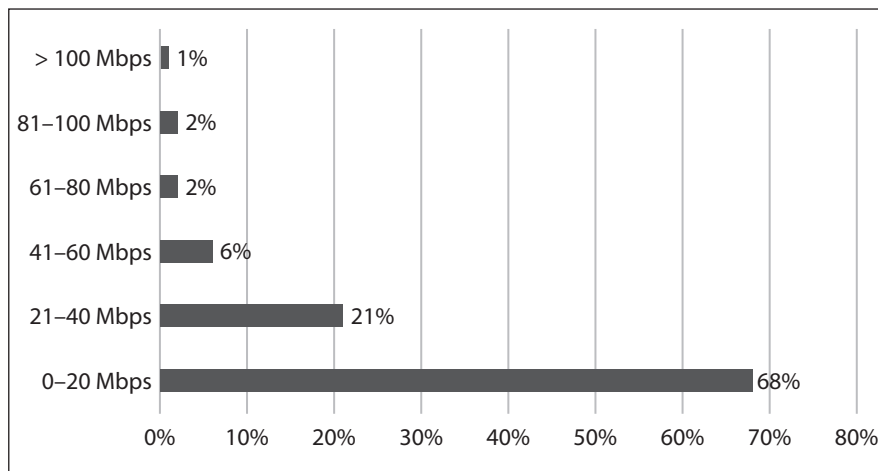


Figure 1: Download speeds for Federated Farmers

With regards to download speeds on farms, the 2020 survey saw an increase of around 7% in the proportion of respondents experiencing slow speeds in the 0–20 Mbps range, with decreases of around 1–4% in the proportion of respondents experiencing better download speed ranges. The significance of this shift in proportions is difficult to assess against proportions in the 2019 survey, given the reduced response rate to the 2020 survey when compared to the number of responses received to the 2019 survey.

The Federated Farmers Rural Connectivity Survey 2020 was conducted between 9 July 2020 and 21 July 2020. It was promoted via email, electronic newsletters, and through specific Federated Farmers member advisories explaining the importance of responding to the survey. The survey was undertaken online, with survey participants volunteering to participate. 98.07% of the 883 respondents were Federated Farmers members.

Adapted from: <https://www.scoop.co.nz/stories/BU2009/S00417/many-farmers-still-stuck-on-connectivity-slow-lane-feds-survey-finds.htm> and [https://www.fedfarm.org.nz/FFPublic/Policy2/National/2020/Rural\\_Connectivity\\_Survey\\_2020.aspx?WebsiteKey=00ff782d-8ff5-4a81-ae69-785972132c32](https://www.fedfarm.org.nz/FFPublic/Policy2/National/2020/Rural_Connectivity_Survey_2020.aspx?WebsiteKey=00ff782d-8ff5-4a81-ae69-785972132c32)

## REPORT 2

### The robot made me do it

New research has shown robots can encourage people to take greater risks in a simulated gambling scenario than they would if there was nothing to influence their behaviours. A professor from the University of Southampton who led the study explained, “We know that peer pressure can lead to higher risk-taking behaviour. With the ever-increasing scale of interaction between humans and technology, both online and physically, it is crucial that we understand more about whether machines can have a similar impact.”

This new research involved 180 university students taking the Balloon Analogue Risk Task (BART), a computer assessment that asks participants to press the spacebar on a keyboard to inflate a balloon displayed on the screen. With each press of the spacebar, the balloon inflates slightly, and 1 coin is added to the player’s ‘temporary money bank’. The balloons can explode randomly, meaning the player loses any money they have won for that balloon. Participants have the option to ‘cash in’ before this happens and move on to the next balloon. Once they have either ‘cashed in’ or exploded their balloon, they move to the next balloon.

A total of 180 psychology students participated in the study (154 women and 26 men). Participants were randomly allocated to one of the three conditions:

- control ( $n = 60$ , 51 females, 9 males)
- robot control ( $n = 60$ , 52 females, 8 males)
- treatment ( $n = 60$ , 51 females, 9 males).

Participants in the three conditions did not differ in age. All participants completed the experiment in the same laboratory room. One-third of the participants took the test in a room on their own (control condition) and one third took the test alongside Pepper the robot, who provided them only with the instructions for the task, and was silent the rest of the time (robot control condition). The final group took the test with the robot providing instruction for the task as well as speaking encouraging statements such as “why did you stop pumping?” (treatment condition). Participants completed 30 trials involving 30 balloons. The explosion point of the balloon was set randomly and could happen anywhere between 1 and 128 pumps.

As seen in Figure 2b, the results showed that the treatment group (those who were encouraged by the robot) took more risks, inflating their balloons significantly more frequently than those in the other groups did. They also earned more money overall. There was no significant difference in the behaviours of the students accompanied by the silent robot and those with no robot.

The professor concluded, “With the widespread use of AI technology and its interactions with humans, this is an area that needs urgent attention from the research community.”

Adapted from: <https://www.sciencedaily.com/releases/2020/12/201211100646.htm> and <https://www.liebertpub.com/doi/10.1089/cyber.2020.0148>



Figure 2a. Overview of the experimental setup with the Balloon Analogue Risk Task shown on the computer screen and Pepper the robot on the right-hand side.

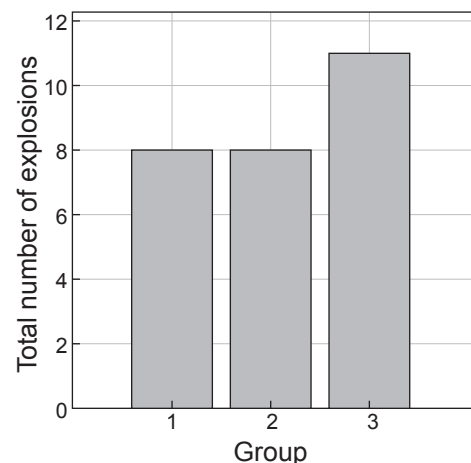


Figure 2b. Total number of explosions. Bars show the median total number of explosions for each group. Group 1: Control condition; Group 2: Robot control condition; Group 3: Treatment condition.

## REPORT 3

### Te reo Māori use by under-fives widespread

A new study has found te reo Māori is flourishing among pre-schoolers, with nearly three quarters of New Zealand under-five year olds using at least some of the language. The research, led by Te Whare Wānanga o Awanuiāraangi, analysed information from ‘Growing Up in New Zealand’, the country’s largest study of child development.

It found 10% of children could speak or understand simple sentences in te reo Māori at age four – and about 20% of those were non-Māori. A research director at the Wānanga said the findings were very encouraging: “about 70% of children under the age of five who were part of the research used some te reo Māori, and that’s something that you wouldn’t find in the more general population.”

He said the figures were an indication that the revitalisation efforts in the past were working. “It tells us that the degree of enthusiasm for te reo Māori is not just among the Māori population, and perhaps the strategies of the past are now beginning to take effect in terms of Māori language use and revitalisation.”

“It also tells us some more specific advice in terms of what the drivers of te reo Māori are and what types of factors support children to speak te reo Māori. We found that if your household is in close proximity to other households that are speaking te reo Māori, that is incredibly important in terms of the child’s fluency or proficiency in te reo Māori, and also if the mother had a tertiary qualification, there was a strong relationship between that and the child’s ability to speak te reo Māori.” He said screen time was a negative predictor of te reo Māori use.

The ‘Growing Up in New Zealand’ study followed the development of approximately 7000 children from before their birth in New Zealand in 2009 and 2010. There were over 1500 children in the study who were identified (by their parents) as Māori. Face-to-face interviews occurred during pregnancy, and then when the children were 9 months, 2 years, 4.5 years, and 8 years of age.

At the age 4.5 years, mothers in the full cohort reported on their children’s te reo Māori proficiency. Responses for the 6104 participants are shown in the table below.

How often does [NAME] do any of the following?

	Often	Sometimes	Rarely	Never
Speak simple words in te reo Māori	523 (9%)	2109 (34%)	1565 (26%)	1907 (31%)

Table 1: Parental report of te reo Māori usage by children at 4.5 years of age ( $n = 6104$ )

Adapted from: <https://www.rnz.co.nz/news/te-manu-korihi/418260/te-reo-maori-use-by-under-fours-widespread-research> and <https://www.growingup.co.nz/study-finds-significant-growth-use-te-reo-maori-among-pre-schoolers>