3

90643

906430

NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 3 Statistics and Modelling, 2009

90643 Solve straightforward problems involving probability

Credits: Four
9.30 am Friday 20 November 2009

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

Make sure you have a copy of the Formulae and Tables Booklet L3–STATF.

You should answer ALL the questions in this booklet.

Show ALL working for ALL questions.

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 2–10 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.

For Assessor's use only	Achievement Criteria				
Achievement		**Achievement with Merit**		**Achievement with Excellence**	
Solve straightforward problems involving probability.		Solve probability problems.		Apply probability theory.	
Overall Level of Performance					

You are advised to spend 45 minutes answering the questions in this booklet.

Assessor's use only

PRIMARY SCHOOL LUNCHES

QUESTION ONE

Primary school students were surveyed about their school lunches. On the day of the survey, 63% of students came to school with a lunch from home, while the remainder of the students bought their lunch, either at school or from nearby shops. Of those students who came to school with a lunch from home, 84% of their lunches included fruit, while only 47% of the bought lunches were found to include fruit.

(a) Calculate the probability that a randomly selected student from those surveyed had a lunch containing fruit.

Assessor's use only

(b) Suppose that a randomly selected student from those surveyed was found to have a lunch containing fruit.

Calculate the probability that the student had a bought lunch.

(c) A survey the previous year showed that 72% of the students surveyed had fruit in their lunch. Of those students who had fruit, it was found that 56% also had juice. Only 12% of the students who did not have fruit in their lunch had juice. It was also found in the survey that 60% of students who had **both** fruit and juice in their lunch had bought their lunch.

Suppose a student from this previous year's survey was randomly selected.

Calculate the probability that the student had a bought lunch containing fruit, given that they were found to have juice in their lunch.

QUESTION TWO

Assessor's use only

One particular primary school does not have a school canteen. Instead, once a week the school orders filled rolls and sushi, which the students can buy.

(a) One week, 11 of the 28 students in one class bought filled rolls, while 15 students in the class bought sushi. There were 8 students in the class who did not buy either.

Calculate the probability a randomly selected student from the class bought both filled rolls and sushi.

(b) Another week, 18 of the 28 students in a class bought sushi for their lunch.

Suppose 12 students from that class are randomly selected.

Calculate the probability that at least 11 of the 12 students selected bought sushi for their lunch that week.

Assessor's use only

(c) In a particular group of 10 students at the school, m of them bought sushi last week.

Suppose 2 students from the group of 10 are randomly selected. Suppose the probability that both of them bought sushi is 0.8.

Find the value of m for this situation.

Assessor's use only

QUESTION THREE

Assessor's use only

Sometimes Hami is taken to school by car. The other times he buses.
Sometimes Hami takes a lunch from home. The other times he buys his lunch.

On any given day, the probability that Hami is taken to school by car is 0.24, and the probability that Hami buys his lunch is 0.32. The probability that Hami is taken to school by car and buys his lunch is 0.0864.

(a) Are the events "Hami is taken to school by car" and "Hami buys his lunch" statistically independent?

Justify your answer.

Assessor's use only

(b) Whenever he doesn't have to pay a bus fare or he gets lunch money, Hami puts some money into his money box.

- He puts $2 into his money box on each day that he is taken to school by car and buys his lunch.
- He puts $1 into his money box on each day that he is taken to school by car and does not buy his lunch.
- He puts 50 cents into his money box on each day that he goes to school by bus and buys his lunch.
- He puts no money in his money box on each day that he goes to school by bus and does not buy his lunch.

Calculate the expected amount of money Hami would put into his money box in a 5-day school week.

Assume that how Hami travels to school one day is independent of how he travels to school on another day, and similarly for buying lunch.

Assessor's use only

Extra paper for continuation of answers if required.
Clearly number the question.

Assessor's use only

Question number

90643