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90194

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

MATHEMATICS, 2002

Level 1

1.6 Calculate relative frequencies and theoretical probabilities.

Credits: Two
9.30 am Wednesday 20 November 2002

Check that the Candidate Code Number on your admission slip is the same as the number at the top of this page.

You should answer ALL the questions in this booklet.

If you need more space for any answer, use the pages provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–8 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.

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ACHIEVEMENT CRITERIA

Achievement	Achievement with Merit	Achievement with Excellence
Determine probabilities. ☐	Solve theoretical probability problems. ☐	Devise strategies to explore probability situations. ☐
		Solve theoretical probability problems. ☐
Overall Level of Performance (all criteria within a column are met) ☐		

You are advised to spend 30 minutes answering the questions in this booklet.

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FAIR GAME

Show **ALL** working.

QUESTION ONE

Southern College students have taken part in a sports tournament against Northern College for each of the past 50 years.

The weather on tournament day was described as being sunny all day, some rain, or cloudy but dry.

Southern College recorded the weather and if their school won or drew the tournament.

These results are shown on the table below.

Weather	Win	Draw	Tournaments
Sunny all day	6	2	12
Some rain	5	3	
Cloudy but dry	5	5	21
TOTAL			50

(a) What is the probability that there was **some rain** during the tournament?

(b) What is the probability that the result of the tournament was a **loss** for Southern College?

QUESTION TWO

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Harry, Sara and Jane all like driving.

They have two coins and decide that they will toss these to see who will drive to the movies.

(a) If the coins land with two tails up, Sara will drive.

What is the probability that Sara will drive?

(b) If the coins land with:

- two tails up, Sara will drive
- two heads up, Harry will drive
- one head and one tail up, Jane will drive.

What is the probability that one of the girls will drive?

QUESTION THREE

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Lyon Forrest has been studying his play on a golf course.

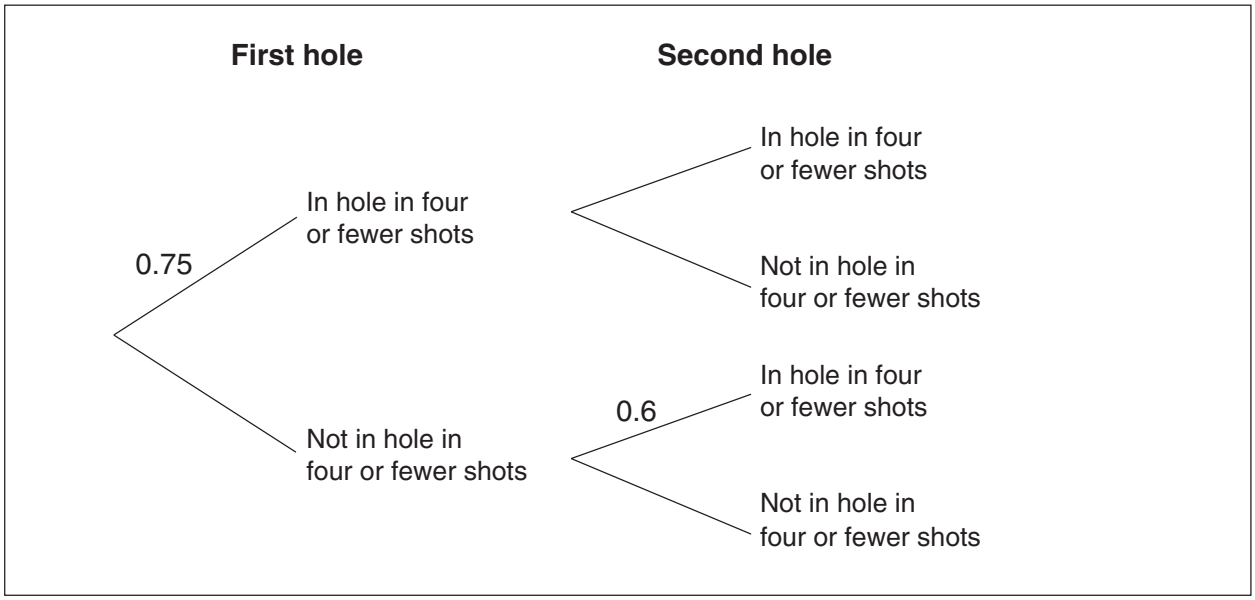
For three of the holes on the course, players take an average of four shots to get the ball in the hole.

Lyon's results show that he does get the ball in the hole in four or fewer shots:

- **75%** of the time for the first of these holes
- **60%** of the time for the second of these holes.

His success on the second hole does not depend on his success on the first.

Some of this information is shown on the tree diagram below.



(a) What is the probability that Lyon:

(i) **does not** get the ball in the hole, in four or fewer shots, for either of the first or second of the two holes?

(ii) **does** get the ball in **at least one** of the first two holes in four or fewer shots?

(b) The probability that Lyon will get the ball in the third hole in four or fewer shots is **0.3**.

What is the probability that if he **does not** get the ball in the first hole in four or fewer shots, then he gets it in both the second and third holes in four or fewer shots?

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QUESTION FOUR

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In tennis, you have to serve the ball **in** to start play.

If your first serve is **out**, you get a second chance to serve the ball.

Mariana's first serve goes **in** three attempts out of five.

If her first serve is **out**, her second serve goes **in** two attempts out of five.

(a) Describe a probability experiment (simulation) that would allow Mariana to estimate the probability that she will serve the ball in.

- Assume that you would have access to: coins, cards, spinners, dice and random number generators on a calculator or computer.
- Give sufficient detail in your description so that someone else could carry out the experiment successfully.
- You will not be doing the experiment.

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Hari likes to take risks on his first serve, but then he is more careful with his second serve.

His first serve is **in** 30% of the time.

If his first serve is **out**, his second serve goes **in** 80% of the time.

(b) (i) Calculate the theoretical probability for **each** of Hari and Mariana serving the ball **in** to start play.

(ii) Who has the better success rate? Explain why.