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MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 3 Statistics and Modelling, 2007

90643 Solve straightforward problems involving probability

Credits: Four
9.30 am Thursday 29 November 2007

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.

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 2–8 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.

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 40 minutes answering the questions in this booklet.

Assessor's use only

QUESTION ONE

A car sales yard is running a promotion.

- Each buyer spins a wheel, which is divided into 36 equally-sized sections.
- Each section on the wheel represents either a \$500, \$1000, or \$5000 discount on a car purchase.
- Twenty-four randomly allocated sections have \$500 marked on them.
- Ten randomly allocated sections have \$1000 marked on them.
- The remaining two sections have \$5000 marked on them.

The table below shows the probability distribution of the random variable D, the amount of discount won.

d (\$)	500	1000	5000
$P(D = d)$	$\frac{24}{36}$	$\frac{10}{36}$	$\frac{2}{36}$

Suppose they sell **15 cars** at the yard over the weekend that the promotion runs.

Calculate the total amount of money the company would expect to discount.

QUESTION TWO

Assessor's use only

The Car Sale Company has 30 cars on display. Of these, 16 cars are 4-door and 5 cars have manual transmission. There are 12 cars on display that are neither 4-door nor have manual transmission.

Suppose one of the cars on display is selected at random.

Calculate the probability that the car selected is a 4-door car with manual transmission.

QUESTION THREE

Assessor's use only

Some people have bought two cars from The Car Sale Company. Records show that 63% of these buyers took a loan to buy the first car.

Of those buyers who took a loan to buy the first car, 91% took a loan to buy the second car.

Of those buyers who did not take a loan to buy the first car, 48% took a loan to buy the second car.

Suppose one of these buyers is randomly selected.

(a) Calculate the probability that the buyer took a loan to buy at least one of their two cars.

(b) If the buyer took a loan to buy their second car, calculate the probability that the buyer did not take a loan to buy the first car.

QUESTION FOUR

Assessor's use only

Another car sales yard has room to display only 20 cars. Any extra cars that it has in stock must be stored in a warehouse. At the moment the company has 30 cars in stock. Of those, 6 are classified as *sports cars*.

The 20 cars to be displayed at the car yard are randomly selected.

Calculate the probability that at least five of them are *sports cars*.

QUESTION FIVE

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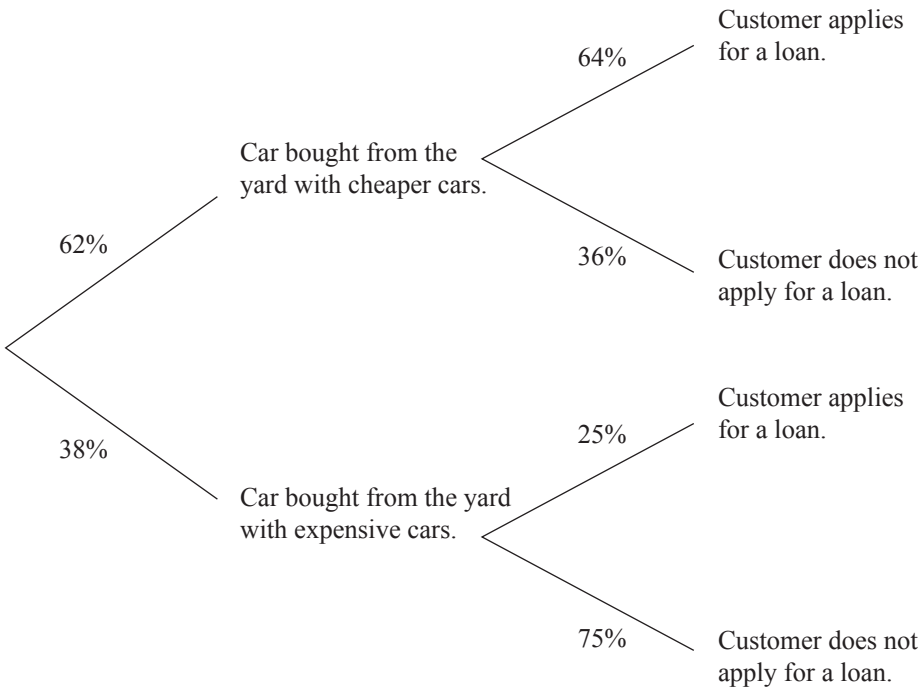
One particular car sale company has two sales yards, one for cheaper cars and one for expensive cars.

Sales records show that 38% of the company's customers buy their cars from the yard with expensive cars.

A salesperson notices that 64% of customers buying from the yard with cheaper cars apply for a loan with a finance company, while only 25% of customers buying from the yard with expensive cars apply for a loan with a finance company.

The tree diagram below represents this situation.



Are the events *A* "a customer applies for a loan" and *B* "a customer buys a car from the yard with expensive cars" statistically independent? Use statistical reasoning to justify your answer.

QUESTION SIX

An insurance person says that the probability of one of the cheaper cars sold by the car sale company being stolen from its new owner is double the probability of one of the expensive cars sold by the company being stolen from its new owner.

It is known that 62% of the car sale company's sales are cheaper cars.

Given that a car sold by the company is not stolen from its new owner, the probability that it was one of the expensive cars is four-ninths.

Calculate the probability that a car sold by the company is one of the expensive cars and is stolen from its new owner.

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

Assessor's use only

Question number