



**WESLEY COLLEGE**  
By daring & by doing

**YEAR 12 MATHEMATICS METHODS**  
Sample proportions and confidence intervals  
**Test 6**

Name: \_\_\_\_\_

Marks: /34

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**Calculator Allowed**

1. [5 marks]

a) Explain what is meant by a simple random sample.

[1]

b) Explain briefly how you could use your ClassPad to select a simple random sample of size 12 from a list of the 70 junior members of a tennis club.

[2]

c) Give an example of a situation in which you might choose to take a stratified sample and explain why.

[2]

2. [4 marks]

A group of would-be card sharks are investigating the results of dealing a card from a well-shuffled pack and checking its suit. Each card shark dealt a card 50 times, replacing and shuffling the cards before dealing the next one. They counted the number of times the card was a diamond and recorded the proportion of times out of 50.

a) State the parameters for  $\hat{p}$ .

[2]

b) What would be the mean and standard deviation of these results?

[2]

3. [5 marks]

As part of a Biology practical testing germination rates, each student saturated and placed 300 seeds in an incubator. When Mitch checked his incubator 5 days later, he found that 250 had germinated. Dr van Lieshout asks the class to calculate a 95% confidence interval based on their findings.

- a) Find the confidence interval that should be obtained by Mitch.

[3]

Assuming that all the students calculate their confidence interval correctly,

- b) State the proportion of the students you would expect to have a confidence interval that includes the population proportion of the distribution.

[1]

- c) Explain why the probability of any one student's confidence interval including the population proportion is not 0.95.

[1]

4. [5 marks]

52% of Australian students travel to school by car. What is the probability that between 25 and 40 students from a sample of 80 students travel by car?

[5]

5. [6 marks]

The number of customers,  $x$ , waiting in Nick's barber's shop in Angelo St is defined by this probability distribution:

$x$	0	1	2	3	4	5
$P(x)$	0.2	0.3	0.3	0.1	0.04	0.06

a) Determine the mean and the standard deviation of this distribution.

[2]

Mr Purdue went to get a haircut from Nick on 10 occasions last year and the average number of customers waiting was 1.9.

b) Is he correct in assuming this sample proportion is part of a normal distribution? Justify your answer.

[1]

c) Use an appropriate probability model to determine whether, for a sample of 50 customers, an average of 1.9 customers or more waiting is consistent with the data calculated in part a).

[3]

6. [6 marks]

A cinema advertising company employed a market research team to measure the effectiveness of the advertisements shown during film sessions.

The first 100 film-goers who left the 9pm session at a cinema complex were asked to recall the advertisements that they had seen. Of these, 58 recalled at least one advertisement.

- a) Using the information above, calculate a 90% confidence interval for the true proportion of film-goers who recalled at least one advertisement. Round your answer to 2 decimal places.

[3]

From the information collected, the marketing research team claimed that '*more than half*' of the film-goers recall cinema advertisements.

- b) Given the sampling process and the confidence interval you have calculated; do you think that this claim is *fair*? Give *two* reasons for your answer.

[3]

7. [3 marks]

The tourist information centre staff in Elizabeth Quay want to determine the proportion of people to within 2%, at a level of confidence of 99%, to work out whether they should request a new tourist advertisement campaign.

How many enquiries, to the nearest 50, would need to be noted at the information centre?

[3]