Section One: Calculator-free **35% (51 Marks)**

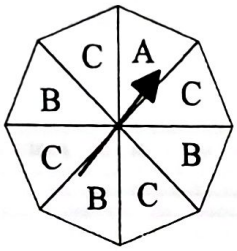
This section has **seven** questions. Answer **all** questions. Write your answers in the spaces provided.

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Working time: 50 minutes.

Question 1 **(6 marks)**

Ashley and Xavier are playing a board game that requires them to use the spinner shown below.



The player spins the arrowhead and the result is where the arrowhead is pointing when it stops moving. The above diagram is showing a result of A.

(a) If the spinner is spun three times, what is the probability that B is never a result? (1 mark)

Let the random variable X be defined as the number of times B is the result when the spinner is spun three times.

(b) Complete the table below showing the probability distribution of X. (3 marks)

x	0	1	2	3
$P(X = x)$				

(c) Determine the mean and variance of the above distribution. (2 marks)

Section One: Calculator-free **35% (52 Marks)**

This section has **seven** questions. Answer **all** questions. Write your answers in the spaces provided.

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Working time: 50 minutes.

Question 1 (DRV) **(9 marks)**

A bag contains 1 red marble and 4 green marbles. A single marble is drawn from the bag. The random variable Y is defined as the number of green marbles drawn from the bag.

S (a) Complete the probability distribution for Y shown below. (2 marks)

y	0	1
$P(Y=y)$		

S (b) State the distribution of Y. (1 mark)

S (c) Determine the mean and standard deviation of the distribution. (2 marks)

The above process is repeated five times, with the marble being replaced every time. The random variable X is defined as the number of green marbles drawn from the bag in five attempts.

S (d) State the distribution of X, including its parameters. (2 marks)

C (e) Evaluate the probability of selecting exactly two green marbles. (2 marks)

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Question 4 (DRV) **(4 marks)**

Ten shop owners in a coastal resort were asked how many extra staff they intended to hire for the next holiday season. Their responses are shown below.

3, 0, 2, 1, 2, 1, 1, 0, 2, 1

If N = number of additional staff,

S (a) complete the probability distribution of N below. (2 marks)

n	0	1	2	3
P $(N = n)$				

S (b) what is the **mean number of staff the shop owners intend** to hire? (2 marks)

Question 5 (IE) **(3 marks)**

C A 95% confidence interval for a population proportion based on a sample size of 200 has width w. What sample size is required to obtain a 95% confidence interval of width $\frac{w}{3}$?

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