Binomial Distribution

Question Paper 8

Level	A Level
Subject	Maths
Exam Board	AQA
Module	Statistics 1
Topic	Distributions
Sub Topic	Binomial Distribution
Booklet	Question Paper 8

Time Allowed: **50 minutes**

Score: **/41**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

Q1. Kirk and Les regularly play each other at darts.

(a) The probability that Kirk wins any game is 0.3, and the outcome of each game is independent of the outcome of every other game.

Find the probability that, in a match of 15 games, Kirk wins:

(i) fewer than half of the games;

(4)

(ii) more than 2 but fewer than 7 games.

(3)

(b) Kirk attends darts coaching sessions for three months. He then claims that he has a probability of 0.4 of winning any game, and that the outcome of each game is independent of the outcome of every other game.

(i) Assuming this claim to be true, calculate the mean and standard deviation for the number of games won by Kirk in a match of 15 games.

(3)

(ii) To assess Kirk's claim, Les keeps a record of the number of games won by Kirk in a series of 10 matches, each of 15 games, with the following results:

8 5 6 3 9 12 4 2 6 5

Calculate the mean and standard deviation of these values.

(2)

(iii) Hence comment on the validity of Kirk's claim.

(3)
(Total 15 marks)

Q2. Kirk and Les regularly play each other at darts.

(a) The probability that Kirk wins any game is 0.3, and the outcome of each game is independent of the outcome of every other game.

Find the probability that, in a match of 15 games, Kirk wins:

(i) exactly 5 games;

(3)

(i) fewer than half of the games;

(3)

(ii) more than 2 but fewer than 7 games.

(3)

(b) Kirk attends darts coaching sessions for three months. He then claims that he has a probability of 0.4 of winning any game, and that the outcome of each game is independent of the outcome of every other game.

(i) Assuming this claim to be true, calculate the mean and standard deviation for the number of games won by Kirk in a match of 15 games.

(3)

(ii) To assess Kirk's claim, Les keeps a record of the number of games won by Kirk in a series of 10 matches, each of 15 games, with the following results:

8 5 6 3 9 12 4 2 6 5

Calculate the mean and standard deviation of these values.

(2)

(iii) Hence comment on the validity of Kirk's claim.

(3)
(Total 17 marks)

Q3. An express coach travels daily between Middlesbrough and London. The coach calls at Thirsk only when seats have been reserved in advance. On any day, the probability that the coach calls at Thirsk is 0.5, and is independent of that on any other day.

(a) Determine the probability that, during a 14-day period, the coach calls at Thirsk:

(i) on at most 10 days;

(ii) on more than 5 days but fewer than 10 days.

(5)

(b) When the coach calls at Thirsk, it is possible to purchase a seat on the coach providing seats are available. The probability that the coach calls at Thirsk with at least one seat available on any day is 0.4, and is independent of that on any other day.

Calculate the probability that, during a 28-day period, the coach calls at Thirsk with at least one seat available on exactly 7 days.

(3)

(c) Indicate why a single binomial model would **not** be appropriate for the number of calls **per month** of the coach at Thirsk.

(1)
(Total 9 marks)