



Name: _____ **Date:** _____ **Score:** _____ / 62

1 A factory packs light bulbs in boxes of 20. The random variable X is the number of faulty bulbs in a box.

- State two conditions needed for X to be modelled by a binomial distribution.
- Sam deals 5 cards, without replacement, from a standard pack of 52 playing cards. The random variable H is the number of hearts dealt. Explain why H cannot be modelled by $B(5, 0.25)$.

(3 marks)

Answer _____

2 The random variable $X \sim B(12, 0.3)$. Find

- $P(X = 4)$
- $P(X \leq 3)$
- $P(X > 5)$

giving each answer to 4 decimal places.

(3 marks)

Answer _____

3 The random variable $X \sim B(20, 0.4)$. Find, to 4 decimal places,

- $P(X \geq 10)$
- $P(5 < X \leq 9)$

(4 marks)

Answer _____

4

A café finds that 15% of its customers order a drink with oat milk. On one morning a random sample of 25 customers is taken. The random variable X is the number of these customers who order a drink with oat milk.

- Write down a suitable distribution to model X .
- Find the probability that exactly 4 of the customers order a drink with oat milk.
- Find the probability that at most 2 of the customers order a drink with oat milk.
- Find the probability that more than 5 of the customers order a drink with oat milk.

(5 marks)

Answer _____

5

In a town, 45% of learner drivers pass their driving test at the first attempt. A random sample of 10 learner drivers from the town is taken.

- Find the probability that exactly 6 of them pass at the first attempt.
- Find the probability that at least 4 of them pass at the first attempt.
- Priya says the same model could be used for 10 friends who all took lessons with the same instructor. Give one reason why the model may not be suitable for them.

(5 marks)

Answer _____

6

The random variable $X \sim B(30, 0.25)$.

- a. Find $P(4 \leq X < 10)$.
- b. Find the largest value of k such that $P(X \leq k) < 0.1$
- c. Find the smallest value of m such that $P(X \geq m) < 0.05$

(6 marks)

Answer _____

7

On any school day, the probability that a particular bus arrives late is 0.2, independently of other days.

- a. Find the probability that the bus is late on exactly 2 of the 5 days in one week.
- b. Find the smallest number of school days, n , for which the probability that the bus is late on at least one of the days is greater than 0.95

(5 marks)

Answer _____

8

Lily rolls a fair six-sided die 8 times and records X , the number of sixes.

- Find $P(X = 2)$.
- Lily repeats this experiment once a day for 12 days. Find the probability that she gets exactly 2 sixes on at least 3 of the days.

(6 marks)

Answer _____

9

A spinner lands on red with probability p on each spin. It is spun 5 times and X is the number of times it lands on red.

Given that $P(X = 0) = 0.07776$

- show that $p = 0.4$
- find $P(X = 2)$
- find $P(X \geq 4)$.

(6 marks)

Answer _____

10 A seed company sells packets of 30 sunflower seeds. Each seed germinates with probability 0.9, independently of the others.

- Find the probability that at least 25 seeds in a packet germinate.
- Kwame buys 6 packets. Find the probability that exactly 4 of his packets have at least 25 seeds that germinate.

(6 marks)

Answer _____

11 The random variable $X \sim B(n, 0.25)$. Given that $P(X = 1) = P(X = 2)$

- show that $n = 7$
- find $P(X \leq 1)$.

(6 marks)

Answer _____

12

Ana is an archer. Each arrow she shoots hits the gold ring with probability 0.35, independently of other arrows. She shoots arrows in rounds of 8 arrows, and X is the number of golds in a round.

- Find $P(X \geq 3)$.
- Find the probability that she gets exactly 2 golds in a round.
- Ana shoots 3 rounds. Find the probability that she gets at least 10 golds altogether.
- Find the probability that she gets at least 3 golds in each of the 3 rounds.

(7 marks)

Answer

End of questions | Total 62 marks