Test - Probability and the binomial distribution

Year: Year 12 · Duration: 60 minutes · /20

Name:	Date:	**Mark: /20**

Question	1	2	3	4	5	Total
marks	4	4	4	4	4	**20**
Mark						

Show your working.

Question 1 (4 marks)

Question 1 – Venn diagram and conditional probability

$P(A) = 0.6$, $P(B) = 0.5$ and $P(A \cup B) = 0.8$.

a. Find $P(A \cap B)$. (2 marks)
b. Find $P(B|A)$ and state whether A and B are independent. (2 marks)

Question 2 (4 marks)

Question 2 – Tree diagram

A box has 4 white and 6 black balls. Two are drawn without replacement. Find the probability that they are the same colour.

Question 3 (4 marks)

Question 3 – Binomial probability

$X \sim B(10, 0.2)$. Find (a) $P(X = 3)$ and (b) $P(X \geq 2)$.

Question 4 (4 marks)

Question 4 – Expected values

A fair coin is tossed 50 times. Let X be the number of heads.

a. State the distribution of X and find its mean and variance. (2 marks)
b. Find the probability of exactly 25 heads. (2 marks)

Question 5 (4 marks)

Question 5 – Problem: a spinner

A spinner lands on blue with probability 0.15. It is spun 12 times.

a. Find the probability that blue occurs at least once. (2 marks)
b. Find the probability that blue occurs exactly twice. (1 mark)
c. How many spins are needed so that the probability of at least one blue exceeds 0.95? (1 mark)