ST ANDREW'S JUNIOR COLLEGE

JC1 H1 MATHEMATICS (8865)

Term 3 Weekend Assignment 2

Topic: Probability

Name: _____ Marks:_____/**10**

C.G.: _____

1 JPJC Promo 8865/2021/Q5

(a) Events A and B are such that $\mathrm{P}(A) = 0.6$, $\mathrm{P}(B) = 0.4$ and $\mathrm{P}(B' \mid A) = 0.8$.

(i) Describe in words what is meant by $\mathrm{P}(B' \mid A)$. [1]

(ii) Find $\mathrm{P}(A \cap B')$. [1]

(iii) Find $\mathrm{P}(A \cap B)$. [1]

(iv) Find $\mathrm{P}(A \cup B')$. [2]

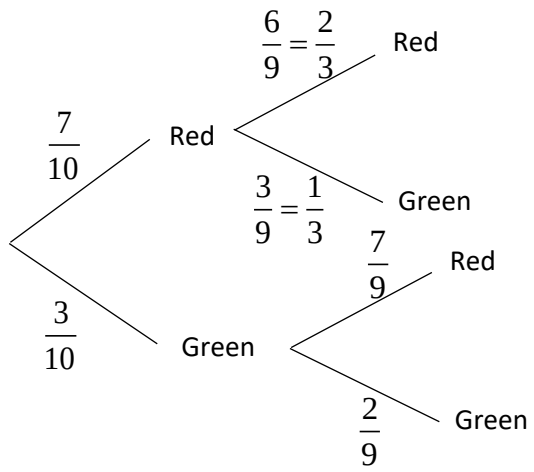
(b) A box contains 7 red balls and 3 green balls. Two balls are drawn, one after the other, without replacement.

(i) Draw a tree diagram to represent the possible outcomes. [2]

(ii) Find the probability that one red ball and one green ball are drawn. [2]

(iii) Find the probability that the first ball drawn is red given that one red ball and one green ball are drawn. [3]

Solutions

1(ai)	$\mathrm{P}(B' \mid A)$ is the probability that the complement of event B happens given that event A has happened.
(aii)	$\mathrm{P}(B' \mid A) = 0.8$ $\dfrac{\mathrm{P}(B' \cap A)}{\mathrm{P}(A)} = 0.8$ $\mathrm{P}(A \cap B') = 0.8 \times \mathrm{P}(A) = 0.8 \times 0.6 = 0.48$
(aiii)	$\mathrm{P}(A \cap B) = \mathrm{P}(A) - \mathrm{P}(A \cap B') = 0.6 - 0.48 = 0.12$
(aiv)	$\mathrm{P}(A \cup B') = \mathrm{P}(A) + \mathrm{P}(B') - \mathrm{P}(A \cap B')$ $= 0.6 + (1 - 0.4) - 0.48 = 0.72$
(bi)	
(bii)	$\mathrm{P}(\text{one red ball and one green ball are drawn}) = \dfrac{7}{10} \times \dfrac{1}{3} + \dfrac{3}{10} \times \dfrac{7}{9} = \dfrac{7}{15}$
(biii)	$\mathrm{P}(\text{first ball is red} \mid \text{one red ball and one green ball})$ $= \dfrac{\mathrm{P}(\text{first ball is red} \cap \text{one red ball and one green ball})}{\mathrm{P}(\text{one red ball and one green ball})}$ $= \dfrac{\mathrm{P}(\text{first ball is red} \cap \text{second ball is green})}{\mathrm{P}(\text{one red ball and one green ball})}$ $= \dfrac{\frac{7}{10} \times \frac{1}{3}}{\frac{7}{15}}$ $= \dfrac{1}{2}$