

Probability – 2020 AS

1. Nov/2020/Paper_9709/51/No.1

Two ordinary fair dice, one red and the other blue, are thrown.

Event A is ‘the score on the red die is divisible by 3’.

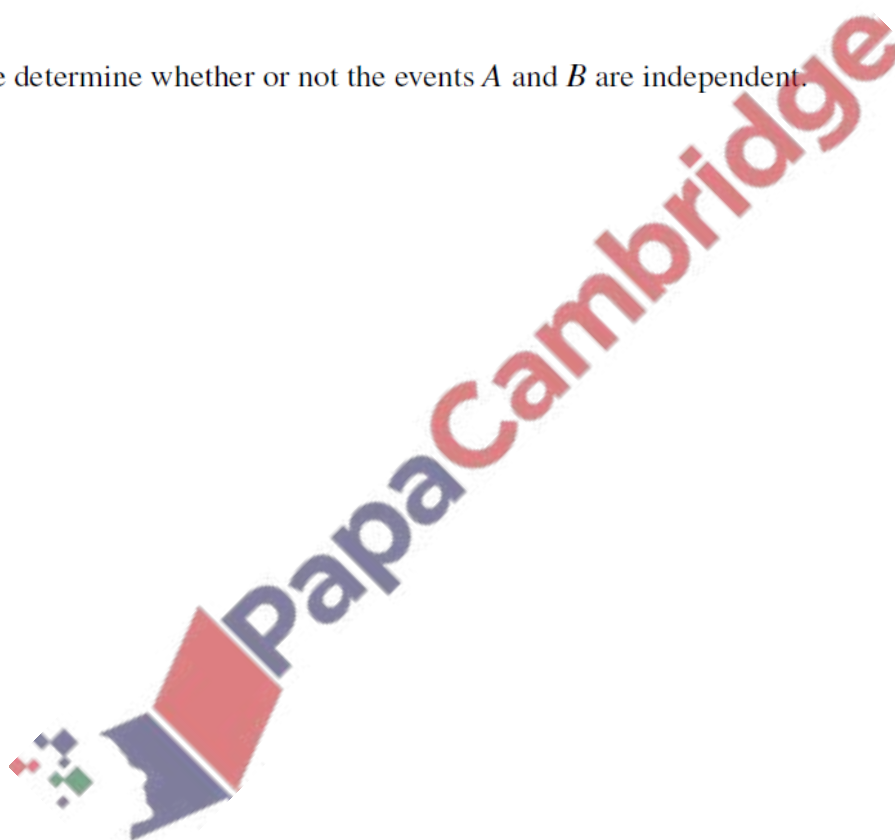
Event B is ‘the sum of the two scores is at least 9’.

(a) Find $P(A \cap B)$.

[2]

(b) Hence determine whether or not the events A and B are independent.

[2]

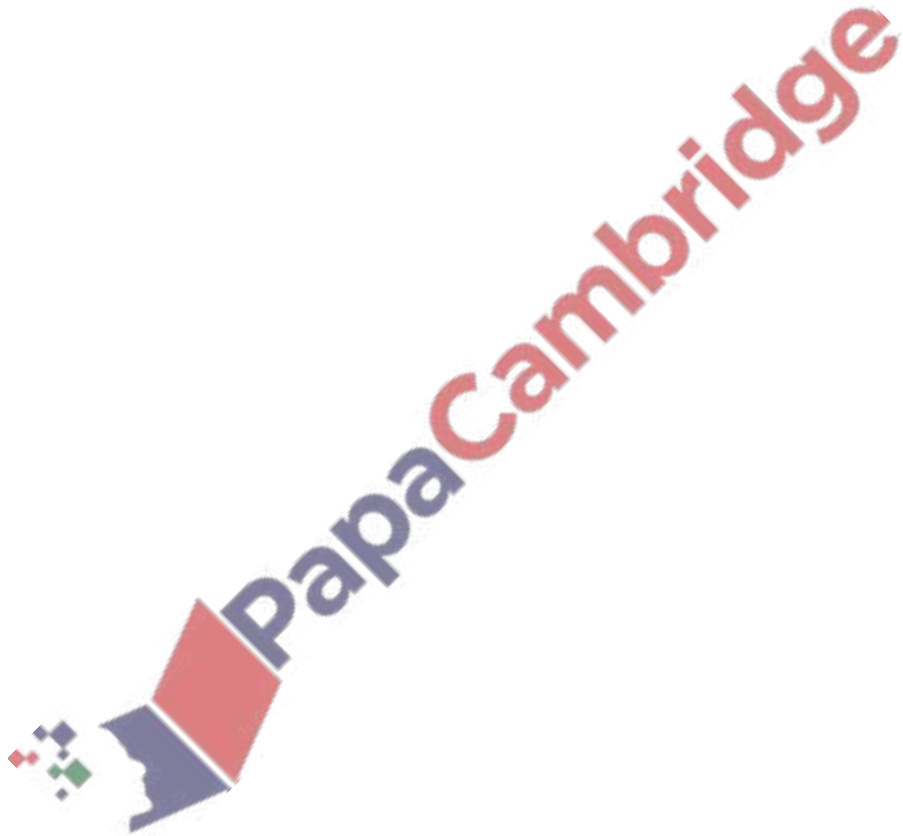


The probability that a student at a large music college plays in the band is 0.6. For a student who plays in the band, the probability that she also sings in the choir is 0.3. For a student who does not play in the band, the probability that she sings in the choir is x . The probability that a randomly chosen student from the college does not sing in the choir is 0.58.

(a) Find the value of x . [3]

Two students from the college are chosen at random.

(b) Find the probability that both students play in the band and both sing in the choir. [2]



Three coins A , B and C are each thrown once.

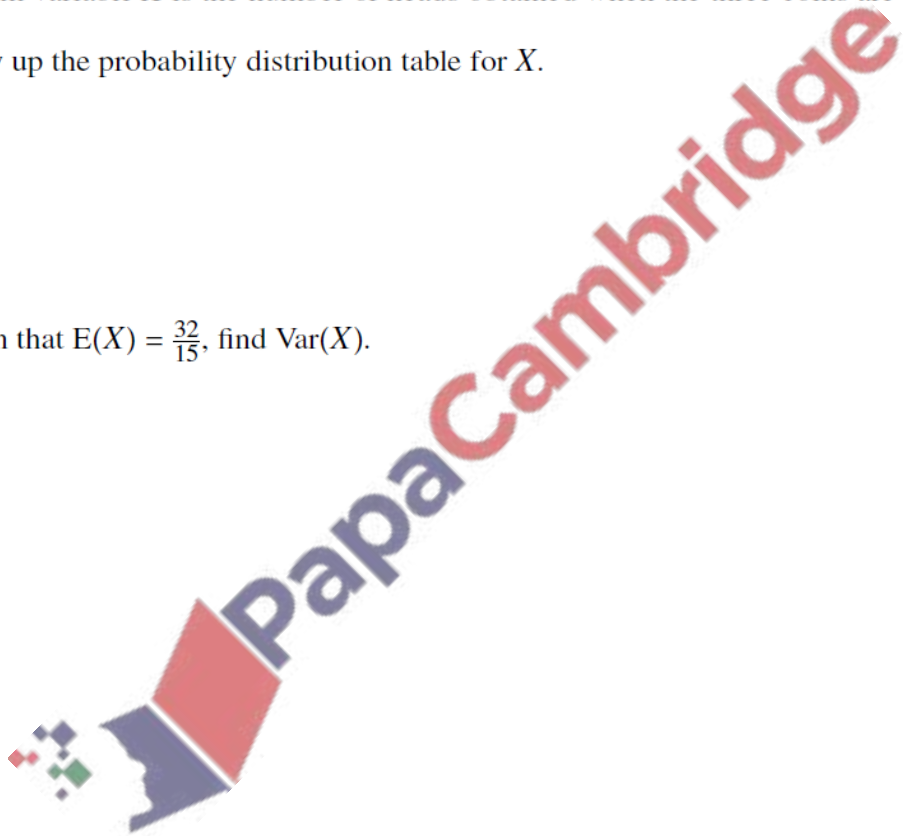
- Coins A and B are each biased so that the probability of obtaining a head is $\frac{2}{3}$.
- Coin C is biased so that the probability of obtaining a head is $\frac{4}{5}$.

(a) Show that the probability of obtaining exactly 2 heads and 1 tail is $\frac{4}{9}$. [3]

The random variable X is the number of heads obtained when the three coins are thrown.

(b) Draw up the probability distribution table for X . [3]

(c) Given that $E(X) = \frac{32}{15}$, find $\text{Var}(X)$. [2]



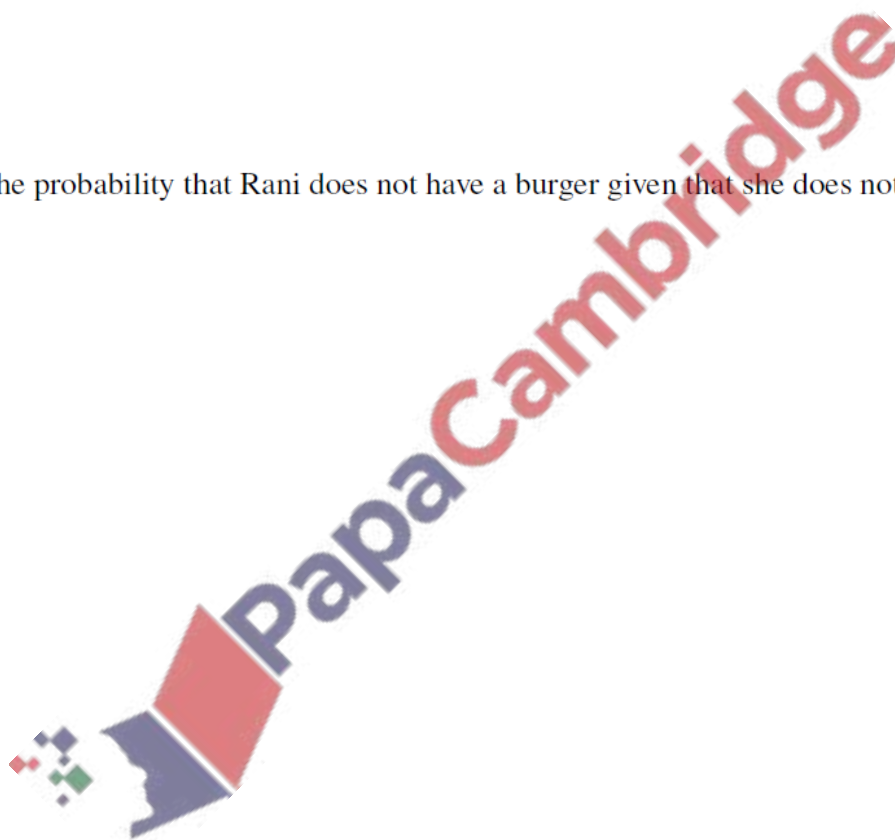
5. June/2020/Paper_9709/51/No.5

On Mondays, Rani cooks her evening meal. She has a pizza, a burger or a curry with probabilities 0.35, 0.44, 0.21 respectively. When she cooks a pizza, Rani has some fruit with probability 0.3. When she cooks a burger, she has some fruit with probability 0.8. When she cooks a curry, she never has any fruit.

(a) Draw a fully labelled tree diagram to represent this information. [2]

(b) Find the probability that Rani has some fruit. [2]

(c) Find the probability that Rani does not have a burger given that she does not have any fruit. [4]



6. June/2020/Paper_9709/52/No.2

A total of 500 students were asked which one of four colleges they attended and whether they preferred soccer or hockey. The numbers of students in each category are shown in the following table.

| | Soccer | Hockey | Total |
|--------|--------|--------|-------|
| Amos | 54 | 32 | 86 |
| Benn | 84 | 72 | 156 |
| Canton | 22 | 56 | 78 |
| Devar | 120 | 60 | 180 |
| Total | 280 | 220 | 500 |

(a) Find the probability that a randomly chosen student is at Canton college and prefers hockey. [1]

(b) Find the probability that a randomly chosen student is at Devar college given that he prefers soccer. [2]

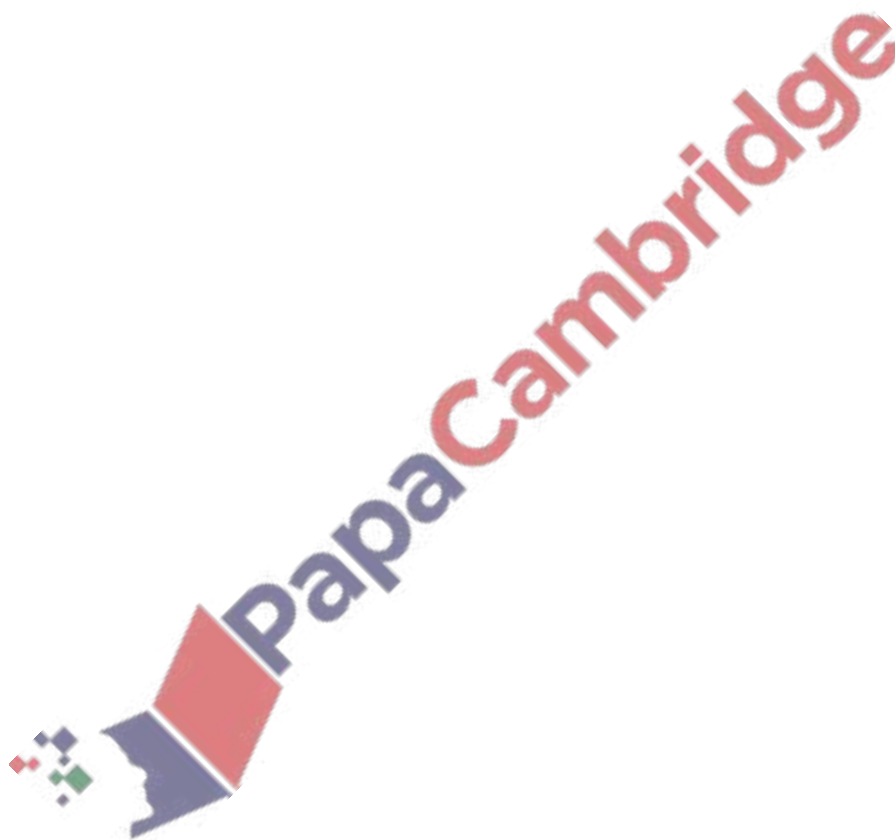
(c) One of the students is chosen at random. Determine whether the events 'the student prefers hockey' and 'the student is at Amos college or Benn college' are independent, justifying your answer. [2]

7. June/2020/Paper_9709/53/No.1

Juan goes to college each day by any one of car or bus or walking. The probability that he goes by car is 0.2, the probability that he goes by bus is 0.45 and the probability that he walks is 0.35. When Juan goes by car, the probability that he arrives early is 0.6. When he goes by bus, the probability that he arrives early is 0.1. When he walks he always arrives early.

(a) Draw a fully labelled tree diagram to represent this information. [2]

(b) Find the probability that Juan goes to college by car given that he arrives early. [4]

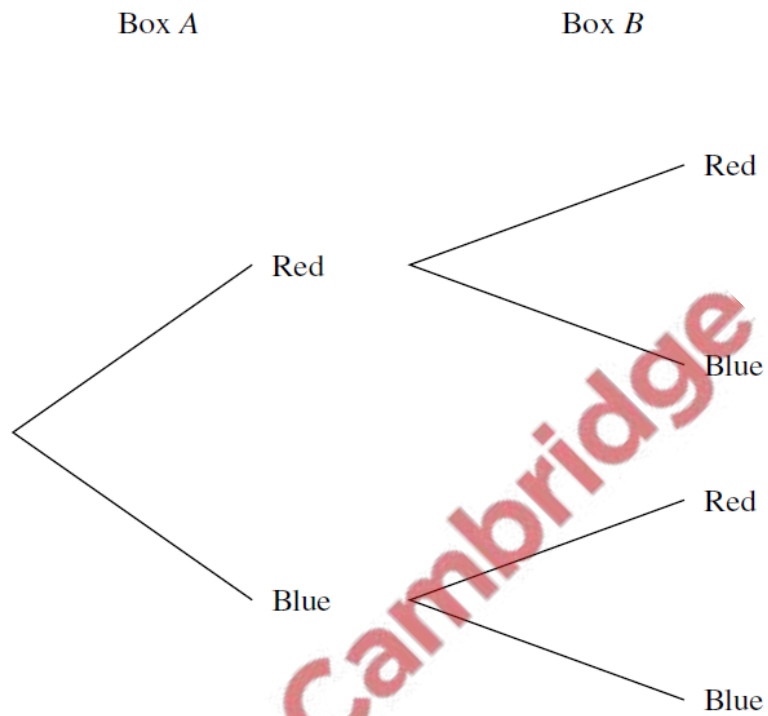


8. March/2020/Paper_9709/51/No.6

Box *A* contains 7 red balls and 1 blue ball. Box *B* contains 9 red balls and 5 blue balls. A ball is chosen at random from box *A* and placed in box *B*. A ball is then chosen at random from box *B*. The tree diagram below shows the possibilities for the colours of the balls chosen.

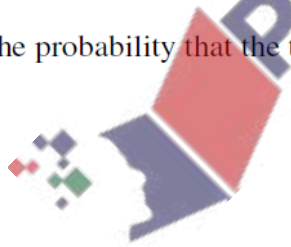
(a) Complete the tree diagram to show the probabilities.

[3]



(b) Find the probability that the two balls chosen are not the same colour.

[2]



(c) Find the probability that the ball chosen from box *A* is blue given that the ball chosen from box *B* is blue.

[4]