MDM 4U
DEPENDENT & INDEPENDENT EVENTS

P(A and B) = P(A) x P(B) independent events
P(A and B) = P(A) x P(B|A) dependent (or conditional) events

- Probability tree diagrams are recommended for ease of calculations.

1. A bag contains 8 marbles of which 3 are red and 5 are blue. One marble is drawn at random, its colour noted and the marble replaced in the bag. A marble is again drawn from the bag and colour noted. Find the probability that the marbles drawn will be...

   A) red followed by blue B) red and blue in any order C) of the same colour.

2. A card is drawn from a deck of cards. What is the probability that it is a jack, if it is known that it is a face card?

3. A card is drawn from a deck of cards and a die is thrown. Find the odds that the card is not a club and the number on the die is greater than 4.

4. A die is thrown twice. What is the probability that the sum of the rolls is less than 4 given that...

   A) one of the rolls is a 1? B) the first roll is a 1? C) the first roll is a 3?

5. Justin estimates that his probability of passing mathematics is 0.8 and passing English is 0.9. Find the probability that Justin...

   A) will pass both math and English. B) will pass math but will fail English.
   C) will not pass either math or English.

6. If the odds in favour of you passing your final exam in math are 5:1 and the odds against you passing your science exam are 2:7, what is the probability that you will...
   [assume these to be independent events]

   A) pass both exams? B) fail both exams? C) pass math, but fail science.

7. Two cards are drawn from a deck of cards, the first being replaced before the second is drawn. Find the probability that the cards will be

A) a diamond then a spade.
B) a king then a black card.
C) a red card and a club in any order.
D) two aces.

8. A bag contains 3 yellow discs and 1 blue disc, whereas a box contains 2 yellow disks and 3 blue discs. A card is drawn from a deck of cards and if this card is a face card, a disc is drawn from the bag, otherwise a disc is drawn from the box.

A) Find the probability that the disc drawn is yellow.
B) Given that the disc drawn is blue, find the probability that it came from the bag.

9. A bag contains 20 discs of which one quarter are white; a similar box contains 15 discs of which one third are white. A card is drawn from a deck, and if the card drawn is a 7, 8, or 9 a disc is drawn from the bag, otherwise a disc is drawn from the box. Find the probability that

A) the disc drawn is white
B) if the disc drawn is white, it came from the box.

10. A hospital diagnoses that a patient has contracted a virus X but it is not known which one of the three strains of the virus X_1, X_2, or X_3 the patient has. For a patient having virus X, the probability of it being X_1, X_2 or X_3 is 1/2, 3/8, 1/8 respectively. The probability of a recovery (event R) is 1/2 for X_1, 1/3 for X_2, and 1/4 for X_3. Find the probability that

A) the patient will recover.
B) if the patient recovers, he had virus X_3.