Exercise 8 - Combinations (Probability)

1. There are only 3 girls in a group of 8 pupils. A group of 5 pupils is to be selected. Find the probability that all three girls in the group are selected.

2. A bag contains four black discs and one white disc. If two discs are removed at random, what is the probability that the white disc is not removed ?

3. An exam consists of selecting 4 questions from a choice of 8 questions. The questions are numbered 1, 2, 3, 4, 5, 6, 7 and 8. Assuming the questions are selected at random, find the probability that a pupil's selection will include two even numbered questions.

4. A box contains 10 cubes of which 4 are green and 6 are yellow. If 4 cubes are selected at random, find the probability that 2 green and 2 yellow cubes are selected.

5. Four letters are chosen at random from the word COMPLEX. Find the probability that both vowels are in the group chosen.

6. A random sample of five children is chosen from a class of 8 girls and 12 boys. What is the probability that the sample contains
   (a) all boys (b) at least one girl ?

7. A bag contains 8 red sweets, 5 yellow sweets and 3 green sweets. Two sweets are selected. What is the probability that two sweets chosen at random are both red ?

8. Four cards are chosen at random from an ordinary pack of 52 playing cards. What is the probability that the four cards
   (a) are all black
   (b) are all kings
   (c) contain at least one king ?

9. There are 5 green, 4 yellow and 3 blue discs in a bag from which 4 discs are chosen at random.
   Find the probability that the 4 discs selected will contain
   (a) exactly 3 blue discs (b) exactly 3 yellow discs (c) at least one green disc.

10. From a well shuffled pack of 52 cards a hand of 7 cards is dealt.
    Find the probability that the hand will contain
    (a) 4 aces
    (b) exactly 3 aces
    (c) at least 3 aces.

11. A hand of 6 cards is dealt from a shuffled pack of 52 cards. Find the probability that the hand will contain
    (a) all black cards
    (b) exactly 5 black cards
    (c) at least 5 black cards.

12. Three cards are dealt from a well shuffled pack of eight cards . The cards are numbered 1, 2, 3, 4, 5, 6, 7, 8. Find the probability that
    (a) the three cards are all even
    (b) the product of the numbers drawn is odd.

Exercise 7 - Combinations

1 (a) 35 (b) 15 (c) 8 (d) 1

2 (a) $\binom{9}{6} = \binom{9}{3} = 84$ (b) $\binom{7}{3} = \binom{7}{4} = 35$

3 56

4 56

5 (a) 120 (b) 680 (c) 593775 (d) 2598960

6 28 , 10

7 1716 , 924

8 (a) 142506 (b) 23751

9 (a) 165 (b) 45 (assuming best debater and oldest pupil are different)

10 (a) 70 (b) 168

11 (a) 126 (b) 252 (c) 72

12 (a) 44352 (b) 125474

Exercise 8 - Combinations (Probability)

1 $\frac{5}{28}$

2 $\frac{3}{5}$

3 $\frac{18}{35}$

4 $\frac{3}{7}$

5 $\frac{2}{5}$

6 (a) $\frac{33}{646}$ (b) $\frac{613}{646}$

7 $\frac{7}{30}$

8 (a) $\frac{46}{833}$ (b) $\frac{1}{270725}$ (c) $\frac{15229}{54145}$

9 (a) $\frac{1}{55}$ (b) $\frac{32}{495}$ (c) $\frac{92}{99}$

10 (a) $\frac{1}{7735}$ (b) $\frac{9}{1547}$ (c) $\frac{46}{7735}$

11 (a) $\frac{253}{22372}$ (b) $\frac{3289}{39151}$ (c) $\frac{14927}{156604}$

12 (a) $\frac{1}{14}$ (b) $\frac{1}{2}$