Example 11 Three squares of chess board are selected at random. The probability of getting 2 squares of one colour and other of a different colour is

(A) $\frac{16}{21}$ (B) $\frac{8}{21}$ (C) $\frac{3}{32}$ (D) $\frac{3}{8}$

Solution (A) is the correct answer. In a chess board, there are 64 squares of which 32 are white and 32 are black. Since 2 of one colour and 1 of other can be 2W, 1B, or 1W, 2B, the number of ways is $({}^{32}C_2 \times {}^{32}C_1) \times 2$ and also, the number of ways of choosing any 3 boxes is ${}^{64}C_3$.

Hence, the required probability $= \frac{{}^{32}C_2 \times {}^{32}C_1 \times 2}{{}^{64}C_3} = \frac{16}{21}$.

Example 12 If A and B are any two events having $P(A \cup B) = \frac{1}{2}$ and $P(\bar{A}) = \frac{2}{3}$, then the probability of $\bar{A} \cap B$ is

(A) $\frac{1}{2}$ (B) $\frac{2}{3}$ (C) $\frac{1}{6}$ (D) $\frac{1}{3}$

Solution (C) is the correct answer. We have $P(A \cup B) = \frac{1}{2}$

$\Rightarrow \quad P(A \cup (B - A)) = \frac{1}{2}$

$\Rightarrow \quad P(A) + P(B - A) = \frac{1}{2}$ (since A and B – A are mutually exclusive)

$\Rightarrow \quad 1 - P(\bar{A}) + P(B - A) = \frac{1}{2}$

$\Rightarrow \quad 1 - \frac{2}{3} + P(B - A) = \frac{1}{2}$

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$$\Rightarrow \quad P(B - A) = \frac{1}{6}$$

$$\Rightarrow \quad P(\bar{A} \cap B) = \frac{1}{6} \qquad \text{(since } \bar{A} \cap B \equiv B - A\text{)}$$

Example 13 Three of the six vertices of a regular hexagon are chosen at random. What is the probability that the triangle with these vertices is equilateral?

(A) $\frac{3}{10}$ (B) $\frac{3}{20}$ (C) $\frac{1}{20}$ (D) $\frac{1}{10}$

Solution (D) is the correct answer.

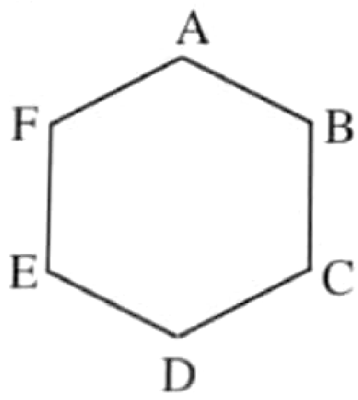

Fig. 16.1

ABCDEF is a regular hexagon. Total number of triangles $^6C_3 = 20$. (Since no three points are collinear). Of these only Δ ACE; Δ BDF are equilateral triangles.

Therefore, required probability $= \frac{2}{20} = \frac{1}{10}$.