MATHS

BOOKS - S CHAND IIT JEE FOUNDATION

PROBABILITY

Example

1. From a well shuffled pack of 52 cards, a card is drawn at random. Find the probability that it is either a spade or a queen.

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2. Two dice are thrown. Find the probability of getting a prime number on one dice and even number on the other dice.

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3. Which of the following are equal?

A. $A = \{2, 4, 6\}$ and $B = \{1, 3, 5, 6\}$

B.

$A = \{x : x = 4n, n \in N, n \le 3\}$ and $B = \{x : x = 2n, n \in N$ and n

C. $A = \{a, e, I, o, u\}$ and $B = \{a, e, I, \{o, u\}\}$

D. None of these

Answer:

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4. Given $\xi = \{x : x$ is a natural number$\}$

$A = \{x : x$ Is an even number $, x \in N\}$

then $(B \cap A) = (x - A) =$

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5. If $\xi = \{2, 3, 4, 5, 6, 7, 8, 9, 10, 11\}$

$A = \{3, 5, 7, 9, 11\}$

$B = \{7, 8, 9, 10, 11\}$ then find (A-B) '

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6. If P and Q any two sets , then Q - P=

A. $Q \cup P'$

B. $Q \cap P$

C. $Q \cup P$

D. $Q \cap P'$

Answer: D

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7. Let P and Q be two sets then what is $(P \cap Q') \cup (P \cup Q)'$ equal to?

8. If n $(A) = 120, n(B) = 250$ and $n(A - B) = 52,$ then find n $(A \cup B)$

9. If $A = \{x, y\}$ and $B = \{3, 4, 5, 7, 9\}$ and $C = \{4, 5, 7, 6, 7\},$ find A $\times (B \cap C).$

10. In a certain group of 36 people. Only 18 are wearing hats and only 24 are wearing sweaters. If six people are wearing neither a hat a sweater , then how many people are wearing both a hat and a sweater?

1. A bag contains 27 balls. Ten are red , 2 are green and the rest are white. Anine takes out a ball from the bag at random. What is the probability that she takes

a white ball

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2. A bag contains 27 balls. Ten are red , 2 are green and the rest are white. Anine takes out a ball from the bag at random. What is the probability that she takes

a ball that is red or green

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3. Each morning I walk to work or take a texi to work. The probability that I walk to work is $\frac{3}{5}$. What is the probability that I take a taxi ?

4. When two coins are tossed together, what is the probability of getting

at least one tail ?

5. Sid draws a card from a pack of cards, replaces it , shuffles the pack and

then another card. What is the probability that the cards are both aces ?

6. There are seven white and one brown eggs in an egg box. Ruchira

decides to make a two-egg omeltte. She takes out each egg from the box

without looking at its colour. What is the probability that Ruchira gets an

omellete made from

two white eggs

7. There are seven white and one brown eggs in an egg box. Ruchira decides to make a two-egg omeltte. She takes out each egg from the box without looking at its colour. What is the probability that Ruchira gets an omellete made from

one white and one brown egg

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8. There are seven white and one brown eggs in an egg box. Ruchira decides to make a two-egg omeltte. She takes out each egg from the box without looking at its colour. What is the probability that Ruchira gets an omellete made from

two brown eggs

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Question Bank

1. In a test, the marks obtained by 15 students are 34, 37, 44, 39, 45, 46, 35, 42, 48, 40, 39, 33, 43, 47, 44. The probability that a pupil chosen at random passed the test, if the passing marks are 40 is :

A. $\dfrac{8}{15}$

B. $\dfrac{3}{5}$

C. $\dfrac{7}{15}$

D. $\dfrac{11}{15}$

Answer: B

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2. Which of the following pairs of events is not mutually exclusive?

A. Throwing a number greater than 4 with a dice/Throwing a number less than 4 with a dice.

B. Drawing a red card from a pack of cards /Draw a club from a pack of cards.

C. Drawing a diamond from a pack of cards/Drawing an ace from a pack of cards.

D. Drawing a vowel card from a set of alphabet cards/Drawing a consonant card from a set of alphabet cards.

Answer: C

3. An electronic machine choses random numbers from 1 to 30. What is the probability that the number chosen is a perfect square?

A. $\dfrac{11}{30}$

B. $\dfrac{1}{10}$

C. $\dfrac{1}{6}$

D. $\dfrac{4}{30}$

Answer: D

4. In a simultaneous toss of two coins, find the probability of getting two tails.

A. $\dfrac{1}{2}$

B. $\dfrac{1}{4}$

C. $\dfrac{3}{4}$

D. $\dfrac{1}{3}$

Answer: B

5. Three coins are tossed simultaneously. Find the probability of at least one head and one tail.

A. $\dfrac{1}{2}$

B. $\dfrac{1}{4}$

C. $\dfrac{3}{4}$

D. None of these

Answer: C

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6. In a single throw of two dice, what is the probability of getting a total of 11.

A. $\dfrac{1}{9}$

B. $\dfrac{1}{18}$

C. $\dfrac{1}{12}$

D. $\dfrac{35}{36}$

Answer: B

7. A bag contains 4 blue, 5 red and 7 green balls. If 4 balls are drawn one by one with replacement, what is the probability that all are blue?

A. $\dfrac{1}{16}$

B. $\dfrac{1}{4}$

C. $\dfrac{1}{256}$

D. $\dfrac{1}{64}$

Answer: C

8. The set S' = {n : n is an integer, $1 \leq n \leq 50$}. If an element of S is selected at random, find the probability that it does not contain the digit '2' at all.

A. $\dfrac{7}{25}$

B. $\dfrac{18}{25}$

C. $\dfrac{17}{50}$

D. $\dfrac{7}{10}$

Answer: B

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9. In a single throw of two dice, find the probability of getting a doublet of odd numbers.

A. $\dfrac{1}{9}$

B. $\dfrac{1}{18}$

C. $\dfrac{1}{36}$

D. $\dfrac{1}{12}$

Answer: D

10. What is the probability that a card drawn at random from a pack of playing cards is either a king or a jack?

A. $\dfrac{1}{13}$

B. $\dfrac{2}{13}$

C. $\dfrac{3}{13}$

D. $\dfrac{4}{9}$

Answer: B

11. Two dice are thrown. Find the odds in favour of getting the sum 4.

A. $1:11$

B. $11:1$

C. $4:11$

D. $11:4$

Answer: A

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12. A machine generates a two-digit number randomly. Find the probability that the number generated is either less than 25 or greater than 85.

A. $\dfrac{27}{89}$

B. $\dfrac{28}{89}$

C. $\dfrac{28}{90}$

D. $\dfrac{29}{90}$

Answer: D

13. From a pack of cards, two are drawn, the first being replaced before the second is drawn. Find the. probability that the first is a club and the second is a red card.

A. $\dfrac{1}{52}$

B. $\dfrac{1}{26}$

C. $\dfrac{1}{8}$

D. $\dfrac{4}{13}$

Answer: C

14. If A and B are two mutually exclusive and exhaustive events with P(B) = 3 P(A), then what is the value of $P(\overline{B})$?

A. $\dfrac{3}{4}$

B. $\dfrac{1}{4}$

C. $\dfrac{1}{3}$

D. $\dfrac{2}{3}$

Answer: B

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15. The probability that a student passes in mathematics is 4/9 and that he passes in physics is 2/5. Assuming that passing in mathematics and physics are independent of each other, what is the probability that he passes in mathematics but fails in physics ?

A. $\dfrac{4}{15}$

B. $\dfrac{8}{45}$

C. $\dfrac{26}{45}$

D. $\dfrac{19}{45}$

Answer: A

16. An aircraft has three engines A, B and C. The aircraft crashes if all the three engines fail. The probabilties of failure are 0.03, 0.02 and 0.05 for engines A, B and C respectively. What is probability that the aircraft will not crash ?

A. 0.00003

B. 0.90

C. 0.99997

D. 0.90307

Answer: C

17. A card is drawn from an ordinary pack of 52 cards and a gambler bets that, it is a spade or an ace. What are the odds against his wining this bet?

A. $9:4$

B. $4:9$

C. $5:9$

D. $9:5$

Answer: A

18. A problem in statistics is given to four students A, B, C and D. Their chances of solving it are $\frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ and $\frac{1}{6}$ respectively. What is the probability that the problem will be solved?

A. $\dfrac{1}{3}$

B. $\dfrac{2}{3}$

C. $\dfrac{4}{5}$

D. None of these

Answer: B

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19. Aman A speaks truth in 80% of the cases and another man B in 90% of the cases. While stating the same fact, what is the probability that they contradict?

A. $\dfrac{37}{50}$

B. $\dfrac{13}{50}$

C. $\dfrac{16}{50}$

D. None of these

Answer: B

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20. From a bag containing 60 standard and 40 substandard articles, two articles are chosen at random. What is the probability that one of them is standard and the other substandard?

A. $\dfrac{60}{100} \times \dfrac{40}{100}$

B. $\dfrac{60}{100} \times \dfrac{39}{100}$

C. $\dfrac{16}{33}$

D. 24%

Answer: C

Self Assessment Sheet

1. Each letter of the word "INDEPENDENT" is written on individual cards. The cards are placed in a box and mingled thoroughly. A card with letter 'N' is removed from the box. Now find the probability of picking a card with a consonant?

A. $\dfrac{7}{11}$

B. $\dfrac{7}{10}$

C. $\dfrac{3}{5}$

D. $\dfrac{2}{5}$

Answer: C

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2. In throwing of two dice, what is the number of exhaustive events ?

A. 6

B. 12

C. 36

D. 18

Answer: C

3. Three coins are tossed simultaneously. What is the probability that head and tail show alternately. (i.e., HTH or THT)?

A. $\dfrac{3}{8}$

B. $\dfrac{1}{4}$

C. $\dfrac{1}{8}$

D. $\dfrac{1}{2}$

Answer: B

4. Two cards are drawn from a well shuffled pack of 52 cards without replacement. The probability of drawing a queen and a jack is :

A. $\dfrac{16}{663}$

B. $\dfrac{2}{663}$

C. $\dfrac{4}{663}$

D. $\dfrac{8}{663}$

Answer: C

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5. In a single throw of two dice, the probability of getting a total of 3 or 5 is

A. $\dfrac{1}{3}$

B. $\dfrac{5}{6}$

C. $\dfrac{1}{9}$

D. $\dfrac{1}{6}$

Answer: D

6. A husband and a wife appear in a interview for two vacancies in the same post. The probability of husband's selection is $\dfrac{1}{7}$ and that of wife's is $\dfrac{1}{6}$. What is the probability that none of them will be selected.

A. $\dfrac{2}{13}$

B. $\dfrac{5}{7}$

C. $\dfrac{1}{42}$

D. $\dfrac{41}{42}$

Answer: D

7. A bag contains x red balls, (x + 5) blue balls and (3x + 10) white balls. If the probability of drawing a blue ball is $\dfrac{2}{9}$, what is the number of white balls?

A. 15

B. 20

C. 35

D. 55

Answer: D

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8. A letter is chosen at random from the letters in the word "PROBABILITY". What is the probability that the letter will be a B or an I?

A. $\dfrac{5}{11}$

B. $\dfrac{4}{11}$

C. $\dfrac{2}{11}$

D. $\dfrac{7}{11}$

Answer: B

9. There are three events A, B, C one of which must and only one can happen; The odds are 8 to 3 against A, 5 to 2 against B; find the odds against C.

A. $43 : 34$

B. $34 : 43$

C. $43 : 77$

D. $77 : 43$

Answer: A

10. A can solve 80% of the problems given in a book and B can solve 60%. What is the probability that, at least one of them will solve a problem selected at random from the book?

A. $\dfrac{12}{25}$

B. $\dfrac{97}{100}$

C. $\dfrac{23}{25}$

D. $\dfrac{11}{25}$

Answer: C

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Question Bank 30

1. If A , B and C are three finite, sets, then what is $[A' \cup B') \cap C]'$ equal to?

A. $(A' \cup B') \cap C'$

B. $A' \cap (B' \cap C')$

C. $(A \cap B) \cup C'$

D. $(A \cap B) \cap C$

Answer: C

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2. If X and Y are any two non-empty sets, then what is (X-Y)' equal to?

A. X'-Y'

B. $X' \cap Y'$

C. $X' \cup Y$

D. $X - Y'$

Answer: C

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3. Out of 32 persons, 30 invest in National Savings Certificates and 17 invest in shares. What is the number of persons who invest in both?

   A. 13

   B. 15

   C. 17

   D. 19

Answer: B

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4. If A=P({1, 2}) where P denotes the power set, then which one of the following is correct?

   A. $\{1, 2\} \subset A$

   B. $1 \in A$

C. $\phi \notin A$

D. $\{1, 2\} \in A$

Answer: D

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5. Which one of the following statement is correct?

where P(A) denotes the power set of A.

A. $A \cup P(A) = A$

B. $A \cap P(A) = A$

C. $A - P(A) = A$

D. $P(A) - \{A\} = P(A)$

Answer: B

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6. If μ is the universal set and P is a subset of μ then what is

$P \cap (P - \mu) \cup (\mu - P)$ equal to

A. ϕ

B. P'

C. ξ

D. P

Answer: A

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7. If F(n) denotes the set of all divisors of n except 1, what is the least

value of y satisfying $[F(20) \cap F(16)] \subseteq F(y)$?

A. 1

B. 2

C. 4

D. 8

Answer: C

8. Consider the following for any three non-empty sets, A, B and C.

1. $A - (B \cup C) = (A - B) \cup (A - C)$

2. $A - B = A - (A \cap B)$

3. $A = (A \cap B) \cup (A - B)$

Which of the above is/are correct ?

A. only 1

B. 2 and 3

C. 1 and 2

D. 1 and 3

Answer: B

9. Let A and B be two non-empty subsets of a set X. If $(A - B) \cup (B - A) = A \cup B$, then which one of the following is correct?

A. $A \subset B$

B. $A \subset (X - B)$

C. $A = B$

D. $B \subset A$

Answer: B

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10. Which one of the following is correct ?

A. $A \cup (B - C) = A \bigcup (B \cap C')$

B. $A - (B \cup C) = (A \cup B') \cap C'$

C. $A - (B \cap C) = (A \cap B') \cap C$

D. $A \cap (B - C) = (A \cap B) \cap C$

Answer: B

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11. If $A = \{1, 2, 3\}, B = \{1, 2\}$ and $C = \{2, 3\},$ which one of the following is correct?

A. $(A \times B) \cap (B \times A) = (A \times C) \cap (B \times C)$

B. $(A \times B) \cap (B \times A) = (C \times A) \cap (C \times B)$

C. $(A \times B) \cup (B \times A) = (A \times B) \cup (B \times C)$

D. $(A \times B) \cup (B \times A) = (A \times B) \cup (A \times C)$

Answer: C

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12. If A and B are finite sets, which of the following is the correct statement.

A. $n(A - B) = n(A)$

B. $n(A - B) = n(B - A)$

C. $n(A - B) = n(A) - n(A \cap B)$

D. $n(A - B) = n(B) - n(A \cap B)$

Answer: C

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13. Out of 40 children , 30 can swim,27 can play chess and 5 can do neither. How many children can swim only?

A. 30

B. 22

C. 12

D. 8

Answer: D

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14. Which one of the following is correct ?

A. $A \times (B - C) = (A - B) \times (A - C)$

B. $A \times (B - C) = (A \times B) - (A \times C)$

C. $A \times (B - C) = (A \times C) - (A \times B)$

D. $A \times (B - C) = (B - A) \times (C - A)$

Answer: B

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15. Consider the following statements:

For non empty sets A, B and C

1. $A - (B - C) = (A - B) \cup C$

2. $A - (B \cup C) = (A - B) - C$

Which of the statements given above is/are correct?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

Answer: B

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16. Out of 800 students in a school ,125 played cricket , 220 played football and 300 played hockey of the total, 28 played both hockey and football , 70 played cricket and football and 32 played cricket and hockey, 26 played

all the three games . What is the number of students who did not play any game?

A. 240

B. 169

C. 259

D. 171

Answer: C

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17. If $n(A) = 65, n(B) = 32$ and $n(A \cap B) = 14,$ then $n(A \Delta B)$ equals

A. 65

B. 47

C. 97

D. 69

Answer: D

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18. Two finite sets have m and n elements. The total number of subsets of the first set is 56 more than the total number of subsets of the second set. The value of m and n is

A. 7,6

B. 6,3

C. 5,1

D. 8,7

Answer: B

19. U is a universal set and n $(U) = 160$ where A, B and C are subset of U. If $n(A) = 50, n(B) = 70, n(B \cup C) = \phi, n(B \cap C) = 15$ and $A \cup B \cup C = U,$ then $n(C)$ equals,

A. 40

B. 50

C. 55

D. 60

Answer: C

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20. Match List- I with List-II and select the correct answer using the codes given below for the lists:

List-I	List-II
(A) $(E - A) \cup (E - A')$	1. ϕ
(B) $E - [(A \cup A') - (A \cap A')]$	2. A
(C) $\{E \cap (A - A')\} \cup A$	3. A'
(D) $[(E - \phi) \cup (\phi - E)] - A$	4. E

Here A' is the complement set of A , E is the universal set and ϕ is an empty set.

A.
$$\begin{array}{cccc} A & B & C & D \\ (a) \quad 4 & 1 & 2 & 3 \end{array}$$

B.
$$\begin{array}{cccc} A & B & C & D \\ (b) \quad 4 & 3 & 2 & 1 \end{array}$$

C.
$$\begin{array}{cccc} A & B & C & D \\ (c) \quad 2 & 3 & 4 & 1 \end{array}$$

D.
$$\begin{array}{cccc} A & B & C & D \\ (d) \quad 2 & 1 & 4 & 3 \end{array}$$

Answer: A

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Self Assessment Sheet 29

1. If A and B are subsets of a set X, then what is $\{A \cap (X - B)\} \cup B$ equal to?

A. $A \cup B$

B. $A \cap B$

C. A

D. B

Answer: A

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2. A set constant n elements. The power set of this set contains.

A. n^2 elements

B. $2^{\lambda/2}$ elements

C. 2^n elements

D. n elements

Answer: C

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3. For non-empty subsets A,B and C of a set X such that $A \cup B = B \cap C$, which one of the following, is the strongest inference that can be derived? a)A=B=C b) $A \subseteq B = C$ c) $A = B \subseteq C$ d) $A \subseteq B \subseteq C$

A. $A = B = C$

B. $A \subseteq B \Rightarrow C$

C. $A = B \subseteq C$

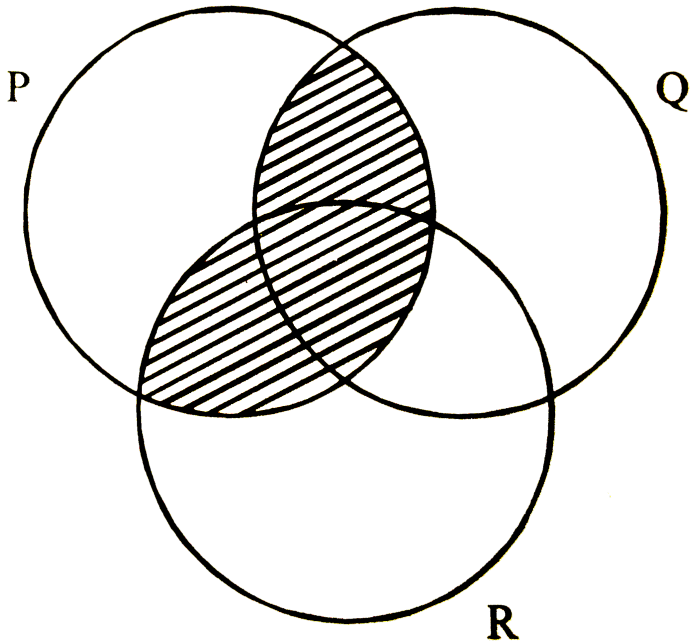D. $A \subseteq B \subseteq C$

Answer: D

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4. Let U = the set of all triangles , P = the set of all isosceles triangles, Q - the set of all equilateral triangles , R = the set of all right angled triangles. What do the sets $P \cup Q$ represents ?

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5. What does the shaded region represent in the figure given below ?

.

A. $(P \cup Q) - (P \cap Q)$

B. $P \cap (Q \cup R)$

C. $(P \cap Q) \cap (P \cap R)$

D. $(P \cap Q) \cup (P \cap R)$

Answer: D

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6. Let $A = \{(n, 2n) : n \in N\}$ and $B = \{(2n, 3n) : n \in N\}$. What is $A \cap B$ equal to ?

    A. $\{(n, 6n) : n \in z\}$

    B. $\{(2n, 6n) : n \in z\}$

    C. $\{(n, 3n) : n \in z\}$

    D. ϕ

Answer: D

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7. While preparing the progress reports of the students the class teacher found that 70% of the students passed in Hindi , 80 % passed English and only 65% passed in both the subject . Find out the percentage of students who failed in both the subject.

A. 0.15

B. 0.2

C. 0.3

D. 0.35

Answer: A

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8. In the cinema set of a movie, 125 mechanical aliens were created. Some of these aliens had peculiar features. 40 had two noses, 30 had three legs, 20 had four ears, 10 had two noses and three legs, 12 had three legs and four ears, 5 had two noses and four ears and 3 had all the three unusual features. How many were there without any of these unusual features? (a) 5 (b) 35 (c) 80 (d) None of these

A. 5

B. 35

C. 80

D. None of these

Answer: D

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9. If A and B are non empty sets and A' and B' represents their compliments respectively, then

A. $A - B = A' - B'$

B. $A - A' = B - B'$

C. $A - B = B' - A'$

D. $A - B' = A' - B$

Answer: C

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10. Let Z_N be the set of non-negative integers Z_p be the set of non-positive integers Z the set of integers, E the set of even integers and P the set of prime number. Then,

A. $E \cap P = \phi$

B. $Z_N \cap Z_P = \phi$

C. $Z - Z_N = Z_P$

D. $Z_N \Delta Z_P = Z - \{0\}$

Answer: D

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