Probability example sums

1. A problem is given to three students whose chances of solving it are 1/2, 1/3 and 1/4 respectively. What is the probability that the problem will be solved?

|  |  |
| --- | --- |
| A) 1/4 | B) 1/2 |
| C) 3/4 | D) 7/12 |

**Answer:** C) 3/4  
  
**Explanation:**

Let A, B, C be the respective events of solving the problem and A , B, C be the respective events of not solving the problem. Then A, B, C are independent event

∴A, B, C are independent events

Now,  P(A) = 1/2 , P(B) = 1/3 and P(C)=1/4

 PA=12, PB=23, PC= 34

∴ P( none  solves the problem) = P(not A) and (not B) and (not C)

                  = PA∩B∩C

                  = PAPBPC         ∵ A, B, C are Independent

                  =  12×23×34

                  = 14

Hence, P(the problem will be solved) = 1 - P(none solves the problem)

                = 1-14= **3/4**

2) A bag contains 6 white and 4 black balls .2 balls are drawn at random. Find the probability that they are of same colour.

|  |  |
| --- | --- |
| A) 1/2 | B) 7/15 |
| C) 8/15 | D) 1/9 |

**Answer:** B) 7/15  
  
**Explanation:**

Let S be the sample space

Then n(S) = no of ways of drawing 2 balls out of (6+4) =10C2 10 =10\*9/ 2\*1 =45

 Let E = event of getting both balls of same colour

Then,n(E) = no of ways (2 balls out of six) or (2 balls out of 4)

                =6C2+4C2 = 6\*5/ 2\*1+ 4\*3/ 2\*1= 15+6 = 21

Therefore, P(E) = n(E)/n(S) = 21/45 = 7/15

3) Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 5?

|  |  |
| --- | --- |
| A) 1/2 | B) 3/5 |
| C) 9/20 | D) 8/15 |

**Answer:** C) 9/20  
  
**Explanation:** Here, S = {1, 2, 3, 4, ...., 19, 20}.

Let E = event of getting a multiple of 3 or 5 = {3, 6 , 9, 12, 15, 18, 5, 10, 20}.

P(E) = n(E)/n(S) = 9/20.

4) Two cards are drawn at random from a pack of 52 cards. what is the probability that either both are black or both are queen?

|  |  |
| --- | --- |
| A) 52/221 | B) 55/190 |
| C) 55/221 | D) 19/221 |

**Answer:** C) 55/221  
  
**Explanation:**

We have n(s) =52C2  = 52\*51/2\*1= 1326.

Let A = event of getting both black cards

     B = event of getting both queens

A∩B = event of getting queen of black cards

n(A) = 52\*51/ 2\*1 = 26C2 = 325, n(B)= 26\*25/ 2\*1= 4\*3/2\*1= 6  and  n(A∩B) = 4C2 = 1

P(A) = n(A)/n(S) = 325/1326;

P(B) = n(B)/n(S) = 6/1326 and

P(A∩B) = n(A∩B)/n(S) = 1/1326

P(A∪B) = P(A) + P(B) - P(A∩B) = (325+6-1) / 1326 = 330/1326 = 55/221

5) A bag contains 4 white, 5 red and 6 blue balls. Three balls are drawn at random from the bag. The probability that all of them are red, is:

|  |  |
| --- | --- |
| A) 2/91 | B) 1/22 |
| C) 3/22 | D) 2/77 |

**Explanation:** Let S be the sample space.

Then, n(S) = number of ways of drawing 3 balls out of 15 = 15C3  =15\*14\*13/3\*2\*1= 455.

Let E = event of getting all the 3 red balls.

 n(E) = 5C3 = 5\*4/ 2\*1 = 10.

 => P(E) = n(E)/n(S) = 10/455 = 2/91.

6) In a lottery, there are 10 prizes and 25 blanks. A lottery is drawn at random. What is the probability of getting a prize?

|  |  |
| --- | --- |
| A) 2/7 | B) 5/7 |
| C) 1/5 | D) 1/2 |

Total=10+25=35 , p(getting pizza)= 10 / 35 =2 / 7

7) Two dice are tossed. The probability that the total score is a prime number is:

|  |  |
| --- | --- |
| A) 5/12 | B) 1/6 |
| C) 1/2 | D) 7/9 |

**Explanation:** Clearly, n(S) = (6 x 6) = 36.

Let E = Event that the sum is a prime number.

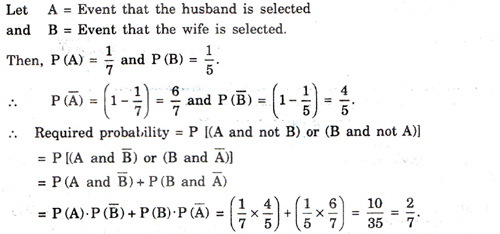
Then E= { (1, 1), (1, 2), (1, 4), (1, 6), (2, 1), (2, 3), (2, 5), (3, 2), (3, 4), (4, 1), (4,3),(5, 2), (5, 6), (6, 1), (6, 5) }

n(E) = 15.

P(E) = n(E)/n(S) = 15/36 = 5/12.

8) A man and his wife appear in an interview for two vacancies in the same post. The probability of husband's selection is (1/7) and the probability of wife's selection is (1/5). What is the probability that only one of them is selected ?

|  |  |
| --- | --- |
| A) 2/7 | B) 1/7 |
| C) 3/4 | D) 4/5 |

**Explanation:**  
**9)** Two cards are drawn together from a pack of 52 cards. The probability that one is a spade and one is a heart, is:

|  |  |
| --- | --- |
| A) 3/20 | B) 29/34 |
| C) 47/100 | D) 13/102 |

**Explanation:** Let S be the sample space.

Then, n(S) = 52C252C2=(52 x 51)/(2 x 1) = 1326.

Let E = event of getting 1 spade and 1 heart.

n(E)= number of ways of choosing 1 spade out of 13 and 1 heart out of 13 = 13C1\*13C113C1\*13C1 = 169.

P(E) = n(E)/n(S) = 169/1326 = 13/102.

10) One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is a face card (Jack, Queen and King only)?

|  |  |
| --- | --- |
| A) 3/13 | B) 1/13 |
| C) 3/52 | D) 9/52 |

Clearly, there are 52 cards, out of which there are 12 face cards.

P (getting a face card) = 12/52=3/13.