

Answer on Question #83052 – Math – Statistics and Probability

Question

Find the probability that at least two 9's appear (as a sum) in four tosses of a pair of dice:

- a. 512/7172
- b. 818/3132
- c. 417/6561
- d. 215/5112

Solution

The probability of getting 9 by rolling a pair of dices is $\frac{1}{9}$, because we have 4 possibilities for 9:

$$(3,6), (4,5), (5,4), (6,3)$$

From the 36 total possibilities.

Now we must calculate, what is the probability of appearing at least two 9's in four dices.

At first we will calculate the probability of the inverse of this event, namely, the probability of appearing exactly zero or one 9's in 4 tosses.

The probability, that we will get 9 by the given roll is $\frac{1}{9}$. The probability of NOT having 9 by the given roll is $\left(1 - \frac{1}{9}\right) = \frac{8}{9}$.

So, the probability, that we have exactly zero 9's is equal to $\left(\frac{8}{9}\right)^4$.

The probability, that we get 9 by the first toss, and NOT get 9 by the other tosses is equal to $\left(\frac{1}{9}\right) \cdot \left(\frac{8}{9}\right)^3$. The same is the probability to get 9 exactly by the second toss, 3 toss, and 4 toss.

So, the probability to get zero or one 9's is equal to $\left(\frac{8}{9}\right)^4 + 4 \cdot \left(\frac{1}{9}\right) \cdot \left(\frac{8}{9}\right)^3 = \frac{6144}{6561}$

The probability to get 2 or more 9's is the inverse of this probability, so it is equal to $\frac{417}{6561}$.

Thus, the correct answer is c 417/6561.

Answer: c. 417/6561.