Name:_____ Date:_____

Assign 12C Math Challengers Worksheet: Probability

1.

Two cubical dice each have the numbers 1, 2, 4, 8, 16, and 32 written on their faces, one number on each face. The two dice are rolled. What is the probability that the *sum* of the numbers on top of the two dice is odd? Write the answer as a common fraction.

2

Two standard dice are rolled, a white one and a black one. Let W be the number showing on the white one and B the number showing on the black one. What is the probability that $W < 2B$? Express the answer as a common fraction.

3

A 5-letter "word" that uses all the letters of the word RAINY is called *deranged* if none of the letters occurs in the same position as in RAINY. Thus IRAYN is deranged, while YANRI is not deranged (since A occurs in the same position as in RAINY). Note also that ARINY and RAINY are not deranged. How many deranged words are there?

4

Four people (A, B, C, and D) line up in a row at random. What is the probability that A and B are next to each other but C and D are not next to each other? Express your answer as a common fraction.

5

Two fair dice are tossed. What is the probability that the *product* of the two numbers so obtained is divisible by 3? Express your answer as a common fraction.

6

Alicia chooses at random a multiple of 6 between 1 and 121. Beth chooses at random a multiple of 15 between 1 and 121. What is the probability that they choose the same number? Express your answer as a common fraction.

7

You flip 2 fair coins, and you win if you get 2 heads or 2 tails. What is the probability that you win? Express your answer as a common fraction.

8

In a certain type of game, B beats A 60% of the time, C beats B 60% of the time, and A always beats C. Player A played against B, and then the winner played against C. Given that C lost that game, what is the probability that C played against A? Write your answer as a common fraction.

9

On any standard die, the sum of the numbers on opposite faces is equal to 7. If two standard dice are tossed, what is the probability that the sum of the numbers on the 10 visible faces is equal to 31? Express your answer as a common fraction.

10

The picture below shows 7 stools arranged in a row. Initially they were all unoccupied. Alfie chose a stool at random and sat down. Then Beti chose an empty stool at random and sat down. What is the probability that Alfie and Beti chose stools that are next to each other? Express your answer as a common fraction.

11

There are six balls in an urn, with the numbers 1, 2, 3, 4, 5, and 6 written on them. You reach into the urn and simultaneously remove two randomly chosen balls. What is the probability that the sum of the numbers on these two balls is equal to 6? Express your answer as a common fraction.

12

Alice and Bob select, independently and at random, a positive integer that divides 16. What is the probability that they select the same number? Express your answer as a common fraction.

13

The integers from 1 to 24 are written on index cards, one number to each card. Alicia picks a card at random. Let x be the probability that the number on her card is divisible both by 2 and by 3, and let y be the probability that the number is divisible by 2 or by 3 (or both). What is $\frac{x}{y}$? Express your answer as a common fraction.

14

Alicia has 6 pairs of shoes, identical except for colour: 3 of the pairs (6 shoes) are brown, 2 pairs are red, and 1 pair is green. Alicia is completely colour blind, so she picks a left shoe and a right shoe at random. What is the probability that the two shoes are of the same colour? Express your answer as a common fraction.

15

Alphonse rolls three standard dice once. What is the probability that the sum of the numbers rolled is equal to 4? Express your answer as a common fraction.

16

One of the factors of 10^{20} is chosen at random. What is the probability that this factor is actually a factor of 10^{10}? Express your answer as a common fraction.

17

Alice picks an integer from 1 to 10 (inclusive) at random and Bob picks an integer from 11 to 20 (inclusive) at random. What is the probability that the product of Alice's number and Bob's number is a multiple of 3? Express the answer as a common fraction.

18

Halfy, Perfect, and Thirdy are mathematicians who participate in a target shooting competition to win a gold coin. When they shoot at the target, Halfy hits it 1/2 of the time, Perfect hits it all the time, and Thirdy only hits it 1/3 of the time. They have a total of 5 bullets.

Halfy shoots first. If he hits, he eliminates one of the other two from the competition (at his choice, so as to maximize his chance of winning the gold). Next goes Perfect (if he was not eliminated already). He hits the target, and eliminates any of the other competitors still left (in a way that maximizes his chance of winning the gold). Then Thirdy gets a turn (if he was not eliminated already), and so on, until two of the three are eliminated *or* the 5 bullets are all gone. If two of the three are eliminated, the last remaining person wins the gold. If they run out of bullets before a winner is declared, no one wins the gold. What is the probability that no one wins the gold? Express your answer as a common fraction.