Probability

Multiple Choice Question

Q: 1 **Pratik has blue and green coins of the same size in a bag. He has 50 coins each of blue and green.**

He is randomly picking up one coin at a time without replacement. He does not see which coin he has picked.

What is the MINIMUM number of coins he would have to pick to definitely get a pair of blue or green coins?

1 2 **2** 3 **3** 4 **4** 5

Free Response Questions

Q: 2 **Drish lives in India and Hugh lives in the USA. The date formats of both the countries is given below.** **[3]**

India: day/month
USA: month/day

They wrote dates everyday in 2022. If a day in 2022 is randomly selected, what is the probability that:

i) both their dates in the two formats are the same on that day?

ii) the date written by Hugh is a valid date for Drish in India?

Show your work and give valid reasons.

Q: 3 **Two jars, A and B, hold 5 identical coins each, numbered from 0 to 9. Jar A contains even-numbered coins, while Jar B contains odd-numbered coins. One coin from each jars is randomly chosen simultaneously, without looking. The selected coins are combined to form a new number.** **[5]**

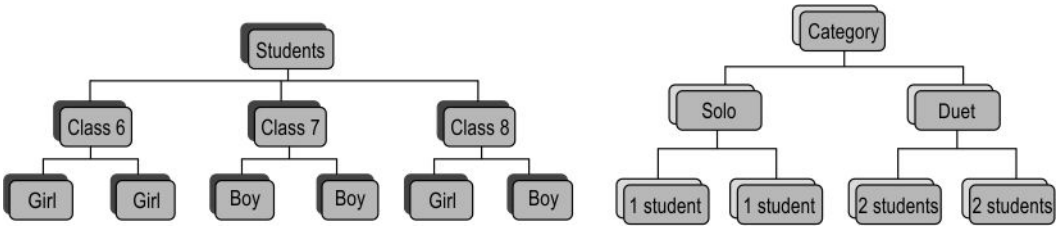
i) The coin from Jar A represents the tens place and the coin from Jar B represents the ones place. Find the probability that the number formed is:
a) greater than 50.
b) equal to 50.

ii) If the rule is changed such that the coin from Jar B represents the tens place and the coin from Jar A represents the ones place, does the probability of getting a number greater than 50 increase/decrease?

iii) The coins from the Jars are re-distributed equally such that each jar has some even and some odd coins. Write a rule with the appropriate arrangement of coins in both the jars such that the probability of forming an odd number is higher on combining coins one from each jar.

Show your work.

Q: 4 **6 students from Daffodil school participated in an inter school dance competition. Each of these 6 students were limited to one performance. There were 2 solo dance categories and 2 duet dance categories as depicted by the flow charts below.** **[5]**



The school's dance teacher used a chit system to select one performance for each of the 6 students in the below order:

Solo 1 --> Duet 1 --> Solo 2 --> Duet 2

i) If one girl was selected from class 6 for Solo 1, find the probability of NOT selecting both girls or both boys for Duet 1? ii) Find the probability of selecting one girl and one boy for Duet 1 such that only one student was left in each class.

iii) After selecting one girl and one boy for Duet 1 only one student was left in each class. The student who got selected for Solo 2 had the probability $\frac{2}{3}$ of getting selected. Was it a girl or a boy and from which class he/she could have been?

Show you work.

Q.No	Correct Answers
1	2

Q.No	What to look for	Marks
2	i) Writes that there are 12 dates in 2022 where the day and the month are interchangeable such as: 01/01, 02/02, 03/03, ... and so on	1
	Finds the probability that the date written by both of them for a random day in 2022 is exactly the same as $\frac{12}{365}$, as 2022 is a non-leap year.	0.5
	ii) Writes that since there are 12 months in a year, Hugh's date's day can have values from 1-12 of every month such that it is a valid date for Drish. Hence, the total number of favourable outcomes are 12 × 12 = 144.	1
	Finds the probability that the date written by Hugh for a random day in the USA format is a valid date for Drish in India as $\frac{144}{365}$.	0.5
3	i) a) Writes that the number formed on combining coins chosen from both the jars will be greater than 50 if either 6 or 8 is selected from Jar A, thus finds its probability as: $\frac{2}{5}$ = 0.4 (Award full marks if all the possible outcomes are listed and then probability is found.)	1
	b) Reasons that the number 50 cannot be formed because it has an even digit at its one's place, but the coins in Jar B are all odd, thus finds its probability as 0. (Award full marks if all possible outcomes are listed and then probability is found.)	0.5
	ii) Writes the possible 25 outcomes as {10, 12, 14, 16, 18, 30, 32, 34, 36, 38, 50, 52, 54, 56, 58, 70, 72, 74, 76, 78, 90, 92, 94, 96, 98} Finds the probability of number formed being more than 50 as: $\frac{14}{25}$ or 0.56 Concludes that the probability of number formed being greater than 50 increases on changing the rule.	1.5

Q.No	What to look for	Marks
	iii) Finds one such rearrangement of coins as: **Jar A: 0, 1, 2, 3, 4** **Jar B: 5, 6, 7, 8, 9** **Forms the rule that the coin from Jar B should represent the ones place and the coin from Jar A should represent the tens place.**	**1.5**
	Reasons that this arrangement of coins satisfies the mentioned condition and as Jar B has more odd numbered coins than even, the probability of getting an odd number will be higher in this rule.	**0.5**
4	**i) Assumes the students who participated from from class 6 were G1 and G2, class 7 were B1 and B2 and class 8 were G3 and B3 and G1 was selected for Solo 1.** **Writes all the possible outcomes on selecting 2 students out of the remaining students as:** **{(G2, B1), (G2, B2), (G2, G3), (G2, B3), (B1, B2), (B1, G3), (B1, B3), (B2, G3), (B2, B3), (G3, B3)}**	**1**
	Finds the probability of NOT selecting both girls or both boys for the Duet 1 as: **$1 - \frac{4}{10} = 0.6$**	**1**
	ii) Finds the desired outcomes of the possible outcomes from step 1 for Duet 1 as: **{(B1, G3), (B2, G3)}** **Finds the probability of selecting one girl and one boy for Duet 1 such that only one student was left in each class as:** **$\frac{2}{10} = 0.2$**	**1**
	iii) Writes that, either (B1, G3) or (B2, G3) were selected for Duet 1, the remaining in the group would have been: **Either** **Class 6: G2** **Class 7: B2** **Class 8: B3** **Or** **Class 6: G2** **Class 7: B1** **Class 8: B3**	**1**

Q.No	What to look for	Marks
	Concludes that in either of the above cases, only a boy either from class 7 or class 8 could have been selected with the probability $\frac{2}{3}$.	**1**