

THE MATHEMATICS OF MAY BE : INTRODUCTION TO PROBABILITY**Multiple Choice Questions**

- Which of the following numbers cannot be the probability of happening of an event?
(a) 0 (b) $\frac{7}{0.01}$ (c) 0.07 (d) $\frac{0.07}{3}$
- If in a lottery, there are 10 prizes and 30 blanks, then the probability of winning a prize is:
(a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{3}{4}$ (d) $\frac{2}{3}$
- Letters **A** to **F** are mentioned on six faces of a die such that each face has a different letter. Two such dice are thrown simultaneously. The probability that vowels turn up on both the dice is:
(a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{1}{9}$ (d) $\frac{1}{36}$
- A school has five houses **A, B, C, D** and **E**. A class has 23 students, 4 from house **A**, 8 from house **B**, 5 from house **C**, 2 from house **D** and rest from house **E**. A single student is selected at random to be the class monitor. The probability that the selected student is not from **A, B** and **C** is:
(a) $\frac{4}{23}$ (b) $\frac{6}{23}$ (c) $\frac{8}{23}$ (d) $\frac{17}{23}$
- A bag contains red coloured, blue coloured and green coloured balls in the ratio 2 : 3 : 4. A ball is drawn at random from the given bag. The probability that the ball so drawn being not of blue colour is:
(a) $\frac{1}{9}$ (b) $\frac{1}{3}$ (c) $\frac{2}{3}$ (d) $\frac{8}{9}$

Assertion-Reason Based Questions

The following questions are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

- Both (b), (c) and (d) as given below.
 - Both A and R are true but R is not the correct explanation of A .
 - A is true, but R is false.
 - A is false, but R is true.
6. Assertion (A) : Probability of a certain event is 1.



Reason (R) : For a certain event, number of favourable outcomes is less than the total number of possible outcomes.

7. Assertion (A) : A cubical die is rolled. Probability of getting a composite number is $\frac{1}{3}$.
Reason (R) : In a throw of a cubical die, probability of getting a prime number is $\frac{2}{3}$.

Very Short Answer Questions

8. What is the probability of getting an odd number when rolling a fair six-sided die:
9. A die is thrown once. What is the probability of getting an even prime number?
10. A coin is tossed 150 times and the outcomes are recorded. The frequency distribution of the outcomes H (i.e. heads) and T (i.e. tails) is given below:

Outcome	H	T
Frequency	85	65

Find the value of $P(H)$, i.e. probability of getting a head in a single trial.

11. A pair of dice is thrown once. What is the probability of getting a doublet?
12. Two dice are thrown simultaneously. What is the probability that the product of the numbers appearing on the top is 1 ?
13. Eleven bags of wheat flour, each marked 5 kg, actually contained the following weights of flour (in kg):

4.97	5.05	5.08	5.03	5.00	5.06	5.08	4.98	5.04	5.07	5.00
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Find the probability that any of these bags chosen at random contains more than 5 kg of flour.

14. Gopi buys a fish from a shop for her aquarium. The shopkeeper takes out one fish at random from a tank containing 5 male fish and 8 female fish. What is the probability that the fish taken out is a male fish?
15. A letter of the English alphabet is chosen at random. What is the probability that it is a letter of the word 'MATHEMATICS'?
16. A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1,2,3,4,5,6,7,8 and these are equally likely outcomes. Find the probability that the arrow will point at any factor of 8.
17. A bag contains 15 balls, out of which some are white and the others are black. If the probability of drawing a black ball at random from the bag is $\frac{1}{3}$, then find how many white balls are there in the bag.



Short Answer Questions

18. Three different coins are tossed together. Find the probability of getting (i) exactly two heads (ii) at least two heads (iii) at least two tails.
19. A game consists of tossing a one-rupee coin 3 times and noting the outcome each time. Ramesh will win the game if all the tosses show the same result, (i.e. either all three heads or all three tails) and loses the game otherwise. Find the probability that Ramesh will lose the game.

Long Answer Questions

20. The letters of the word EVENTS are placed on cards. Reet draws a card without looking.

(i) What is the probability that it is E, V or T ?

(ii) What is the probability that it is not an E ?

E	V	E	N	T	S
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21. The distance (in km) of 40 engineers from their residence to their place of work were found as follows:

5	3	10	20	25	11	13	7	12	31	19	10
12	17	18	11	32	17	16	2	7	9	7	8
3	5	12	15	18	3	12	14	2	9	6	15
15	7	6	12								

What is the empirical probability that an engineer lives:

(i) less than 7 km from her place of work?

(ii) more than or equal to 7 km from her place of work?

(iii) within $\frac{1}{2}$ km from her place of work?

22. In a school canteen, there are three popular snack options: Burger, Sandwich, and Pizza. Students can also choose a drink-either Coffee or Lemonade.

(i) Write the sample space of all possible snack and drink combinations that a student can choose.

(ii) List the event E "Choosing Burger as a snack" and find its probability.

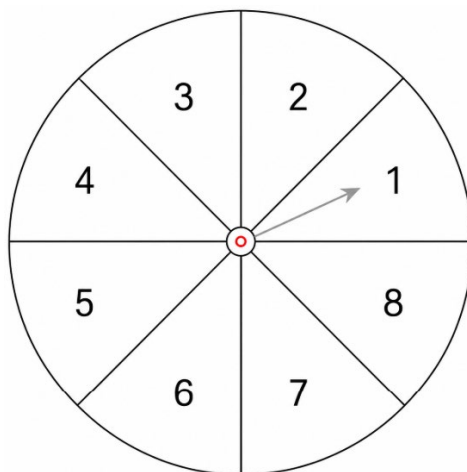
23. Say that you have a box containing 5 blue pens, 4 green pens and 7 red pens. You pick a pen (without looking) from the box and put it back. Then your classmate does the

(i) What are the possible outcomes of the pen colours? Can you draw a tree diagram same, representing the possible outcomes?

(ii) Can you use the tree diagram to guess the probability that both you and your classmate pick pens of the same colour?



24. A game of chance consists of spinning an arrow on a circular board, divided into 8 equal parts, which comes to rest pointing at one of the numbers 1,2,3, ... ,8 (see figure), which are equally likely outcomes. Find the probability that the arrow will point at (i) an odd number (ii) a number greater than 3 (iii) a number less than 9



25. Write the sample space and calculate the probability based on the given information.
- (i) Ten identical cards numbered 1 to 10 are placed in a box. One card is drawn at random. What is the probability of drawing a card with a factor of 43 ?
 - (ii) Two coins are tossed at the same time. What is the probability of getting exactly two heads?
 - (iii) A die is rolled once. What is the probability of getting a number less than 5 ?
 - (iv) Three coins are tossed simultaneously. What is the probability of getting at least two tails?
 - (v) A bag contains 3 red balls, 8 blue balls, and 4 green balls. One ball is picked at random. What is the probability that it is not red?

CASE STUDY BASED QUESTIONS

26. Sunil went to the market to buy an aquarium for his house. He asked the shopkeeper to add some fish to it. The shopkeeper took 13 guppy fish, 18 flowerhorn fish, 12 koi fish, and 11 angel fish from the large tank he had and placed them in the aquarium that Sunil had purchased. Now, Sunil selects a fish at random.

On the basis of above information, answer the following questions:

- (i) If total number of male fish in the aquarium is 36 , then find the probability of selecting a female fish.
- (ii) Find the probability of selecting a flowerhorn fish.
- (iii)(a) Find the probability of not selecting a koi fish.

OR



(b) Find the probability of selecting neither angel fish nor flowerhorn fish.



1.B
7.C

2.A

3.C

4.B

5.C

6.C

8. $\frac{1}{2}$

9. $\frac{1}{6}$

10. $\frac{17}{30}$

11. $\frac{1}{6}$

12. $\frac{1}{36}$

13. $\frac{7}{11}$

14. $\frac{5}{13}$

15. $\frac{4}{13}$

16. $\frac{1}{2}$

17. 5

18. (i) $\frac{3}{8}$ (ii) $\frac{1}{2}$ (iii) $\frac{1}{2}$

19. $\frac{3}{4}$

20. (i) $\frac{2}{3}$ (ii) $\frac{2}{3}$

21. (i) $\frac{9}{40}$
(ii) $\frac{31}{40}$ (iii) 0



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22. (i) {(Burger, Coffee), (Burger, Lemonade), (Sandwich, Coffee), (Sandwich, Lemonade), (Pizza, Coffee), (Pizza, Lemonade)}

(ii) {(Burger, Coffee), (Burger, Lemonade) }; $\frac{1}{3}$

23. (i) Blue (B), Green (G), Red (R)

(ii) $\frac{45}{128}$

24. (i) $\frac{1}{2}$

(ii) $\frac{5}{8}$

(iii) 1

25. (i) $\frac{1}{10}$

(ii) $\frac{1}{4}$

(iii) $\frac{2}{3}$

(iv) $\frac{1}{2}$

(v) $\frac{4}{5}$

26. (i) $\frac{1}{3}$

(ii) $\frac{1}{3}$

(iii) (a) $\frac{7}{9}$ OR

(b) $\frac{25}{54}$



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