The Mathematics of Maybe: Introduction to Probability

Standard difficulty · 20 questions · 40 marks · Time: 36 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. A die is thrown once. The probability of getting an odd number is:
(a) 1/4 **(b)** 1/2 **(c)** 1/3 **(d)** 2/3

2. Two coins are tossed together. The probability of getting at most one head is:
(a) 3/4 **(b)** 1/4 **(c)** 3/8 **(d)** 3/5

3. A bag has 14 red, 14 blue and 10 green balls. One ball is drawn at random. The probability that it is blue is:
(a) 15/38 **(b)** 7/38 **(c)** 7/19 **(d)** 12/19

4. A card is drawn from a well-shuffled deck of 52 cards. The probability that it is a red card is:
(a) 25/52 **(b)** 1/4 **(c)** 1/2 **(d)** 27/52

5. The probability of an impossible event is:
(a) −1 **(b)** 1 **(c)** 1/2 **(d)** 0

6. If P(E) = 0.44, then P(not E) is:
(a) 0.56 **(b)** 0.52 **(c)** 0.44 **(d)** 0.6

7. Two dice are thrown together. The probability of getting a doublet (the same number on both) is:
(a) 7/36 **(b)** 5/6 **(c)** 1/12 **(d)** 1/6

8. Assertion (A): When a die is thrown, the probability of getting an odd number is 1/2.
Reason (R): The probability of an event can be greater than 1.
(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

Section B — Short answer — 8 × 2 = 16 marks

9. A box has discs numbered 1 to 60. One disc is drawn at random. Find the probability that its number is a prime number.

10. All the spades are removed from a deck of 52 cards. One card is drawn from the rest. Find the probability that it is a face card.

11. Two dice are thrown. Find the probability that the product of the numbers is 2.

12. A box of 290 bulbs has 48 defective bulbs. One bulb is taken at random. Find the probability that it is not defective.

13. A letter is chosen at random from the word CALCULATOR. Find the probability that it is a vowel.

14. Three coins are tossed together. Find the probability of getting more heads than tails.

15. A jar has 66 marbles. The probability of drawing a red marble is 5/6. How many red marbles are there?

16. A spinner has 9 equal sectors numbered 1 to 9. Find the probability that it stops on an odd number.

Section C — Word problems — 4 × 4 = 16 marks

17. In a lucky draw there are 750 tickets, of which 9 carry a prize. Dev buys one ticket. Find the probability that Dev wins a prize, and that Dev does not.

18. A crate has 190 mangoes, of which 27 are rotten. A shopkeeper picks one at random. What is the probability that it is good?

19. Zoya and Dev play a game: two dice are thrown, and Zoya wins if they show a total of more than 9. Otherwise Dev wins. Find the probability that Dev wins.

20. A lot of 400 shirts has 369 good shirts, 21 with minor defects and 10 with major defects. Jimmy buys only a good shirt; Sujatha refuses only shirts with major defects. A shirt is drawn at random. Find the probability that it is acceptable to (i) Jimmy, (ii) Sujatha.

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Answer key

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Q	Answer	Working
1	**(b) 1/2**	3 favourable outcomes out of 6
2	**(a) 3/4**	outcomes HH, HT, TH, TT: 3 favourable
3	**(c) 7/19**	14 blue out of 38
4	**(c) 1/2**	26 such cards out of 52
5	**(d) 0**	—
6	**(a) 0.56**	1 − 0.44 = 0.56
7	**(d) 1/6**	6 favourable outcomes out of 36
8	**(c) A is true, but R is false.**	A is true: 3 of the 6 outcomes are favourable. R is false.
9	**17/60**	17 such numbers from 1 to 60
10	**3/13**	39 cards are left, and 9 of them are face cards
11	**1/18**	pairs with product 2: 2 out of 36
12	**121/145**	290 − 48 = 242 good bulbs out of 290
13	**2/5**	4 vowels among 10 letters
14	**1/2**	8 outcomes (HHH, HHT, …, TTT); 4 favourable
15	**55 red marbles**	5/6 × 66 = 55
16	**5/9**	5 of the 9 numbers
17	**3/250; 247/250**	9 out of 750; 1 − 3/250
18	**163/190**	163 good out of 190
19	**5/6**	Zoya wins in 6 of 36 outcomes; Dev in 30
20	**(i) 369/400 (ii) 39/40**	Jimmy: 369 of 400; Sujatha: 390 of 400