

STD 9 Maths [Manjari]
Probability

*** Choose the right answer from the given options. [1 Marks Each]**

[15]

1. The sum of the probabilities of all possible outcomes of a trial is:
(A) 4 (B) 1 (C) 3 (D) 2
2. Which of the following CANNOT be the probability of an event?
(A) 1 (B) 0 (C) 0.75 (D) 1.3
3. If $P(E) = 0.44$, then $P(\text{not } E)$ is:
(A) 0.44 (B) 0.55 (C) 0.50 (D) 0.56
4. The probability of an impossible event is:
(A) 1 (B) 0 (C) More than 1 (D) Less than 0
5. A coin is tossed 1000 times. Heads appear 455 times and tails 545 times. What is the empirical probability of getting a head?
(A) 0.455 (B) 0.5 (C) 0.545 (D) 455
6. A die is thrown. What is the probability of getting an odd number less than 4?
(A) $1/6$ (B) $1/2$ (C) $1/3$ (D) 0
7. Two coins are tossed 1000 times. 0 heads appeared 250 times, 1 head appeared 500 times, and 2 heads appeared 250 times. What is the probability of getting at most one head?
(A) $1/5$ (B) $1/4$ (C) $3/4$ (D) $4/5$
8. A die is thrown once. What is the probability of getting a prime number?
(A) $1/6$ (B) $1/3$ (C) $1/2$ (D) $2/3$
9. What is the probability of drawing a queen from a deck of 52 cards?
(A) $1/26$ (B) $1/52$ (C) $1/13$ (D) $3/52$
10. The probability of drawing the 10 of a black suit from a deck of 52 cards is:
(A) $1/52$ (B) $1/26$ (C) $1/13$ (D) $2/13$
11. There are 5 red balls and 3 black balls in a bag. What is the probability of drawing a black ball?
(A) $5/8$ (B) $1/2$ (C) $3/8$ (D) $1/8$
12. In a survey of 364 children aged 19–36 months, 91 liked to eat potato chips. If a child is selected at random, what is the probability that the child does NOT like potato chips?
(A) 0.25 (B) 0.50 (C) 0.75 (D) 0.80

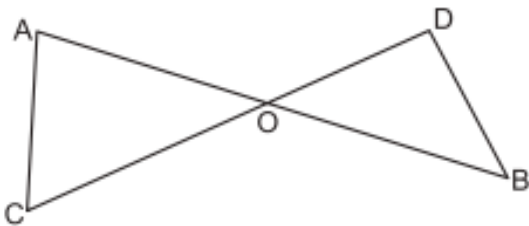
13. There are 5 prizes on 1000 lottery tickets. What is the probability of winning a prize?
 (A) $1/500$ (B) $1/200$ (C) $1/100$ (D) $1/50$
14. A number is selected at random from the numbers 1, 2, 3, ... 15. What is the probability that the selected number is a multiple of 4?
 (A) $1/5$ (B) $1/3$ (C) $4/15$ (D) $2/15$
15. What is the probability of a leap year having 53 Sundays?
 (A) $1/7$ (B) $1/4$ (C) $2/7$ (D) $3/7$

* A statement of Assertion (A) is followed by a statement of Reason (R). [4]
 Choose the correct option.

Directions: In each question below, there are two statements labelled as Assertion (A) and Reason (R). Choose the correct answer as per the options given below:

- (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

16.



Assertion (A) : In the given figure, O is the mid point of AB and CD .
 $\triangle AOC \cong \triangle BOD$ can be proven by SAS.

Reason (R) : Two triangles are congruent if two sides and the included angle of one are equal to the corresponding sides and the included angle of the other.

17. **Assertion (A) :** ABC is an isosceles triangle with $AB = AC$. Draw $AP \perp BC$. Then $\angle B = \angle C$

Reason (R) : Angles opposite to equal sides are equal.

18. **Assertion(A) :** In right triangles ABC and DEF , if hypotenuse $AB = EF$ and side $AC = DE$, then $\triangle ABC \cong \triangle EFD$.

Reason (R) : Two triangles are congruent, if the three sides of one triangle are equal to the corresponding three sides of other triangle.

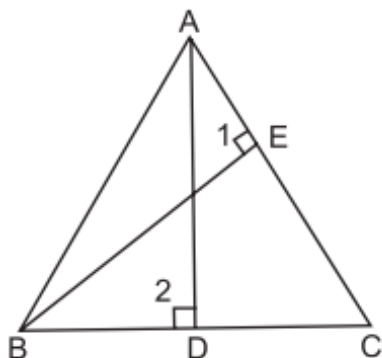
19. **Assertion (A) :** In $\triangle ABD$ and $\triangle ADC$, $AD = AD$, $BD = DC$, then $\angle ADB = \angle ADC$.
 So $\triangle ABD \cong \triangle ACD$ (by SAS) $AB = AC$

Reason (R) : Corresponding parts of congruent triangles.

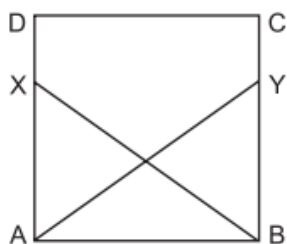
*** Answer the following short questions. [2 Marks Each]**

20. Toss a coin 20 times and record the result each time (heads or tails).
(i) How many times did you get heads.
(ii) How many times did you get tails?
(iii) Calculate the experimental probability of getting heads.
(iv) If you toss the coin once more, what is the probability of getting tails?
21. What is the probability of getting an even number when rolling fair 6-sided die?
22. When a single 6-sided die is rolled, what is the total number of possible outcomes in the sample space?
23. For the following experiments write down the sample space S.
Rolling a die and tossing a coin together.
24. For the following experiments write down the sample space S.
Choosing a random integer between -5 and +5
25. Write the sample space and calculate the probability based on the given information.
Two coins are tossed at the same time. What is the probability of getting at least one head?
26. Write the sample space and calculate the probability based on the given information.
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 an even number?
27. Write the sample space and calculate the probability based on the given information.
A die is rolled once, What is the probability of getting a number greater than 4?
28. Write the sample space and calculate the probability based on the given information.
A bag contain 3 red balls, 2 blue balls and 1 green ball. One ball is picked at random. What is the probability that it is not red?
29. Write the sample space and calculate the probability based on the given information.
Three coins are tossed simultaneously. What is the probability of getting exactly two heads?
30. A bag has 3 candies: strawberry, lemon, and mint. One is picked at random. What is the probability of picking a strawberry candy?
31. I throw a pair of 6-sided dice. Write down an event that has a probability of 0 and an outcome that has a probability of 1.
32. List the elements of a sample space for the simultaneous tossing of a coin and drawing of a card from a set of 6 cards numbered 1 through 6.

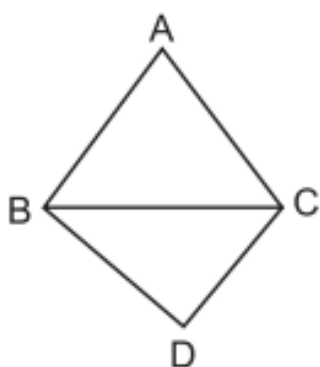
33. ABC is an isosceles triangle in which $AC = BC$. AD and BE are respectively two altitudes to sides BC and AC . Prove that $AE = BD$.



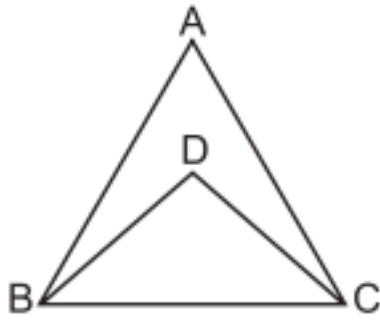
34. If two triangles are congruent, what can you say about:
 (i) Their sides?
 (ii) Their angles? State the converse also.
35. In $\triangle ABC$, given $AB = AC$. Prove that $\angle B = \angle C$. State its converse.
36. $ABCD$ is a square, X and Y are points on sides AD and BC respectively, such that $AY = BX$. Prove that $BY = AX$.



37. $ABCD$ is a quadrilateral in which $AB = BC$ and $AD = CD$. Show that BD bisects both the angles ABC and ADC .
38. In the figure, $AB = AC$ and $DB = DC$. Prove that $\angle ABD = \angle ACD$.



39. $\triangle ABC$ and $\triangle DBC$ are two triangles on the same base BC such that $AB = AC$ and $DB = DC$. Prove that $\angle ABD = \angle ACD$.



40. Prove that if the line bisecting the vertical angle of a triangle is perpendicular to the base the triangle is isosceles

*** Answer the following questions. [3 Marks Each]**

[33]

41. A teacher mixes a large bag of sweets of different colours and randomly selects a sample of 30 sweets. She counts the number of sweets of each colour:
10 red | 8 green | 7 yellow | 5 blue
(i) Calculate the probability that a randomly picked sweet from the sample is green.
(ii) If there are 600 sweets in total in the large bag, estimate how many are likely to be yellow, based on the sample results.
42. A survey is conducted at a school where a random sample of 40 students is asked about their favourite club. The responses are:
14 students: Science Club | 11 students: Arts Club |
9 students: Sports Club | 6 students: Debate Club
Assume there are 800 students in the whole school.
(i) What is the probability that a randomly chosen student from the sample prefers the Arts Club?
(ii) Using the sample results, estimate how many students in the whole school are likely to prefer the Sports Club.
43. Toss a paper cup into the air 100 times. After each toss record whether the cup lands on its bottom, upside down on its bottom, upside down its top or on its side (See Fig.). Assign probabilities to the outcomes by using experimental

probability.



*Fig.: Paper cup landing positions
(left to right)—bottom, top and side*

44. Suppose you roll a 6-sided die 12 times and get a '3' times.
- (i) What is the experimental probability of rolling a '3'?
 - (ii) What is the theoretical probability of rolling a '3'?
 - (iii) Why might these probabilities be different? What would you expect to happen if you roll the die 60, 600, or 6000 times?
45. For the following experiments write down the sample space S .
A box containing 5 green and 7 red balls. One ball is drawn at random.
46. In a village fair, there are 3 popular snacks available: Samosa, Pakora, and Bhaji. For drinks, villagers can choose either Chai or Lassi.
- (i) List the sample space of all possible snack and drink combinations a person could choose at the fair.
 - (ii) List the event 'Selecting Samosa as a snack.'
47. A tyre company records distances before replacement in 1000 cases.

Distance (km)	Less than 4000	4001 to 9000	9001 to 14000	More than 14000
Number of cases	20	210	325	445

Find the probability that a randomly chosen tyre lasts:

- (i) Less than 4000 km.
 - (ii) Between 4000 and 14000 km.
 - (iii) More than 14000 km.
48. The letter of the word 'PEACE' are placed on cards. Leela draws a card without looking



- (i) What is the probability that it is a P, E or C?
(ii) What is the probability that it is not an E?
49. A box contains 4 balls numbered 1 to 4. Record a sample space using a tree diagram for the following experiments:
(i) A ball is drawn, and the number is recorded. Then the ball is returned, and a second ball is drawn and recorded.
(ii) A ball is drawn and recorded. Without replacing the first ball, the experimenter draws and records a second ball.
(iii) What are the sizes of these two sample spaces?
50. Three coins are tossed, and the number of heads is recorded. Which of the following lists is a sample space for this experiment? Why do the other lists fail to qualify as a sample space?
(i) {1, 2, 3}
(ii) {0, 1, 2}
(iii) {0, 1, 2, 3, 4}
(iv) {0, 1, 2, 3}
51. Suppose you drop a dye at random on the rectangular region show in fig What is the probability that it will land inside the circle with a diameter of 1 m?

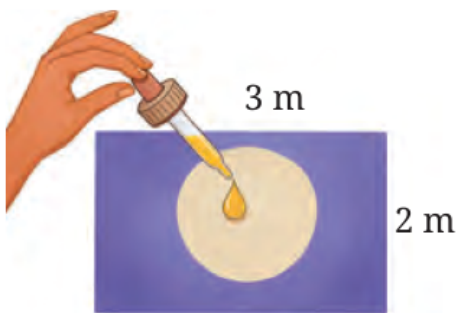


Fig.

*** Answer the following questions. [5 Marks Each]**

[60]

52. Rank the following events on a scale from 0 (Impossible) to 1 (Certain). Label each event: Impossible, less likely, equally likely (even chance), more likely, certain. Give reasons why you gave each event its ranking.
(i) The next Monday will come after Sunday.
(ii) It will snow in Mumbai in July.
(iii) An elephant will walk through your classroom today.
(iv) You will greet at least one friend at school tomorrow.
53. There are two fruit baskets A and B. Basket A has one apple and two oranges. Basket B has one banana and one mango. You randomly pick one fruit from each basket.
(i) Draw a tree diagram showing all possible pairs of fruits.

- (ii) List the sample space.
- (iii) What is the probability of picking one apple and one banana?
54. Let us say that you have a box containing 3 red pens, 4 black pens and 2 green pens. You pick a pen (without looking) from the box and put it back. Then your friend does the same.
- (i) What are the possible outcomes of the pen colours? Can you draw a tree diagram representing the possible outcomes?
- (ii) Can you use the tree diagram to guess the probability that both you and your friend pick pens of the same colour?
55. Which of the following experiments have equally likely outcomes? Explain.
- (i) A driver attempts to start a car. The car starts or does not start.
- (ii) Tossing a fair coin once.
- (iii) Rolling a fair 6-sided die.
- (iv) Choosing a marble randomly from a bag that contains 3 red marbles and 7 blue marbles.
56. A child has 2 shirts (one red and one blue) and 3 types of pants (jeans, khakis, and shorts). List all the possible combinations of outfits consisting of one shirt and one pair of pants. Display your answer in a table format.
57. A game of chance consists of spinning an arrow (see Fig) which comes to rest pointing at one of the numbers 1,2,3,4,5,6,7,8 and these are equally likely outcomes. What is the probability that it will point at



Fig.

- (i) 8?
- (ii) An odd number?
- (iii) A number greater than 2?
- (iv) A number less than 9?
- (v) A multiple of 3?
58. A basket contains 4 red balls and 5 blue balls. One ball is drawn and laid aside, and a second ball is drawn. Draw a tree diagram to represent the possible outcomes and probabilities. Use the tree diagram to answer the following

questions. (i) What is the probability of drawing a red ball and then a blue ball?
(ii) What is the probability of drawing 2 blue balls?

59. Write the sample space and calculate the probability based on the given information.

Two dice are rolled. What is the probability that the sum is a prime number greater than 5?

60. Write the sample space and calculate the probability based on the given information.

A bag contains 4 red, 3 green, and 2 blue balls. Two balls are drawn without replacement. What is the probability that both are of different colours?

61. Write the sample space and calculate the probability based on the given information.

Three coins are tossed. What is the probability that the first coin shows heads and exactly two heads occur in total?

62. Write the sample space and calculate the probability based on the given information.

A four-digit number is formed using the digits 1, 2, 3 and 4 with no repetition. What is the probability that the number is even?

63. Write the sample space and calculate the probability based on the given information.

A student takes a multiple-choice test with 3 questions, each having 4 options (A, B, C, D), with only one correct answer. What is the probability that the student guesses and gets exactly 2 answers correct?
