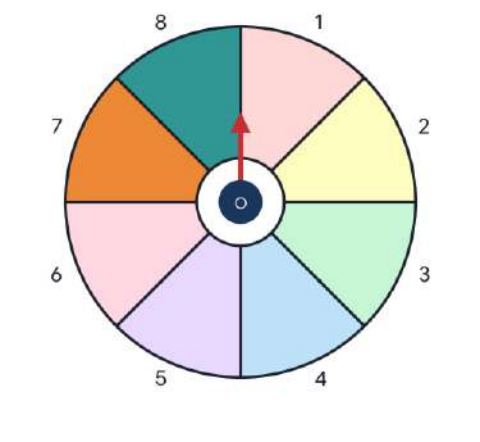
MATHS BASEMAKER

Class 10 CBSE — Chapter 14: Probability

Chapter Test Paper

https://youtu.be/hpknWXp4wpk (video solution on youtube)

Q1. In the given figure, a spinning wheel is divided into 8 equal sectors numbered from 1 to 8. If the spinner is spun once, the probability that it stops at an odd prime number is:



(a) 3/8 (b) 1/2

(c) 1/4 (d) 5/8

Q2 If the probability of an event NOT happening is 1 − p, then the probability of the event happening is:

(a) p – 1 (b) p (c) 1 − 1/p (d) 1 – p

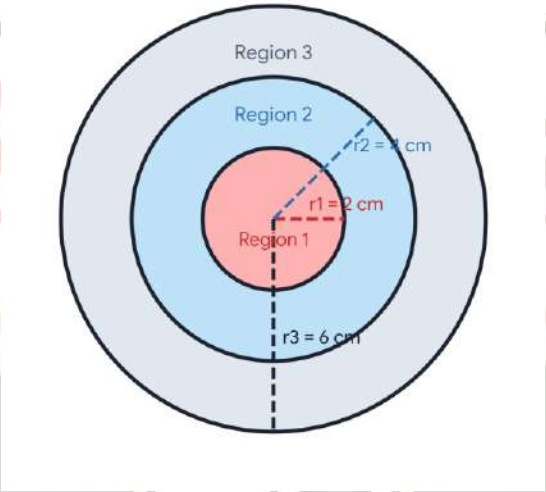
Q3. Two dice are thrown together. The probability of getting a doublet of even numbers is:

(a) 1/6 (b) 1/12

(c) 1/4 (d) 1/18

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Q4. In the given target dartboard, three concentric circles have radii 2 cm, 4 cm, and 6 cm respectively. A dart is thrown at the target and hits the board at random. Find the probability that the dart lands in region 2 (between the inner circle and middle circle):



(a) 5/9 (b) 1/4
(c) 1/3 (d) 4/9

Q5. Find the probability that a leap year selected at random contains 53 Sundays and 53 Mondays.

Q6. A game of chance consists of rolling a fair cubical die whose six faces are marked with the numbers -3, -2, -1, 0, 1, and 2. If the die is rolled once, find the probability that the square of the number obtained is:
(i) less than 4.
(ii) at least 1.
(iii) a non-negative integer.

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Q7. From a well-shuffled pack of 52 playing cards, all face cards of red colour are removed. From the remaining cards, a card is drawn at random. Find the probability that the card drawn is:
(i) a queen.
(ii) a black face card.
(iii) an ace of hearts.

Q8. A box contains 12 balls out of which x are black. If one ball is drawn at random from the box, what is the probability that it will be a black ball? If 6 more black balls are put in the box, the probability of drawing a black ball is now double of what it was before. Find the value of x.

Q9. Two dice, one blue and one grey, are thrown at the same time. Write down all the possible outcomes. What is the probability that the sum of the two numbers appearing on the top of the dice is:
(i) equal to 8?
(ii) more than 9?
(iii) less than or equal to 12?

Q10. A bag contains 24 marbles, some are green and others are blue. If a marble is drawn at random from the bag, the probability that it is green is 2/3. If 6 blue marbles are added to the bag, what is the new probability of getting:
(i) a green marble?
(ii) a blue marble?

HINTS & STEPS

Q1. Solution & Steps [CBSE Sample Paper]

Hint: Total outcomes = 8. Prime numbers from 1 to 8 are 2, 3, 5, 7. Odd prime numbers are 3, 5, 7.

Sample space S = {1, 2, 3, 4, 5, 6, 7, 8}. Total outcomes n(S) = 8.

Favourable event E = odd prime numbers = {3, 5, 7}.

Number of favourable outcomes n(E) = 3.

Probability P(E) = n(E) / n(S) = 3/8.

Answer: (a) 3/8

Q2 solution steps

Given: Probability of an event not happening = 1 − p

We know that:

Probability of an event happening + Probability of an event not happening = 1

Therefore,

Probability of an event happening = 1 − (1 − p)

= 1 − 1 + p

= p

Hence, the correct answer is (b) p.

Q3. Solution & Steps [CBSE Board Trap MCQ]

Hint: Total outcomes when throwing two dice = 36. Doublets of even numbers are (2, 2), (4, 4), and (6, 6).

Total elementary outcomes = 6 * 6 = 36.

Doublets = {(1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6)}.

Doublets of even numbers = {(2, 2), (4, 4), (6, 6)}.

Favourable outcomes = 3.

Probability = 3 / 36 = 1/12.

Answer: (b) 1/12

Q4. Solution & Steps [CBSE Sample Paper Logical]

Hint: Geometric probability: P = Area of favourable region / Total target area.

Total target area (Circle 3 of radius 6 cm) = $\pi(6^2) = 36\pi$ cm².

Area of Region 2 (ring between radius 2 cm and 4 cm):

Area = $\pi(r_2^2 - r_1^2) = \pi(4^2 - 2^2) = \pi(16 - 4) = 12\pi$ cm^2.

Probability of landing in Region 2 = $(12\pi) / (36\pi) = 12 / 36 = 1/3$.

Answer: (c) 1/3

Q5. Solution & Steps [CBSE Board Classic]

Hint: A leap year has 366 days = 52 weeks + 2 odd days. Look for favourable combinations of the 2 extra days.

366 days = 52 weeks + 2 days.

52 weeks contain 52 Sundays and 52 Mondays.

Possible pairs for the remaining 2 consecutive days:

{(Sun, Mon), (Mon, Tue), (Tue, Wed), (Wed, Thu), (Thu, Fri), (Fri, Sat), (Sat, Sun)}.

Total outcomes = 7.

Favourable pair containing both Sunday and Monday = {(Sun, Mon)} = 1 pair.

Probability = 1/7.

Answer: 1/7

Q6. Solution & Steps [CBSE Board 3-Marker Logical]

Hint: Outcomes S = {-3, -2, -1, 0, 1, 2}. Total outcomes = 6. Squares = {9, 4, 1, 0, 1, 4}.

1. Outcomes: {-3, -2, -1, 0, 1, 2}. Total = 6.
2. (i) Square < 4: Squares are 1, 0, 1 corresponding to outcomes {-1, 0, 1}. Favourable = 3.
   P(Square < 4) = 3 / 6 = 1/2.
3. (ii) Square ≥ 1: Squares are 9, 4, 1, 1, 4 corresponding to outcomes {-3, -2, -1, 1, 2}. Favourable = 5.
   P(Square ≥ 1) = 5 / 6.
4. (iii) Square is a non-negative integer: All squares {9, 4, 1, 0, 1, 4} are non-negative integers. Favourable = 6.
   P(Non-negative integer) = 6 / 6 = 1.

Answer: (i) 1/2, (ii) 5/6, (iii) 1

Q7. Solution & Steps [CBSE Board Playing Cards]

Hint: Face cards of red colour are 6 (2 Kings, 2 Queens, 2 Jacks). Remaining cards = 52 - 6 = 46.

Total cards remaining = 52 - 6 = 46.

(i) Red queens are removed, so only 2 black queens remain.

P(queen) = 2 / 46 = 1/23.

(ii) Black face cards are intact (2 Kings, 2 Queens, 2 Jacks) = 6 cards.

P(black face card) = 6 / 46 = 3/23.

(iii) Red face cards are removed, but Ace is not a face card. Ace of hearts remains in the deck.

P(ace of hearts) = 1 / 46.

Answer: (i) 1/23, (ii) 3/23, (iii) 1/46

Q8. Solution & Steps [CBSE Board Algebraic Logic]

Hint: Initially P(black) = x/12. After adding 6 black balls: Total = 18, black = x + 6. Set up equation $P_2 = 2\ P_1$.

Initial total balls = 12, black balls = x.

P_1 = x / 12.

When 6 black balls are added:

New total balls = 12 + 6 = 18, new black balls = x + 6.

P_2 = (x + 6) / 18.

Given: $P_2 = 2 * P_1$

(x + 6) / 18 = 2 * (x / 12)

(x + 6) / 18 = x / 6

Multiply both sides by 18: x + 6 = 3x

2x = 6 => x = 3.

Answer: x = 3

Q9. Solution & Steps [CBSE Sample Paper 4-Marker]

Hint: Two dice rolled simultaneously: total outcomes = 36.

Total outcomes = 36.

(i) Sum equal to 8: {(2, 6), (3, 5), (4, 4), (5, 3), (6, 2)} = 5 outcomes.

P(sum = 8) = 5/36.

(ii) Sum more than 9 (sum = 10, 11, or 12):

Sum = 10: {(4, 6), (5, 5), (6, 4)}

Sum = 11: {(5, 6), (6, 5)}

Sum = 12: {(6, 6)}

Total favourable = 3 + 2 + 1 = 6 outcomes.

P(sum > 9) = 6 / 36 = 1/6.

(iii) Max possible sum is 12 (6 + 6), so all 36 outcomes are less than or equal to 12.

P(sum <= 12) = 36 / 36 = 1 (Sure event).

Answer: (i) 5/36, (ii) 1/6, (iii) 1

Q10. Solution & Steps [HOTS / Olympiad / 5-Marker]

Hint: Find original number of green marbles: P(green) = G/24 = 2/3 => G = 16. Then blue = 8. New total = 30.

Total marbles = 24.

P(green) = Green / 24 = 2/3 => Green = 24 * (2/3) = 16 marbles.

Initial blue marbles = 24 - 16 = 8 marbles.

When 6 blue marbles are added:

New total marbles = 24 + 6 = 30 marbles.

Green marbles remain = 16, Blue marbles become = 8 + 6 = 14.

(i) New P(green) = 16 / 30 = 8/15.

(ii) New P(blue) = 14 / 30 = 7/15.

Answer: (i) 8/15, (ii) 7/15

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