# MATHS

# BOOKS - KUMAR PRAKASHAN

# PROBABILITY

## Textual Examples

**1.** Find the probability of getting a head when a coin is tossed once. Also find the probability of getting a tail.

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**2.** A bag contains a red ball, a blue ball and a yellow ball, all the balls being of the same size. Kritika takes out a ball from the bag without looking into it. What is the probability that she takes out the (i) yellow ball? (ii) red ball? (iii) blue

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**3.** Suppose we throw a die once, (i) What is the probability of getting a number greater than 4? (ii) What is the probability of getting a number less than or equal to 4 ?

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**4.** One card is drawn from a well-shuffled deck of 52 cards. Calculate the probability that the card will not be an ace.

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**5.** Two players, Sangeeta and Reshma, play a tennis match. It is known that the probability of Sangeeta winning the match is 0.62. What is the probability of Reshma winning the match?

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**6.** Savita and Hamida are friends. What is the probability that both will have (i) different birthdays? (ii) the same birthday? (ignoring a leap year).

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**7.** There are 40 students in Class X of a school of whom 25 are girls and 15 are boys. The class teacher has to select one student as a class representative. She writes the name of each student on a separate card, the cards being identical. Then she

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**8.** A box contains 3 blue, 2 white, and 4 red marbles. If a marble is drawn at random from the box, what is the probability that it will be (i) white? (ii) blue? (iii) red?

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**9.** Haipreet tosses two different coins simultaneously (say. one is of Re 1 and other of Rs 2). What is the probability that she gets at least one head?

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**10.** In a musical chair game, the person playing the music has been advised to stop playing the music at any time within 2 minutes after she starts playing. What is the probability that the music will stop within the first half-minute after starting?

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**11.** A missing helicopter is reported to have crashed somewhere in the rectangular region shown in Fig. 15.2. What is the probability that it crashed inside the lake shown in the figure?

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**12.** A carton consists of 100 shirts of which 88 are good. 8 have minor defects and 4 have major defects. Jimmy, a trader, will only accept the shirts which are good, but Sujatha,

another trader, will only reject the shirts which have major defects. O

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**13.** 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 (ii) 13? (iii) less than or equal to 12?

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## Other Important Examples

**1.** Find the probability that a non-leap year chosen at random has 53 Sundays.

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**2.** From a pack of 52 playing cards Jacks, queens, kings and aces of red colour are removed. From the remaining, a card is drawn at random. Find the probability that the card

drawn is : (i) a black queen (ii) a red card (iii) a black jack

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**3.** Peter throws two different dice together and finds the product of the two numbers obtained. Rina throws a die and squares the number obtained. Who has the better chance to get the number 25?

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## Exercise 15 1

**1.** Complete the following statements: (i) Probability of an event E + Probability of the event 'not E' =__. (ii) The probability of an event that cannot happen is___ Such an event is called__ (iii) The probability of an event that is certain to happ

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**2.** The probability of an event that cannot happen is ..... Such an event is called .....

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**3.** The probability of an event that is certain to happen is ..... Such an event is called .....

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**4.** The sum of the probabilities of all the elementary events of an experiment is.....

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**5.** The probability of an event is greater than or equal to ..... and less than or equal to .....

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**6.** 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) A player attempts to shoot a basketball. She/he shoots or misses the shot. (iii) A trial is

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**7.** Which of the following experiments have equally likely outcomes? Explain.

A player attempts to shoot a basketball. She /He shoots or misses the shot.

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**8.** A trial is made to answer a true-false question. The answer is right or wrong.

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**9.** A baby is born. It is a boy or a girl.

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**10.** Why is tossing a coin considered to be a fair way of deciding which team should get the ball at the beginning of a football game?

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**11.** Which of the following cannot be the probability of an event?

A. $\frac{2}{3}$

B. $-1.5$

C. $15\ \%$

D. $0.7$

**Answer: b**

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**12.** If $P(E) = 0.\ 05$ P(E) = 0.05, what is the probability of not E?

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**13.** A bag contains lemon flavoured candies only. Malini takes out one candy without looking into the bag. What is the probability that she takes out (i) an orange flavoured candy? (ii) a lemon flavoured candy?

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**14.** It is given that in a group of 3 students, the probability of 2 students not having the same

birthday is 0.992. What is the probability that the 2 students have the same birthday?

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**15.** A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is (i) red ? (ii) not red?

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**16.** A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be ( 1 ) red ? ( 2 ) white ? ( 3 ) not green?

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**17.** A piggy bank contains hundred 50p coins, fifty Rs. 1 coins, twenty ? 2 coins and ten Rs. 5 coins. If it is equally likely that one of the coins

will fall out when the bank is turned upside down, what is the probability that the coin (i) will be a

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**18.** Gopi buys a fish from a shop for his 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?

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**19.** A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers $1, 2, 3, 4, 5, 6, 7, 8$ (See Fig. 131), and these are equally likely outcomes. What is the probability that it will point at (i) 8? (ii) an odd number? (iii) a number greater than 2? (iv) a number less than 9?

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**20.** A die is thrown once. Find the probability of getting (i) a prime number; (ii) a number lying between 2 and 6; (iii) an odd number.

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**21.** One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting : ( 1 ) a king of red colour ( 2 ) a face card (3 ) a red face card (4)the jack of hearts ( 5 ) a spade ( 6 ) the queen of diamonds

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**22.** Five cardsthe ten, jack, queen, king and ace of diamonds, are well shuffled with their face downwards. One card is then picked up at random. (i) What is the probability that the card is the queen? (ii) If the queen is drawn and put aside, what

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**23.** 12 defective pens are accidentally mixed with 132 good ones. It is not possible to just look at a pen and tell whether or not it is defective. One pen is taken out at random from this lot. Determine the probability that the pen taken out is a goo

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**24.** (i) A lot of 20 bulbs contain 4 defective ones. One bulb is drawn at random from the

lot. What is the probability that this bulb is defective? (ii) Suppose the bulb drawn in (i) is not defective and is not replaced. Now one bulb is drawn at ra

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**25.** A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears (i) a two-digit number (ii) a perfect square number (iii) a number divisible by 5.

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**26.** A child has a die whose six faces show the letters as given below:


The die is thrown once. What is the probability of getting ( 1 ) A ? ( 2 ) D ?

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**27.** Suppose you drop a die at random on the rectangular region shown in Figure. What is the probability that it will land inside the circle with diameter 1m?

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**28.** A lot consists of 144 ball pens of which 20 are defective and the others are good. Nuri will buy a pen if it is good, but will not buy if it is defective. The shopkeeper draws one pen at

random and gives it to her. What is the probability that (i

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**29.** (1) Complete the following table :

| Event : 'Sum on 2 dice' | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Probability | $\frac{1}{36}$ | | | | | | $\frac{5}{36}$ | | | | $\frac{1}{36}$ |

(2) A student argues that 'there are 11 possible outcomes 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12. Therefore, each of them has a probability $\frac{1}{11}$ Do you agree with this argument? Justify your answer.

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**30.** A game consists of tossing a one rupee coin 3 times and noting its outcome each time. Hanif wins if all the tosses give the same result i.e., three heads or three tails, and loses otherwise. Calculate the probability that Hanif will lose the game

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**31.** A die is thrown twice. What is the probability that (i) 5 will not come up either time? (ii) 5 will come up at least once? [Hint: Throwing a die twice and throwing two dice simultaneously are treated as the same experiment]

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**32.** Which of the following arguments are correct and which are not correct? Give

reasons for your answer. (i) If two coins are tossed simultaneously there are three possible outcomes two heads, two tails or one of each. Therefore, for each of these o

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## Exercise 15 2

**1.** Two customers Shyam and Ekta are visiting a particular shop in the same week (Tuesday to Saturday). Each is equally likely to visit the

shop on any day as on another day. What is the probability that both will visit the shop on (i) the same day?

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**2.** A die is numbered in such a way that its faces show the numbers 1, 2, 2, 3, 3, 6. It is thrown two times and the total score in two throws is noted. Complete the following table which gives a few values of the total score on the two throws :

Number in first throw

| Number in second throw | | | | | | |
|---|---|---|---|---|---|---|
| + | 1 | 2 | 2 | 3 | 3 | 6 |
| 1 | 2 | 3 | 3 | 4 | 4 | 7 |
| 2 | 3 | 4 | 4 | 5 | 5 | 8 |
| 2 | | | | | 5 | |
| 3 | | | | | | |
| 3 | | | 5 | | | 9 |
| 6 | 7 | 8 | 8 | 9 | 9 | 12 |

What is probability that the total score is ( 1 ) even ? (2)6? ( 3 ) at least 6 ?

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**3.** A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of a red ball, determine the number of blue balls in the bag.

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**4.** 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 o

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**5.** A jar contains 24 marbles, some are green and others are blue. If a marble is drawn at random from the jar, the probability that it is green is $\frac{2}{3}$. Find the number of blue balls in the jar.

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Test Your Skills

**1.** There are 30 cards, of same size, in a bag on which numbers 1 to 30 are written. One card is taken out of the bag at random. Find the probability that the number on the selected card is not divisible by 3.

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**2.** A and B throw a pair of dice. If A throws 9, find Bs chance of throwing a higher number.

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**3.** A bag contains 6 red, 8 black and 4 white balls. A ball is drawn at random. What is the probability that ball drawn is not black?

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**4.** Tickets numbered from 1 to 20 are mixed up and a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 7?

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**5.** Cards marked with numbers 3, 4, 5, ....., 50 are placed in a box and mixed thoroughly. One card is drawn at random from the box. Find the probability that number on the drawn card is

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**6.** What is the probability that a number selected at random from numbers 1, 2, 2, 3, 3,

3, 4, 4, 4, 4 will be their average ?


**7.** A card is drawn at random from a well-shuffled deck of 52 cards. Find the probability that the card drawn is ( 1 ) a black king, ( 2 ) either a black card or a king, ( 3 ) neither a heart nor a king, ( 4 ) a spade or an ace, ( 5 ) neither an ace nor a king, ( 6 ) not a face card and (7 ) a red face card.

**8.** In a simultaneous throw of a pair of dice, find the probability of getting (1)8 as the sum, ( 2 ) a doublet, ( 3 ) a doublet of prime numbers, ( 4 ) a doublet of odd numbers, ( 5 ) a sum less than 7, (6) an even number on each die, ( 7 ) the product is 12 and ( 8 ) the product is more than 50.

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Practice Thoroughly

**1.** A card is drawn at random from a well-shuffled deck of playing cards. Find the probability that the card drawn is ( 1 ) either a king or a queen, ( 2 ) a red ace and ( 3 ) not a face card.

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**2.** A bag contains 5 red, 8 green and 7 white balls. One ball is drawn at random from the bag. Find the probability that the ball drawn is

( 1 ) a white ball or a green ball, ( 2 ) neither a green ball nor a red ball and ( 3 ) not a white ball.

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**3.** Two coins are tossed simultaneously. Find the probability of getting ( 1 ) one head, ( 2 ) two heads, ( 3 ) at least one head and ( 4 ) no head

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**4.** A pair of dice is tossed simultaneously. Find the probability of getting the product of the numbers on dice to be 12.


**5.** A pair of dice is tossed simultaneously. Find the probability that the sum of numbers on the dice Is a prime number.

**6.** Cards marked with numbers 13, 14, 15.....60 are placed in a box and mixed thoroughly. One card is drawn at random from the box Find the probability that the sum of the digits of the number on the card is 5.

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**7.** A number is selected from numbers 1, 2, 3, 4 and another number is selected from numbers 1, 5, 6, 12. Find the probability that the product of two numbers selected is less than 12.

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**8.** The king, queen and jack of clubs are removed from a deck of 52 playing cards and then from remaing well-shuffled cards, one card is drawn at random. Find the probability of getting ( 1 ) a red card, ( 2 ) a queen and ( 3 ) a club.

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## Objective Questions

**1.** Fill in the blanks so as to make each of the following statements true:

If an event occurs surely, its probability is .....

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**2.** If an event cannot occur, then its propbability is

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**3.** If the probability of the non-occurrence of an event A is q, then the probability of the occurrence of event A is .....

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**4.** If $P(A) = \frac{3}{4}$, then $P(\overline{A})$=.....

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**5.** The probability of a month of January having 5 Sundays is .....

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**6.** Among the followings..... cannot be the probability of an event.

A. $\frac{2}{3}$

B. 0.7

C. 0.15

D. 1.5

**Answer: D**

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**7.** Two friends were born in the year 2000. The probability that they have the same birth date is .....

A. $\frac{1}{2000}$

B. $\frac{2}{365}$

C. $\frac{1}{365}$

D. $\frac{1}{366}$

**Answer: D**

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**8.** A letter is chosen at random from the English alphabet. Then, the probability that the chosen letter is a vowel is .....

A. $\frac{1}{26}$

B. $\frac{3}{26}$

C. $\frac{5}{26}$

D. $\frac{1}{52}$

**Answer: C**

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**9.** Find the probability of receiving a prime number in the experiment of throwing a balanced die once.

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

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

C. $\frac{1}{3}$

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

**Answer: A**

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**10.** If $P\left(\overline{A}\right) : P(A) = 3:5$, then P (A) =.....

A. $\frac{3}{5}$

B. $\frac{5}{3}$

C. $\frac{5}{8}$

D. $\frac{3}{8}$

**Answer: C**

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**11.** The probability of a leap year having 53 Fridays is .....

A. $\frac{1}{7}$

B. $\frac{2}{7}$

C. $\frac{3}{7}$

D. $\frac{4}{7}$

**Answer: B**

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**12.** A card is drawn at random from a well-shuffled deck of 52 playing cards. The probability of the drawn card being a black face card is .....

A. $\frac{1}{26}$

B. $\frac{3}{26}$

C. $\frac{1}{52}$

D. $\frac{3}{52}$

**Answer: B**

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**13.** One letter is chosen randomly from the word PROBABILITY. The probability of that letter being a vowel is .....

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

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

C. $\frac{5}{11}$

D. $\frac{4}{11}$

**Answer: D**

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**14.** In one thousand lottery tickets, there are 50 prizes to be given. If Manish buys 1 ticket, the probability of him winning a prize is .....

A. $\frac{1}{50}$

B. $\frac{1}{1000}$

C. $\frac{1}{100}$

D. $\frac{1}{20}$

**Answer: A**

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**15.** A digit is randomly taken from a logarithmic table. Then the probability of that digit being 0 or 9 is .....

A. $\frac{2}{5}$

B. $\frac{1}{5}$

C. $\frac{3}{5}$

D. $\frac{4}{5}$

**Answer: B**

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## Objective Questions Answer The Following By A Number Or A Word Or A Sentence

**1.** The probability of getting a defective shirt in a lot of 400 shirts is 0.035. Find the number of defective shirts.

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**2.** Find the probability that a number selected at random from 1 to 100 is a prime number.

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**3.** A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets of the lottery are sold, how many tickets has she bought ?

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**4.** If $P(A) - P(\overline{A}) = 0.2$, find P (A).

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**5.** Find the probability of scoring 35 marks in a 50-mark test.

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## Objective Questions State Whether Each Of The Following Statements Is True Or False

**1.** For any event A, P (A) is always greater than $P(\overline{A})$.

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**2.** The sum of the probabilities of all the elementary events of an experiment is.....

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**3.** If $P(A) : P(\overline{A}) = 3 : 7$, then $P(\overline{A}) = 0.3$

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**4.** For some event A, $P(A) = P(\overline{A})$ is possible.

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**5.** The probability of the Sun rising in the West is $-1$.

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