

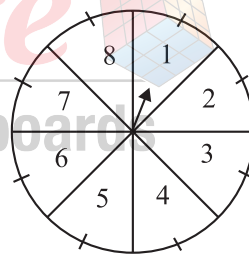
EXERCISE – 6.1

NCERT TEXTUAL EXERCISE (SOLVED)

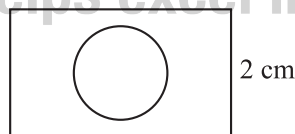
1. Complete the following statements.
 - (i) Probability of an event E + probability of the event 'not E' = _____.
 - (ii) The probability of an event that cannot happen is _____. Such an event is called _____.
 - (iii) The probability of an event that is certain to happen is _____. Such an event is called _____.
 - (iv) The sum of the probabilities of all the elementary events of an experiment is _____.
 - (v) The probability of an event is greater than or equal to _____ and less than or equal to _____.
2. 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 made to answer a true–false question. The answer is right or wrong.
 - (iv) A baby is born. It is a boy or a girl.
3. 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?
4. Which of the following cannot be the probability of an event?

(A) $\frac{2}{3}$	(B) -1.5
(C) 15%	(D) 0.7
5. If $P(E) = 0.05$, what is the probability of 'not E'?
6. 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?
7. 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?
8. 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?
9. 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
- (i) red? (ii) white?
(iii) not green?
10. A piggy bank contains hundred 50 paise coins, fifty ₹1 coins, twenty ₹2 coins and ten ₹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 50 paise coin? (ii) will not be a ₹5 coin?
11. 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?
12. 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. What is the probability that it will point at the following:
- (i) 8
(ii) an odd number
(iii) a number greater than 2
(iv) a number less than 9
13. 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
14. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting
- (i) a king of red colour (ii) a face card
(iii) a red face card (iv) the jack of hearts
(v) a spade (vi) the queen of diamonds
15. Five cards—the 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 a queen?
(ii) If the queen is drawn and put aside, what is the probability that the second card picked up is
- (a) an ace? (b) a queen?



16. Twelve 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 good one.
17. (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 random from the rest. What is the probability that this bulb is not defective?
18. 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
19. A child has a die whose six faces show the letters as given below:
 A B C D E A
 The die is thrown once. What is the probability of getting the following:
 (i) A (ii) D
20. Suppose you drop a die at random on the rectangular region shown in the below figure. What is the probability that it will land inside the circle with diameter 1m?



21. 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) She will buy it? (ii) She will not buy it?
22. Two dice, one blue and one grey, are thrown at the same time.
 (i) Complete the following table:

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

- (ii) 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 probability $\frac{1}{11}$. Do you agree with this argument? Justify your answer.
23. A game consists of tossing a one rupee coin 3 times and noting its outcome each time. Hanif will win if all the tosses give the same result, that is three heads or three tails, and will lose otherwise. Calculate the probability that Hanif will lose the game.
24. A die is thrown twice. What is the probability that
- 5 will not come up either time?
 - 5 will come up at least once?
- (Hint : Throwing a die twice and throwing two dice simultaneously are treated as the same experiment)
25. Which of the following arguments are correct and which are not correct? Give reasons for your answer.
- If two coins are tossed simultaneously, there are three possible outcomes – two heads, two tails or one of each. Therefore, for each of these outcomes, the probability is $\frac{1}{3}$.
 - If a die is thrown, there are two possible outcomes – an odd number or an even number. Therefore, the probability of getting an odd number is $\frac{1}{2}$.

TEST YOURSELF – PRB 1

- A die is rolled once. Find the probability of getting:
 - an even number
 - a number less than 5
 - a number greater than 6
- An unbiased die is thrown. What is the probability of getting:
 - a multiple of 2
 - a multiple of 3
 - an even number or a multiple of 3
 - an even number and a multiple of 3
- A letter of the English alphabet is chosen at random. Find the probability that the letter chosen
 - precedes p
 - follows r

4. In a group there are 3 boys and 4 girls. A child is selected from the group at random. Find the probability that the selected child is a boy.
5. There are 12 apples in a basket. Out of these, 3 apples are rotten. Find the probability of choosing a good apple.
6. A bag contains 4 red, 5 black and 6 white balls. A ball is drawn from the bag at random. Find the probability that the ball drawn is:
 - (i) white
 - (ii) red
 - (iii) not black
 - (iv) red or white
7. A bag contains 8 black, 5 white and 7 red balls. A ball is drawn from the bag at random. Find the probability that the ball drawn is:
 - (i) neither red nor white
 - (ii) neither black nor red
 - (iii) neither white nor black
8. A card is drawn at random from a well-shuffled pack of 52 cards. Find the probability that the card drawn is:
 - (i) a card of diamond
 - (ii) of red colour
 - (iii) a king
9. One card is drawn from a well-shuffled pack of 52 cards, each of which is likely to be drawn. Find the probability that the card drawn is:
 - (i) black
 - (ii) either black or a queen
 - (iii) black and a queen
 - (iv) a jack, a queen or a king
 - (v) neither an ace nor a queen
10. A card is drawn at random from a pack of 52 cards. Find the probability that the card drawn is:
 - (i) neither an ace nor a king
 - (ii) neither a red card nor a black king
 - (iii) neither a queen nor a jack
 - (iv) neither a red card nor a queen

NCERT Textual Exercises and Assignments

Exercise – 6.1

1. (i) **1** (ii) **O, impossible** (iii) **1, sure/certain event** (iv) **1** (v) **0, 1**
2. (iii) and (iv) have equally likely outcomes.
3. When a coin is tossed, getting head or tail are equally likely outcomes; therefore, both the teams have equal chance of winning the toss.
4. (B) – 1.5
5. $P(E) = 0.05$
 $P(E) + P(\bar{E}) = 1$
 $\therefore P(\bar{E}) = 1 - P(E)$
 $= 1 - 0.05$
 $= \mathbf{0.95}$
6. A box contains only lemon-flavoured candies. Let it be 10
 Total candies = 10
 (i) Let A be the event of drawing on orange-flavoured candy
 \therefore Number of outcomes favourable to A = 0
 $\therefore P(A) = \frac{0}{10} = \mathbf{0}$
- (ii) Let B be the event of drawing a lemon-flavoured candy
 \therefore Number of outcomes favourable to B = 10
 $\therefore P(B) = \frac{10}{10} = \mathbf{1}$
7. Let $P(\bar{E})$ = probability of 2 students not having the same birthday.
 $\therefore P(\bar{E}) = 0.992$
 $P(E) + P(\bar{E}) = 1$
 $\therefore P(E) = 1 - P(\bar{E})$
 $= 1 - 0.992$
 $= 0.008$
 \therefore Probability of 2 students having the same birthday is **0.008**.
8. (i) Total number of possible outcomes = 3 + 5 = 8
 \therefore Let A be the event of drawing a red ball
 \therefore Number of outcomes favourable to A = 3

$$\therefore P(A) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{3}{8}$$

(ii) Let B be the event that the ball drawn is not red

$$\therefore P(B) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{5}{8}$$

9. As the box contains 5 red marbles, 8 white marbles and 4 green marbles,
total no of possible outcomes = $5 + 8 + 4 = 17$

(i) Let A be the event that a red marble is drawn

\therefore Number of outcomes favourable to A = 5

$$\therefore P(A) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{5}{17}$$

(ii) Let B be the event that a white marble is drawn

\therefore Number of outcomes favourable to B = 8

$$\therefore P(B) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{8}{17}$$

(iii) Let C be the event that the marble drawn is not green

\therefore Number of outcomes favourable to C = 13

$$\therefore P(C) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{13}{17}$$

10. A bag contains hundred 50 paise coins, fifty ₹1 coins, twenty ₹2 coins and ten ₹5 coins.

Total number of possible outcomes = $100 + 50 + 20 + 10 = 180$

(i) Let A be the event that the coin will be a 50 paise coin

\therefore Number of outcomes favourable to A = 100

$$\therefore P(A) = \frac{100}{180} = \frac{5}{9}$$

(ii) Let B be the event that it is not a ₹5 coin

\therefore Number of outcomes favourable to B = 170

$$\therefore P(B) = \frac{170}{180} = \frac{17}{18}$$

11. The tank contains 5 male fish and 8 female fish

\therefore Total number of possible outcomes = $5 + 8 = 13$

Let A be the event that the fish taken out is a male fish

\therefore Number of outcomes favourable to A = 5

$$\therefore P(A) = \frac{5}{13}$$

12. Total number of possible outcomes = 8

(i) Let A be the event that the number is 8

∴ Number of outcomes favourable to A = 1

$$\therefore P(A) = \frac{1}{8}$$

(ii) Let B be the event that it is an odd number

∴ Number of outcomes favourable to B = 4

$$\therefore P(B) = \frac{4}{8} = \frac{1}{2}$$

(iii) Let C be the event that the number is greater than 2

∴ Number of outcomes favourable to C = 6

$$\therefore P(C) = \frac{6}{8} = \frac{3}{4}$$

(iv) Let D be the event that the number is less than 9

∴ Number of outcomes favourable to D = 8

$$\therefore P(D) = \frac{8}{8} = 1$$

13. Total number of possible outcomes = 6

(i) Let A be the event of getting a prime number = {2, 3, 5}

∴ Number of outcomes favourable to A = 3

$$\therefore P(A) = \frac{3}{6} = \frac{1}{2}$$

(ii) Let B be the event of getting a number lying between 2 and 6 = {3, 4, 5}

∴ Number of outcomes favourable to B = 3

$$\therefore P(B) = \frac{3}{6} = \frac{1}{2}$$

(iii) Let C be the event of getting an odd number = {1, 3, 5}

∴ Number of outcomes favourable to C = 3

$$\therefore P(C) = \frac{3}{6} = \frac{1}{2}$$

14. Total number of possible outcomes = 52

(i) Let A be the event of getting a king of red colour

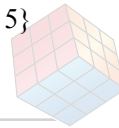
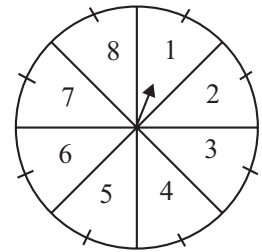
∴ Number of outcomes favourable to A = 2 (there are 2 kings of red colour)

$$\therefore P(A) = \frac{2}{52} = \frac{1}{26}$$

(ii) Let B be the event of getting a face card

∴ Number of outcomes favourable to B = 12 (3 of each suit)

$$\therefore P(B) = \frac{12}{52} = \frac{3}{13}$$



(iii) Let C be the event of getting a red face card

∴ Number of outcomes favourable to C = 6 (3 of each suit)

$$\therefore P(C) = \frac{6}{52} = \frac{3}{26}$$

(iv) Let D be the event of getting the jack of hearts

∴ Number of outcomes favourable to D = 1

$$\therefore P(D) = \frac{1}{52}$$

(v) Let E be the event of getting a spade

∴ Number of outcomes favourable to E = 13

$$\therefore P(E) = \frac{13}{52} = \frac{1}{4}$$

(vi) Let F be the event of getting the queen of diamonds

∴ Number of outcomes favourable to F = 1

$$\therefore P(F) = \frac{1}{52}$$

15. (i) Total number of possible outcomes = 5

Let A be the event that the card drawn is a queen

∴ Number of outcomes favourable to A = 1

$$\therefore P(A) = \frac{1}{5}$$

(ii) Now the queen is drawn and kept aside

∴ There are only 4 cards

∴ Total number of possible outcomes = 4

(a) Let E be the event that the second card is an ace

∴ Number of outcomes favourable to E = 1

$$\therefore P(E) = \frac{1}{4}$$

(b) Let F be the event that the second card is a queen

∴ Number of outcomes favourable to F = 0

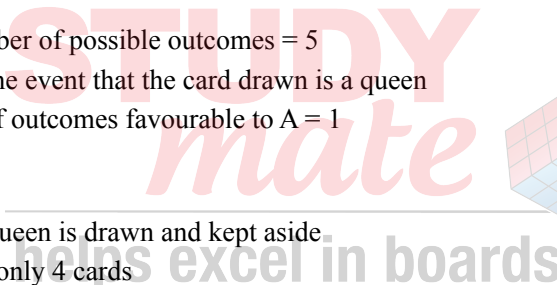
$$\therefore P(F) = \frac{0}{4} = 0$$

16. Total number of possible outcomes = (12 defective + 132 good) pens
= 144 pens

Let A be the event that the pen taken out is a good one

∴ Number of outcomes favourable to A = 132

$$\therefore P(A) = \frac{132}{144} = \frac{33}{36} = \frac{11}{12}$$



17. (i) Total bulbs = 20

Number of all possible outcomes = 20

Defective bulbs = 4

\therefore Non-defective bulbs = $20 - 4 = 16$

Let A be the event that the bulb taken out is defective

\therefore Number of outcomes favourable to A = 4

$$\therefore P(A) = \frac{4}{20} = \frac{1}{5}$$

(ii) Since the bulb drawn in (i) is not defective and is not replaced

\therefore Total defective bulbs = 4

Total non-defective bulbs = $16 - 1 = 15$

Total number of possible outcomes = $4 + 15 = 19$

Let B be the event that this bulb is not defective

\therefore Number of outcomes favourable to B = 15

$$\therefore P(B) = \frac{15}{19}$$

18. Total number of possible outcomes = 90

(i) Let A be the event that the disc drawn bears a two-digit number.

= $\{10, 11, 12, \dots, 90\} = 81$

\therefore Number of outcomes favourable to A = 81

$$\therefore P(A) = \frac{81}{90} = \frac{9}{10}$$

(ii) Let B be the event that the disc bears a perfect square number

= $\{1, 4, 9, 16, 25, 36, 49, 64, 81\} = 9$

\therefore Number of outcomes favourable to B = 9

$$\therefore P(B) = \frac{9}{90} = \frac{1}{10}$$

(iii) Let C be the event that the disc drawn bears a number divisible by 5

= $\{5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90\} = 18$

\therefore Number of outcomes favourable to C = 18

$$\therefore P(B) = \frac{18}{90} = \frac{1}{5}$$

19. Total number of possible outcomes = 6

(i) Let A be the event of getting 'A'

\therefore Number of outcomes favourable to A = 2

$$\therefore P(B) = \frac{2}{6} = \frac{1}{3}$$

(ii) Let B be the event of getting D

∴ Number of outcomes favourable to B = 1

$$\therefore P(B) = \frac{1}{6}$$

20. Area of the rectangle = $l \times b = 3 \times 2 = 6 \text{ m}^2$

For circle, $d = 1 \text{ m} \therefore r = \frac{1}{2} \text{ m}$

$$\therefore \text{Area of the circle} = \pi r^2 = \pi \left(\frac{1}{2}\right)^2 = \frac{\pi}{4} \text{ m}^2$$

∴ Total number of possible outcomes = 6m^2

Number of outcomes favourable to A = $\frac{\pi}{4} \text{ m}^2$

$$\therefore P(A) = \frac{\frac{\pi}{4}}{6} = \frac{\pi}{24}$$

21. Total number of ball pens = 144

∴ Number of defective pens = 20

∴ Number of non-defective pens = $144 - 20 = 124$

(i) Let A be the event that Nuri buys a good pen

∴ Number of outcomes favourable to A = 124

$$\therefore P(A) = \frac{124}{144} = \frac{31}{36}$$

(ii) Let B be the event that Nuri doesn't buy a defective pen

∴ Number of outcomes favourable to B = 20

$$\therefore P(B) = \frac{20}{144} = \frac{5}{36}$$

22. (i) When two dice are thrown, total number of possible outcomes = $6 \times 6 = 36$

(a) When the sum on 2 dice is 3, favourable cases are (1, 2), (2, 1)

∴ Number of favourable outcomes = 2

$$\therefore P(\text{sum on 2 dice is 3}) = \frac{2}{36}$$

(b) When the sum on 2 dice is 4, favourable cases are (1, 3), (2, 2), (3, 1)

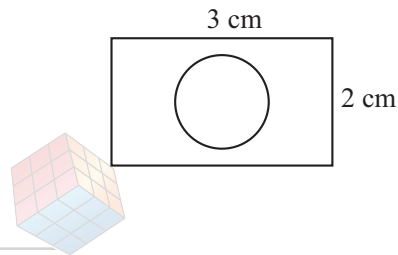
∴ Number of favourable outcomes = 3

$$\therefore P(\text{sum on 2 dice is 4}) = \frac{3}{36}$$

(c) When the sum on 2 dice is 5, favourable cases are (1, 4), (2, 3), (3, 2), (4, 1)

∴ Number of favourable outcomes = 4

$$\therefore P(\text{sum on 2 dice is 5}) = \frac{4}{36}$$



(d) When the sum on 2 dice is 6, favourable cases are (1, 5), (2, 4), (3, 3), (4, 2), (5, 1)

∴ Number of favourable outcomes = 5

$$\therefore P(\text{sum on 2 dice is 6}) = \frac{5}{36}$$

(e) When the sum on 2 dice is 7,

favourable cases are (1, 6), (2, 5), (3, 4), (4, 3), (5, 2), (6, 1)

∴ Number of favourable outcomes = 6

$$\therefore P(\text{sum on 2 dice is 7}) = \frac{6}{36}$$

(f) When the sum on 2 dice is 9, favourable cases are (3, 6), (4, 5), (5, 4), (6, 3)

∴ Number of favourable outcomes = 4

$$\therefore P(\text{sum on 2 dice is 9}) = \frac{4}{36}$$

(g) When the sum on 2 dice is 10, favourable cases are (4, 6), (5, 5), (6, 4)

∴ Number of favourable outcomes = 3

$$\therefore P(\text{sum on 2 dice is 10}) = \frac{3}{36}$$

(h) When the sum on 2 dice is 11, favourable cases are (5, 6), (6, 5)

∴ Number of favourable outcomes = 2

$$\therefore P(\text{sum on 2 dice is 11}) = \frac{2}{36}$$

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

(ii) Number the eleven sums are not equally likely.

23. A coin is tossed 3 times

∴ Total number of possible outcomes = { HHH, HHT, HTH, THH, HTT, THT, TTH, TTT } = 8

∴ Let A be the event that Hanif loses the game

∴ Number of outcomes favourable to A = { HHT, HTH, THH, HTT, THT, TTH } = 6

$$\therefore P(A) = \frac{6}{8} = \frac{3}{4}$$

24. A die is thrown twice

∴ Total number of possible outcomes

= { (1, 1) (1, 2) (1, 3) (1, 4) (1, 5) (1, 6)

(2, 1) (2, 2) (2, 3) (2, 4) (2, 5) (2, 6)

(3, 1) (3, 2) (3, 3) (3, 4) (3, 5) (3, 6)
 (4, 1) (4, 2) (4, 3) (4, 4) (4, 5) (4, 6)
 (5, 1) (5, 2) (5, 3) (5, 4) (5, 5) (5, 6)
 (6, 1) (6, 2) (6, 3) (6, 4) (6, 5) (6, 6) } = 36

(i) Let A be the event that 5 will not come up either time

∴ Number of outcomes favourable to A
 = { (1, 1) (1, 2) (1, 3) (1, 4) (1, 6)
 (2, 1) (2, 2) (2, 3) (2, 4) (2, 6)
 (3, 1) (3, 2) (3, 3) (3, 4) (3, 6)
 (4, 1) (4, 2) (4, 3) (4, 4) (4, 6)
 (6, 1) (6, 2) (6, 3) (6, 4) (6, 6) } = 25

$$\therefore P(A) = \frac{25}{36}$$

(ii) Let B be the event that 5 will come up at least once

∴ Number of outcomes favourable to B
 = { (1, 5), (2, 5), (3, 5), (4, 5), (5, 5), (6, 5)
 (5, 1), (5, 2), (5, 3), (5, 4), (5, 6) } = 11

$$\therefore P(B) = \frac{11}{36}$$

25. (i) **INCORRECT**

When two coins are tossed simultaneously,

Number of all possible outcomes = { HH, HT, TH, TT } = 4

$$P(HH) = P(\text{two heads}) = \frac{1}{4}$$

$$P(TT) = P(\text{two tails}) = \frac{1}{4}$$

$$\therefore P(\text{HT or TH}) = P(\text{one head or one tail}) = \frac{2}{4} = \frac{1}{2}$$

∴ (i) **argument is incorrect.**

(ii) **CORRECT**

When a die is thrown,

Number of all possible outcomes = { 1, 2, 3, 4, 5, 6 } = 6

$$\therefore P(\text{odd number}) = P(1, 3, 5) = \frac{3}{6} = \frac{1}{2}$$

$$P(\text{Even number}) = P(2, 4, 6) = \frac{3}{6} = \frac{1}{2}$$

∴ (ii) **argument is correct.**



TEST YOURSELF – PRB 1

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

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

(iii) 0

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

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

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

(iv) $\frac{1}{6}$

3. (i) $\frac{15}{26}$

(ii) $\frac{4}{13}$

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

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

6. (i) $\frac{2}{5}$

(ii) $\frac{4}{15}$

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

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

7. (i) $\frac{2}{5}$

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

(iii) $\frac{7}{20}$

8. (i) $\frac{1}{4}$

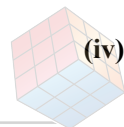
(ii) $\frac{1}{2}$

(iii) $\frac{1}{13}$

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

(ii) $\frac{7}{13}$

(iii) $\frac{1}{26}$



(iv) $\frac{3}{13}$

(v) $\frac{11}{13}$

10. (i) $\frac{11}{13}$

(ii) $\frac{6}{13}$

(iii) $\frac{11}{13}$

(iv) $\frac{6}{13}$

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