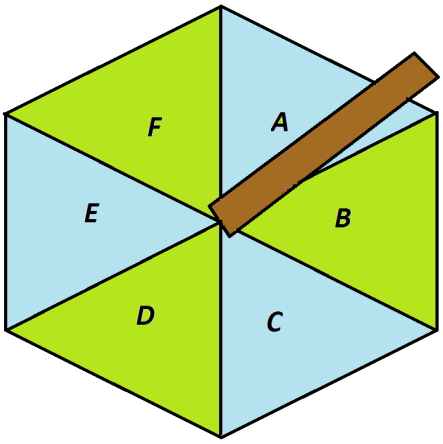
Probability

Section 1: Lists

1. A spinner which is divided into three colours, Blue, green and yellow, is spun and a dice is thrown.
   i. How many different outcomes of colour and number can you have?
   ii. How may of these outcomes will have the colour yellow?
   iii. How many of the outcomes will have the number 3?
2. A code consists of one of the letters A, B, C or D followed by a digit form 1 to 9. How many different codes are possible?
3. A lunch menu consists of 3 starters, 4 main courses and 2 desserts. How many different three-course meals can a person have?
4. A car manufacturer produces different types of cars as follows:
   - the model can be saloon, estate or hatchback
   - the colours can be silver, black or red.
   - the style can be standard, deluxe or premium.

   How many different choices of car does a buyer have?
5. . A game consists of spinning the given spinner and throwing a dice.



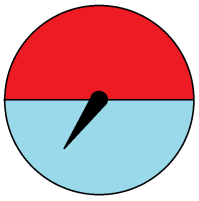
i. If the outcome of the game is a letter and a number, how many different outcomes are possible?

ii. If the game consists of a colour and a number, how many different outcomes are possible?

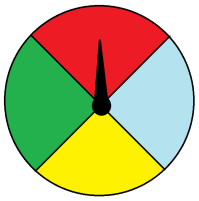
Section 2 - Introduction to Probability

6. i. State the sample space for each of these spinners:

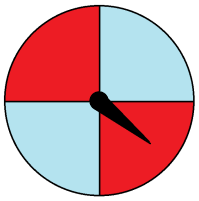
(a) .



(b) .

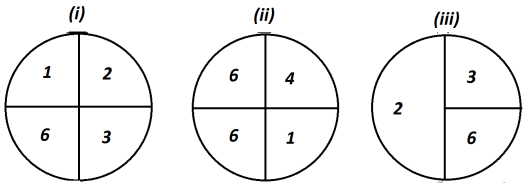


(c) .



ii. For each of the spinners, write down the probability that the spinner ends on red.

7. (a) What is the probability of getting a 6 on each of these spinners?
   (b) What is the probability of getting a 2 or a 6 on spinner (iii)?



8. A fair dice is rolled. What is the probability of getting
   i. a 5
   ii. a 1 or a 2
   iii. 4 or more
   iv. an odd number
   v. less than 3
   vi. a prime number?

9. A letter is chosen at random from the word *PROBABILITY*. Write down the probability that it will be
   i. A
   ii. B
   iii. I
   iv. a vowel
   v. a B or an I

10. A standard pack of cards has 4 suits; hearts, diamonds, clubs, and spades. There are 13 cards in each suit and 52 cards altogether. The first of these cards is called an **Ace**. The last three cards are the *Picture* or *court* cards: the **Jack**, the **Queen** and the **King**.
    From the 13 Hearts cards in a deck, one card is to be chosen at random. What is the probability that the card chosen will be:
    i. the 7
    ii. the Ace
    iii. a picture card
    iv. a heart
    v. a spade
    vi. either a 9 or a 10?

11. From a standard pack of 52 cards, a card is chosen at random. What is the probability that the card chosen will be:
    i. a diamond
    ii. a red card
    iii. a black card
    iv. a 3
    v. a picture card
    vi. either an Ace or a King?

12. Assuming that a person is equally likely to be born on any day of the week or in any month of the year, what is the probability that a randomly-chosen person has his/her birthday
    i. on a Tuesday
    ii. on a Saturday or Sunday
    iii. in January or February?

13. A bag contains five red discs with the numbers 1 to 5 painted on them and seven blue disks painted with the numbers 1 to 7. If a disk is chosen at random, what is the probability of choosing
    i. a red disk
    ii. a disk numbered 3
    iii. a disk numbered 6
    iv. the blue disk numbered 1
    v. an even numbered disk
    vi. an odd numbered disk

    Explain why the probabilities in (v) and (vi) sum to 1.

14. In a pre-election poll of 400 people, 120 supported the A party, 140 supported the B party and the rest were undecided. if a person is selected at random from this group, what is the probability that they:
    i. support the A party
    ii. support the B party
    iii. support a party
    iv. are undecided?

15. Of 100 tickets sold in a raffle, Luke bought 10, Heather bought 5 and Alan bought 1. A ticket was chosen at random to determine who won the prize. What is the probability that the prize was won by:
    i. Alan
    ii. Luke
    iii. Heather

iv. None of these three people?

Section 3 - Sample Spaces

16. These are the possible outcomes when two coins are tossed: *HH, HT, TH, TT*.
Write down the probability of getting

    i. 2 tails

    ii. 2 heads

    iii. a head and a tail.

17. A fair three-sided spinner has sections labelled 2, 4 and 6. The spinner is spun once and a fair six-sided dice is thrown once. The number that the spinner lands on is added to the number that the dice shows. This gives the score. Copy and complete the table below and show all possible scores. Use the table to write down

+	1	2	3	4	5	6
2	3					
4						
6						12

the probability that the score is

    i. 4

    ii. 5

    iii. 7

    iv. 9 or more

    v. 5 or less

    vi. a multiple of 4

18. The ace, king, queen and jack of clubs and the ace, king, queen and jack of diamonds are put in two piles. Draw out a sample space that shows all the possible outcomes when a card is taken from each pile.
Write down the probability that

    i. both cards will be kings

    ii. one card will be a club

    iii. only one of the cards will be a queen

    iv. the cards will be a matching pair

    v. at least one of the cards will be a queen

    vi. neither card will be a jack.

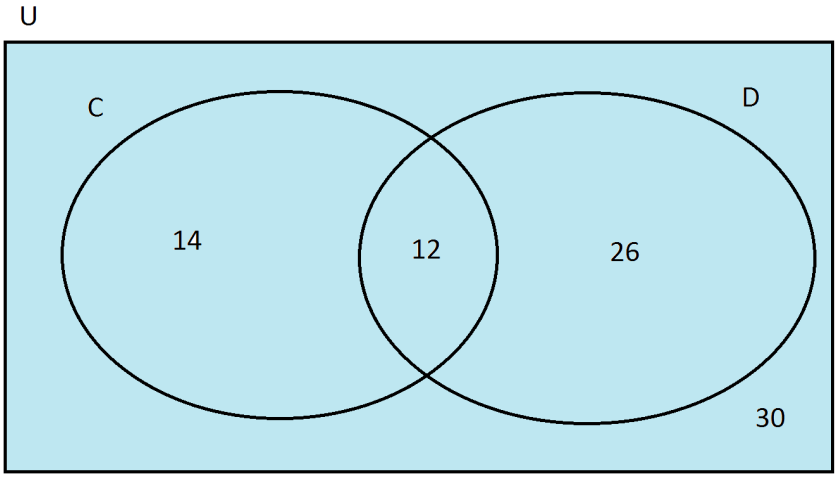
19. Two dice are thrown and the scores obtained are added. Draw a sample space showing the resulting outcomes. Find the probability that the sum of the two numbers is

i. 9
ii. 10
iii. 3 or less
iv. 10 or 11

Section 4: Venn Diagrams

20. In the given Venn Diagram

- U represents the houses in a given street,
- C represents those which have a cat and
- D represents those which have a dog.



If a household is selected at random, what is the probability that it has

i. a cat

ii. a cat and a dog

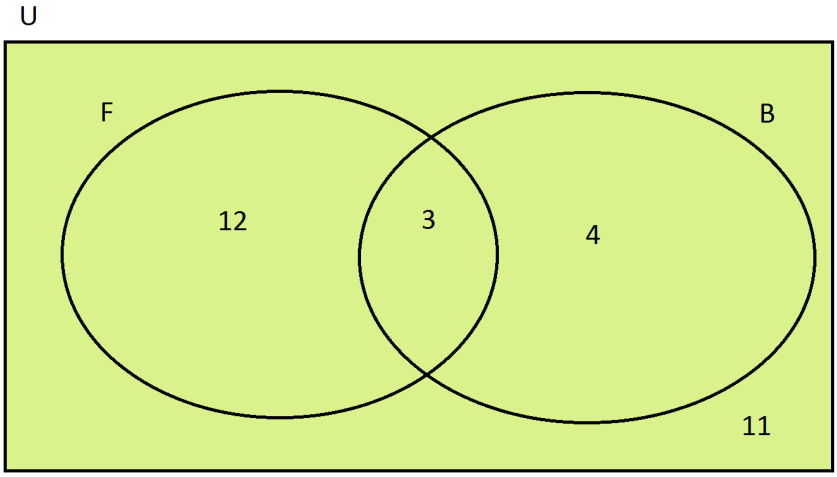
iii. a dog but not a cat

iv. a cat or a dog

v. neither a cat nor a dog?

21. In the given Venn Diagram

- U = the students in class $1K$
- F = the students in the class who play football
- D = the students in the class who play badminton.



i. How many students are there in the class?

ii. How many students play badminton?

If a student is selected randomly from the class, find the probability that the student

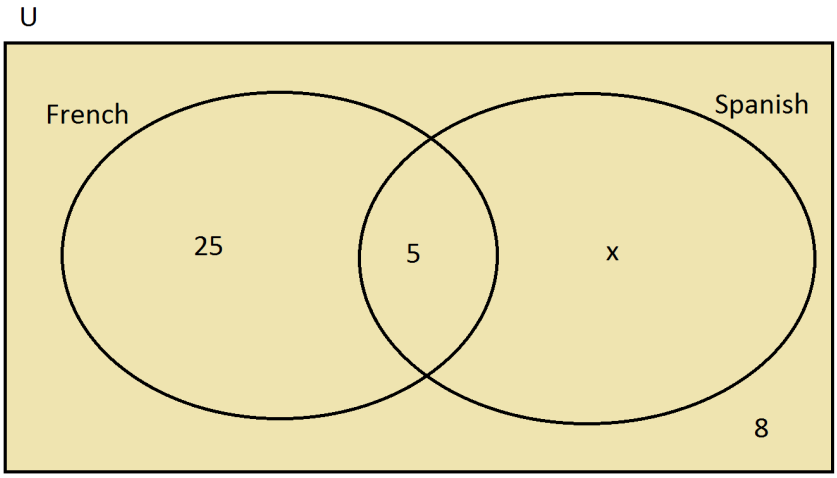
iii. plays both games

iv. plays neither game

v. plays badminton but not football

vi. plays one game only.

22. The given Venn Diagram shows the modern languages, if any, taken by a group of 50 students.



i. Find the value of x
If a student is selected at random, find the probability that the student takes

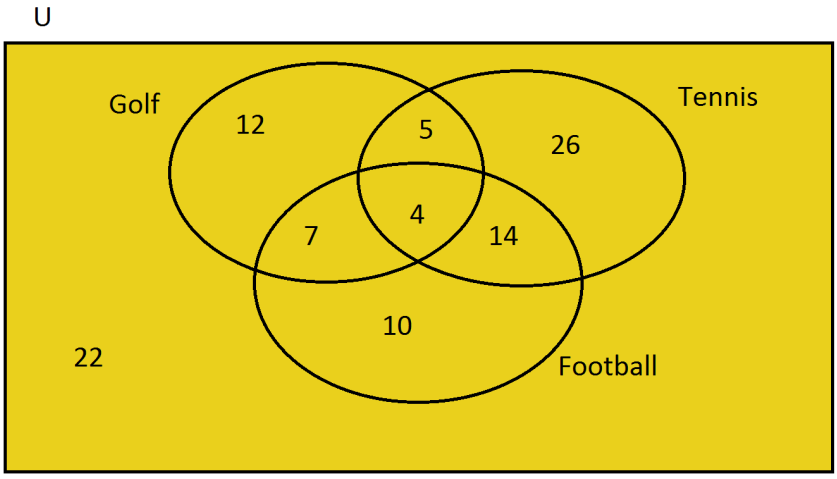
ii. French

iii. Both French and Spanish

iv. French or Spanish

v. one of these languages only.

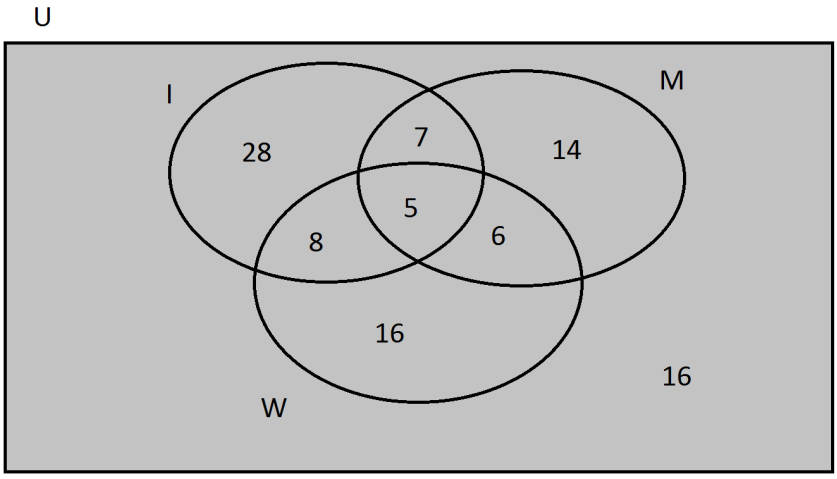
23. The Venn diagram below shows the result of a survey of a number of adults to find out which of the games golf, tennis or football, if any, they play.



i. How many adults were surveyed?
If an adult is selected at random, find the probability that the person plays

ii. golf
iii. both golf and tennis
iv. all three games
v. football only
vi. football and tennis
vii. football and tennis but not golf

24. The given Venn diagram shows the result of a survey in which 100 people were asked to name which of the papers- *Independent(I)*, *Mail(M)* or *World(W)* they had bought the previous Sunday.



If a person is selected at random, find the probability that he/she had bought

i. the Independent

ii. the World or the Mail

iii. one paper only

iv. two papers only

v. the Mail and Independent but not the World.

25. 35 people coming back from America were asked if the had visited New York, Boston or San Francisco. The results were as follows:

- 20 had visited New York.
- 13 had visited Boston.
- 16 had visited San Francisco.
- 7 had been to all thee cities
- 3 had been to both New York and San Francisco, but not Boston.
- 1 had been to both New York and Boston, but not San Francisco.
- 8 had been to Boston and San Francisco.

i. Display this information in a Venn Diagram.

ii. If one person is chosen at random from the group, what is the probability that the person had not visited any of the three cities?

iii. If one person is chosen at random, what is the probability that the person had visited New York only?

iv. If one person is chosen at random, what is the probability that the person had visited Boston or New York?

v. A person who visited New York is chosen at random. What is the probability that the person also visited Boston?

Section 5:Tree Diagrams

26. Paula has a dice with 5 red faces and 1 green face. She rolls the dice twice.
    i. Copy and complete the tree diagram
    ii. Find the probability that the dice shows the same colour each time.
    iii. Find the probability that the dice shows green and red in that order.

27. A bag contains 4 red beads and 2 blue beads. A second bag contains 2 red beads and 4 blue beads. Jack takes one bead at random from each bag.
    i. Complete the probability tree diagram
    ii. Find the probability that Jack takes
        (a) 2 red beads
        (b) red and blue in that order
        (c) red and blue in any order

28. Gerry has a coin which is weighted so that the probability that it lands on heads is $\frac{3}{5}$ and tails $\frac{2}{5}$.
    i. Copy and complete the tree diagram for two tosses of the coin, writing the probabilities on the branches.
    ii. Find the probability of getting one head and one tail.

29. A bag contains 10 coins. There are 6 gold coins and the rest are silver. A coin is taken at random from the bag. The type of coin is recorded and the coin is then returned to the bag. A second coin is taken at random from the bag.
    i. The tree diagram shows all the ways in which two coins can be taken from the bag. Copy the diagram and write the probabilities on it.
    ii. Use your tree diagram to calculate the probability that one coin is gold and one coin is silver.

30. Silvia throws an ordinary dice twice.
    i. Copy and complete this tree diagram.
    ii. Use the tree diagram to write down the probabilities that Silvia gets
        (a) two sixes
        (b) one six only