Probability Practice

1. A bag contains 4 red discs, 10 white discs and 6 blue discs. Two discs are selected at random from the bag one at a time with replacement.
   (a) Represent the sample space using a tree diagram.
   (b) Hence, find the probability of selecting
      (i) a red disc first and a blue disc next,
      (ii) a red disc and a blue disc,
      (iii) two discs of the same colour,
      (iv) two discs of different colours.

2. A bag contains 8 ten-cent coins, 10 fifty-cent coins and x one-dollar coins. A coin is drawn at random.
   (a) If the probability of drawing a ten-cent coin is $\frac{2}{5}$, find the value of x and write down the total number of coins in the bag.
   (b) Two coins are drawn at random from the bag one at a time with replacement. Find the probability of drawing
      (i) 2 ten-cent coins,
      (ii) a fifty-cent coin and a one-dollar coin,
      (iii) 2 coins that add up to at least \$1.50.

3. Two fair dice each with 5 faces numbered 1 to 5 and 2 to 6 respectively are tossed.
   (a) Represent the sample space using a possibility diagram.
   (b) Find the probability that the sum of the two numbers shown
      (i) is a prime number,
      (ii) is at most 7,
      (iii) is a prime number and is at most 7.

4. Two cards are drawn at random one at a time with replacement from a pack of 10 cards, numbered 1 to 10. Find the probability that the two numbers on the cards drawn are
   (a) both even,
   (b) multiples of 2 but not multiples of 4,
   (c) even or prime.

5. (a) A fair die with 6 faces numbered 1 to 6 is rolled 3 times. Draw a tree diagram to show the possibilities of getting a two in each roll.
   (b) Hence, calculate the probability of getting
      (i) 3 twos,
      (ii) a two,
      (iii) at least a two.

6. A card is drawn at random from a pack of 52 playing cards. The card is replaced and a second card is drawn. The second card is then replaced and a third card is drawn. Find the probability of drawing
   (a) 3 spades,
   (b) a heart,
   (c) at least 2 clubs.

7. 4 mobile phones that are fully charged are mixed with 6 other mobile phones that are partially charged. 3 mobile phones are randomly selected one at a time without replacement after all the mobile phones are switched off.
   (a) Represent the sample space using a tree diagram.
   (b) Find the probability that
      (i) 3 fully charged mobile phones are selected,
      (ii) none of the fully charged mobile phones is selected,
      (iii) at least 2 fully charged mobile phones are selected,
      (iv) a fully charged mobile phone is selected only on the 3rd selection.

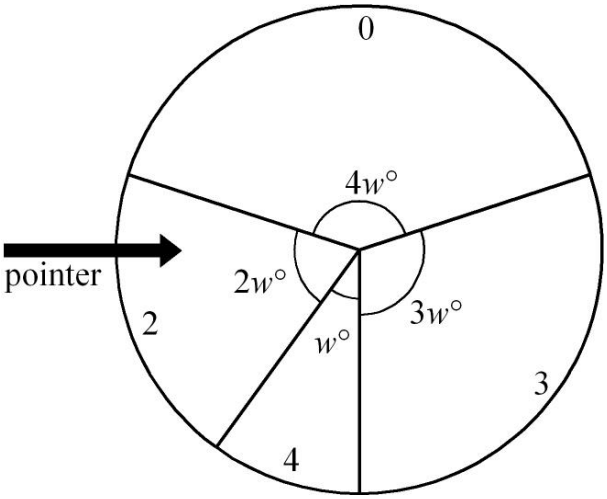
8. Three students go to school together by car daily. On a particular day, they were late for school and gave the excuse that one of the car tyres was punctured on the way to school. Find the probability the students were found lying if each of them randomly selects a tyre that was supposedly punctured when questioned individually which tyre of the car was punctured.

9. The probability of a soccer team winning or losing any match is 0.4 and 0.25 respectively. Find the probability of the team
   (a) not winning or losing a particular match,
   (b) winning only one of two consecutive matches,
   (c) first winning only at the third match.

10. If the probabilities of Brazil, Germany and France winning the next World Cup are $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{6}$ respectively, find the probability that
   (a) none of the 3 teams will win the World Cup,
   (b) neither Brazil nor Germany will win the World Cup,
   (c) Germany or any other unlisted countries will win the World Cup.

11. 6 out of 15 bulbs in a box are defective.
   (a) Suppose the bulbs are randomly drawn one at a time without replacement until a defective bulb is first drawn. Find the probability that the first defective bulb is drawn
      (i) in the 3rd draw,
      (ii) in the 8th draw,
      (iii) in the 11th draw.
   (b) Find the probability of drawing at least one good bulb in the first 5 draws.

12. The surface of a circular disc is sub-divided into 4 numbered sectors as shown in the figure below.
   (a) Find the value of *w*.
   (b) The circular disc is spun twice. For each spin, the number on the sector the pointer indicates is noted when the disc stops. Find the probability that the
      (i) two numbers have the same value,
      (ii) two numbers have a sum of at least 7,
      (iii) product of the two numbers is 0.



13. Bag *P* contains 5 blue chips and 3 red chips. Bag *Q* contains 4 red chips and 5 green chips. A chip from either bag is selected by tossing a fair coin. If the coin shows a head, a chip from bag *P* is selected. If the coin shows a tail, a chip from bag *Q* is selected.
    (a) Represent the sample space using a tree diagram.
    (b) Find the probability of selecting
        (i) a blue chip,
        (ii) a green chip,
        (iii) a red chip.

14. A fair coin and a fair die with five faces numbered 1, 3, 5, 6 and 8 are tossed.
    (a) Represent the sample space using a possibility diagram.
    (b) If the coin shows a head, 3 is subtracted from the number on the die. If the coin shows a tail, 2 is added to the number on the die. Find the probability that the resulting number is
        (i) zero,
        (ii) positive,
        (iii) 3 or 5.

15. Bag *X* contains 6 black balls and 4 white balls. Bag *Y* contains 3 black balls and 7 white balls. A ball from either bag is selected by tossing a fair coin. If a head appears, a ball from bag *X* is selected. If a tail appears, 2 balls are selected from bag *Y*, one after another without replacement.
    (a) Represent the sample space using a tree diagram.
    (b) Find the probability of selecting
        (i) two black balls,
        (ii) two white balls,
        (iii) at least one black ball.
    (a) If the first ball selected in bag *Y* is replaced, find the probability of selecting
        (i) two black balls,
        (ii) two white balls,
        (iii) at least one black ball.