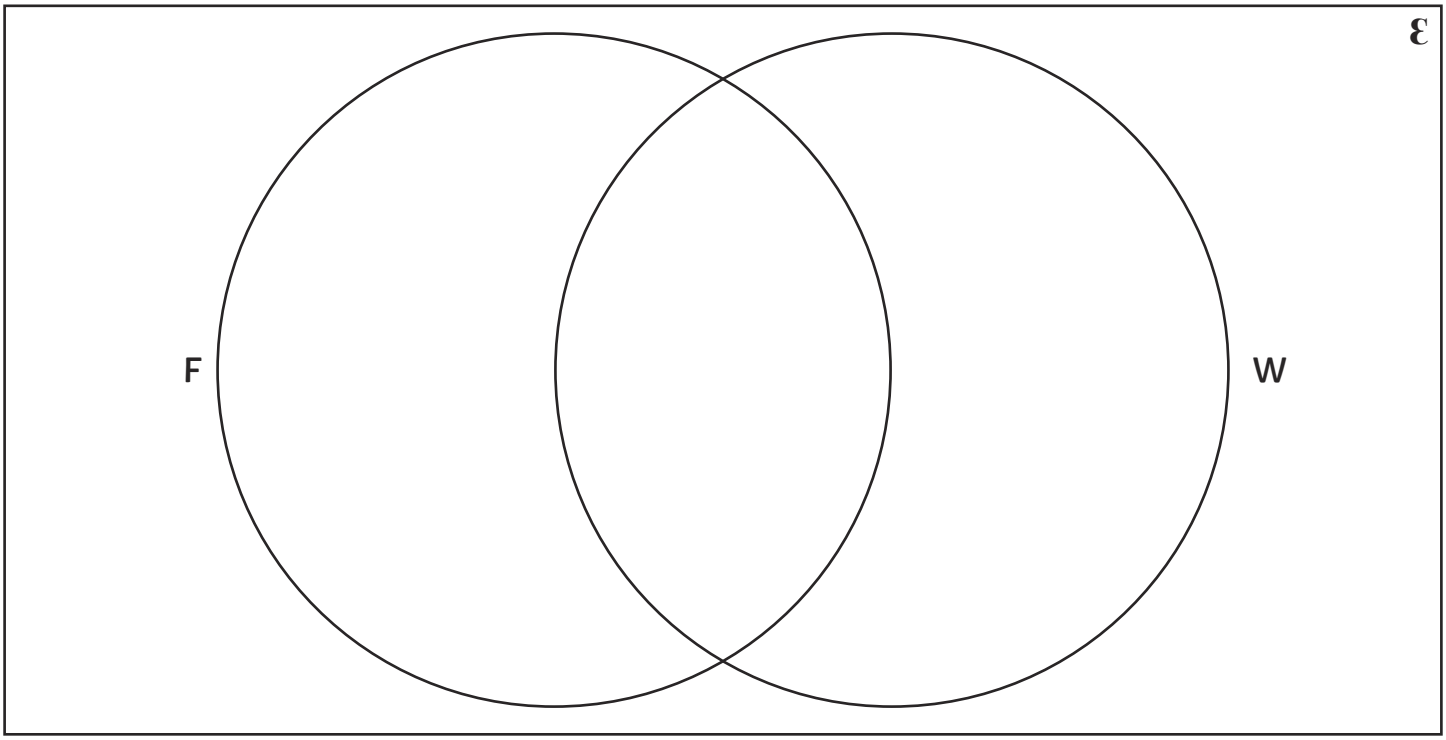
Using Venn Diagrams to Solve Worded Probability Problems

1. A supermarket stocks 25 different festive biscuit selection boxes. 13 of the boxes cost less than £5. 8 of the boxes contain white chocolate. 5 of the boxes cost less than £5 and contain white chocolate. In the Venn diagram, F is the set of boxes costing less than £5 and W is the set of boxes containing white chocolate.

   a. Complete the Venn diagram.



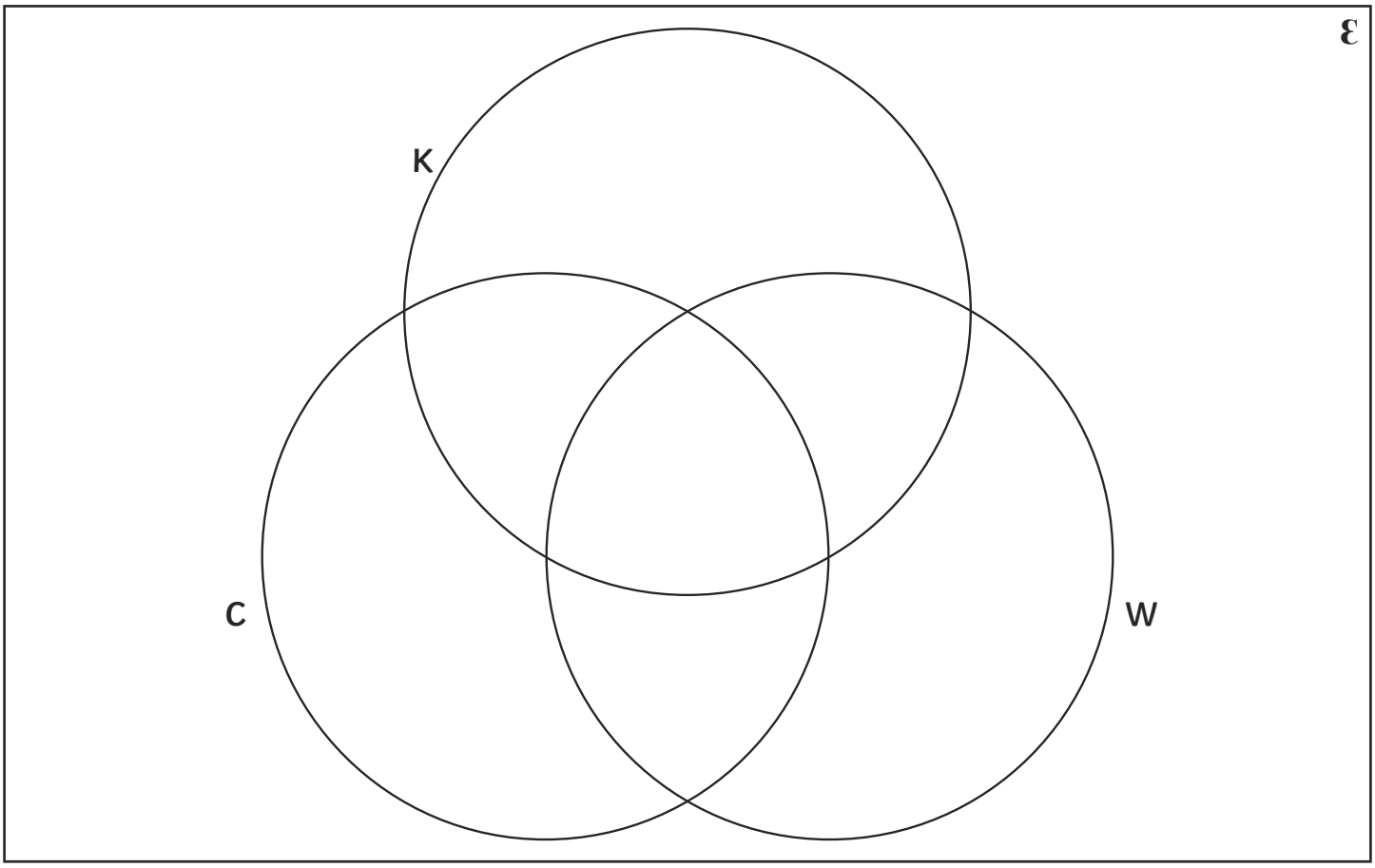
   b. If a box is picked at random from the 25 boxes, what is the probability that it costs £5 or more and contains no white chocolate?

   c. A box is picked at random. Given that it contains white chocolate, what is the probability that it costs less than £5?

   d. If 6 of the boxes cost exactly £5, find the probability that a box of chocolates picked at random costs more than £5.

2. On a residential trip, 55 students have the option of doing 3 different outdoor activities: climbing, kayaking and water-skiing. 27 students do climbing, 19 do kayaking and 28 do water-skiing. 8 do all 3 activities, 10 do climbing and kayaking, 9 do water-skiing and climbing and 12 do water-skiing and kayaking. In the Venn diagram, W is the set of students who took part in water-skiing; K, those who took part in kayaking; and C, those who took part in climbing.

   a. Complete the Venn diagram to show the number of students in each set.



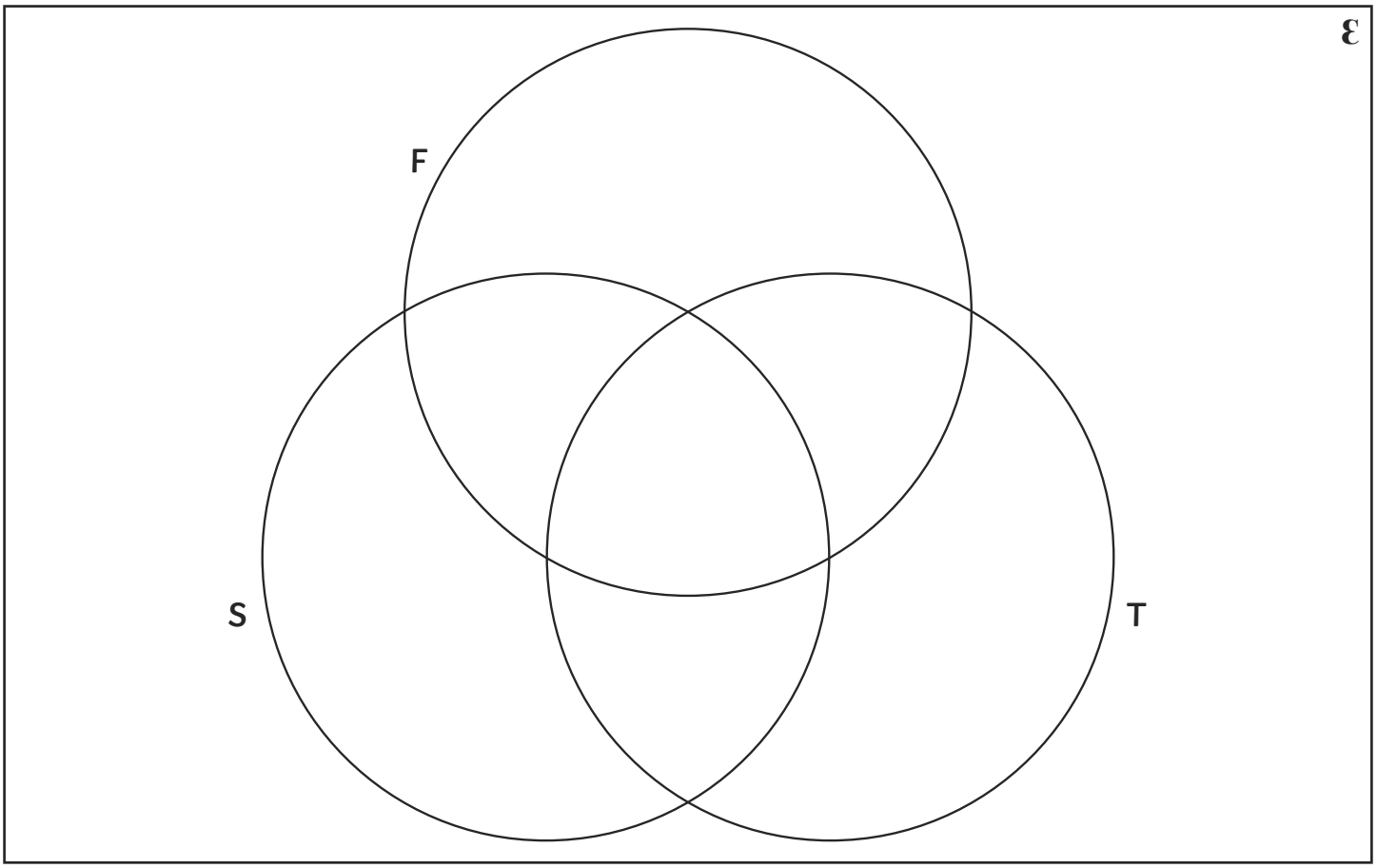
   b. A student is picked at random from the group. What is the probability that the student did exactly 2 of the activities?

   c. When a student is picked at random from the group, what is the probability that the student did fewer than 2 activities?

   d. A student is picked at random from the group. Given that the student did water-skiing, what is the probability that he or she did exactly 1 other activity?

3. $\mathfrak{E}$ is the universal set of even numbers less than 30. F is the set of multiples of 4. S is the set of square numbers. T is the set of multiples of 3.

   a. Complete the Venn diagram.



   b. When a number is chosen at random from the universal set, find the probability that it is both a square number and a multiple of 4.

   c. A number is picked at random from the universal set. Given that it is a multiple of 4, what is the probability that it is also a multiple of 6?