23 A box contains 6 red pencils and 8 blue pencils. A pencil is chosen at random and not replaced. A second pencil is then chosen at random.

(a) Complete the tree diagram.

(b) Calculate the probability that

(i) both pencils are red,

(ii) at least one of the pencils is red.

Answer(b)(i) ........................................... [2]

Answer(b)(ii) ........................................... [3]
Samira takes part in two charity runs. The probability that she finishes each run is 0.8.

First run
- Finishes: 0.8
- Does not finish: 0.2

Second run
- Finishes: 0.8
- Does not finish: 0.2

Find the probability that Samira finishes at least one run.

**Answer** ................................................ [3]
The probability of a cricket team winning or losing in their first two matches is shown in the tree diagram.

Find the probability that the cricket team wins at least one match.
The probability that a plant will produce flowers is \( \frac{7}{8} \). The flowers are either red or yellow. If the plant produces flowers, the probability that the flowers are red is \( \frac{3}{4} \).

(a) (i) Complete the tree diagram by writing a probability beside each branch.

(ii) Calculate the probability that a plant, chosen at random, will produce red flowers.
(iii) Two plants are chosen at random.

Calculate the probability that both will produce red flowers.

.................................................. [2]

(b) Alphonse buys 200 of these plants.

Calculate the number of plants that are expected to produce flowers.

.................................................. [2]

(c) Gabriel has 1575 plants with red flowers.

Estimate the total number of plants that Gabriel has.

.................................................. [2]
6 In a box there are 7 red cards and 3 blue cards. A card is drawn at random from the box and is not replaced. A second card is then drawn at random from the box.

(a) Complete this tree diagram.

(b) Work out the probability that the two cards are of different colours. Give your answer as a fraction.
8 In all parts of this question give your answer as a fraction in its lowest terms.

(a) (i) The probability that it will rain today is $\frac{1}{3}$.

What is the probability that it will not rain today?

Answer(a)(i) .................................... [1]

(ii) If it rains today, the probability that it will rain tomorrow is $\frac{2}{5}$.

If it does not rain today, the probability that it will rain tomorrow is $\frac{1}{6}$.

Complete the tree diagram.

(b) Find the probability that it will rain on at least one of these two days.

Answer(b) ....................................... [3]

(c) Find the probability that it will rain on only one of these two days.

Answer(c) ....................................... [3]
A train stops at station $A$ and then at station $B$.
If the train is late at station $A$, the probability that it is late at station $B$ is 0.9.
If the train is not late at station $A$, the probability that it is late at station $B$ is 0.2.
The probability that the train is late at station $A$ is 0.3.

(a) Complete the tree diagram.

(b) (i) Find the probability that the train is late at one or both of the stations.

(ii) This train makes 250 journeys.

Find the number of journeys that the train is expected to be late at one or both of the stations.

(c) The train continues to station $C$.
The probability that it is late at all 3 stations is 0.27.

Describe briefly what this probability shows.
If the weather is fine the probability that Carlos is late arriving at school is \( \frac{1}{10} \).
If the weather is not fine the probability that he is late arriving at school is \( \frac{1}{3} \).
The probability that the weather is fine on any day is \( \frac{3}{4} \).

(a) Complete the tree diagram to show this information.

(b) In a school term of 60 days, find the number of days the weather is expected to be fine.

Answer (b) ................................................ [1]

(c) Find the probability that the weather is fine and Carlos is late arriving at school.

Answer (c) ................................................ [2]

(d) Find the probability that Carlos is not late arriving at school.

Answer (d) ................................................ [3]

(e) Find the probability that the weather is not fine on at least one day in a school week of 5 days.

Answer (e) ................................................ [2]
8 In this question, give all your answers as fractions.

When Ivan goes to school in winter, the probability that he wears a hat is \( \frac{5}{8} \).
If he wears a hat, the probability that he wears a scarf is \( \frac{2}{3} \).
If he does not wear a hat, the probability that he wears a scarf is \( \frac{1}{6} \).

(a) Complete the tree diagram.

(b) Find the probability that Ivan

(i) does not wear a hat and does not wear a scarf,

Answer(b)(i) ............................................... [2]

(ii) wears a hat but does not wear a scarf,

Answer(b)(ii) ............................................... [2]

(iii) wears a hat or a scarf but not both.

Answer(b)(iii) ............................................... [2]

(c) If Ivan wears a hat and a scarf, the probability that he wears gloves is \( \frac{7}{10} \).
Calculate the probability that Ivan does not wear all three of hat, scarf and gloves.

Answer(c) ............................................... [3]
2  In this question give all your answers as fractions.

The probability that it rains on Monday is \( \frac{3}{5} \).

If it rains on Monday, the probability that it rains on Tuesday is \( \frac{4}{7} \).

If it does not rain on Monday, the probability that it rains on Tuesday is \( \frac{5}{7} \).

(a) Complete the tree diagram.

(b) Find the probability that it rains

(i) on both days,

Answer(b)(i) ...........................................[2]

(ii) on Monday but not on Tuesday,

Answer(b)(ii) ...........................................[2]

(iii) on only one of the two days.

Answer(b)(iii) ...........................................[2]

(c) If it does not rain on Monday and it does not rain on Tuesday, the probability that it does not rain on Wednesday is \( \frac{1}{4} \).

Calculate the probability that it rains on at least one of the three days.

Answer(c) ...........................................[3]
Yeung and Ariven compete in a triathlon race.
The probability that Yeung finishes this race is \( \frac{3}{5} \).
The probability that Ariven finishes this race is \( \frac{2}{3} \).

(a) (i) Which of them is more likely to finish this race?
Give a reason for your answer.

\[ \text{Answer (a)(i)} \]

because

(ii) Find the probability that they both finish this race.

\[ \text{Answer (a)(ii)} \]

(iii) Find the probability that only one of them finishes this race.

\[ \text{Answer (a)(iii)} \]
(b) After the first race, Yeung competes in two further triathlon races.

(i) Complete the tree diagram.

(ii) Calculate the probability that Yeung finishes all three of his races.

\[ \text{Answer(b)(ii)} \] ................................................ [2]

(iii) Calculate the probability that Yeung finishes at least one of his races.

\[ \text{Answer(b)(iii)} \] ................................................ [3]