

1. The table below shows the number of left and right handed tennis players in a sample of 50 males and females.

	Left handed	Right handed	Total
Male	3	29	32
Female	2	16	18
Total	5	45	50

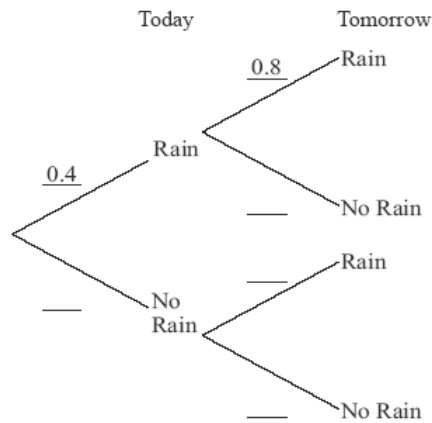
If a tennis player was selected at random from the group, find the probability that the player is

- male and left handed;
- right handed;
- right handed, given that the player selected is female.

(Total 4 marks)

2. The probability that it rains today is 0.4. If it rains today, the probability that it will rain tomorrow is 0.8. If it does not rain today, the probability that it will rain tomorrow is 0.7.

- Complete the tree diagram below.



(3)

- Calculate the probability of rain tomorrow.

(3)

(Total 6 marks)

16. Heinrich rolls two 6-sided dice at the same time. One die has three red sides and three black sides. The other die has the sides numbered from 1 to 6. By means of a tree diagram, table of outcomes or otherwise, answer each of the following questions.

- How many different possible combinations can he roll?
- What is the probability that he will roll a red and an even number?
- What is the probability that he will roll a red or black and a 5?
- What is the probability that he will roll a number less than 3?

(Total 8 marks)

3. A survey was carried out at an international airport. A number of travellers were interviewed and asked for their flight destinations. The results are shown in the table below.

Destination	America	Africa	Asia
Number of males	45	62	37
Number of females	35	46	25

One traveller is to be chosen at random from all those interviewed.

- (a) Find the probability that this traveller was going to Africa. (2)

One female traveller is to be chosen at random from all those interviewed.

- (b) Find the probability that this female traveller was going to Asia. (2)

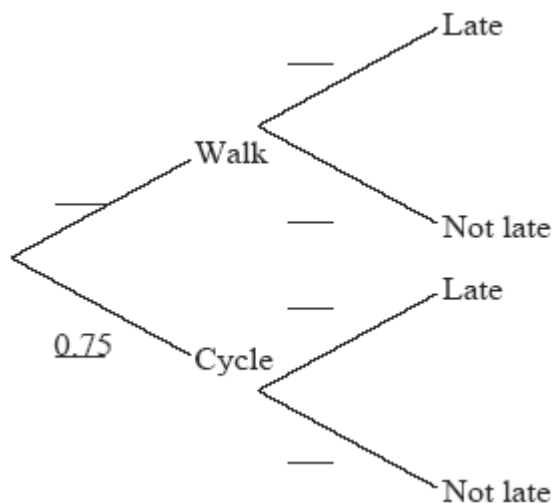
One traveller is to be chosen at random from those **not** going to America.

- (c) Find the probability that the chosen traveller is female. (2)
(Total 6 marks)

4. Maria travels to school either by walking or by bicycle. The probability she cycles to school is 0.75.

If she walks, the probability that she is late for school is 0.1.
 If she cycles, the probability that she is late for school is 0.05.

- (a) Complete the tree diagram below, showing the appropriate probabilities.



- (3)

- (b) Find the probability that Maria is late for school. (3)
(Total 6 marks)

5. In a research project on the relation between the gender of 150 science students at college and their degree subject, the following set of data is collected.

		Degree Subject		
		Biology	Physics	Chemistry
Gender	Male	40	16	35
	Female	15	24	20

Find the probability that a student chosen at random

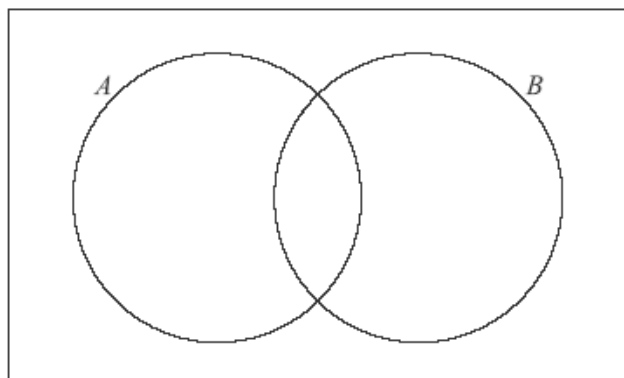
- (a) is male; (2)
- (b) is either male or studies Chemistry; (2)
- (c) studies Physics, given that the student is male. (2)

(Total 6 marks)

6. A group of 30 students were asked about their favourite topping for toast.

18 liked peanut butter (A)
 10 liked jam (B)
 6 liked neither

- (a) Show this information on the Venn diagram below.



- (2)
- (b) Find the number of students who like both peanut butter and jam. (2)
- (c) Find the probability that a randomly chosen student from the group likes peanut butter, given that they like jam.

(2)
(Total 6 marks)

8. *Note: For this question, it is important that you show your working and explain your method clearly.*

A box contains 10 coloured light bulbs, 5 green, 3 red and 2 yellow. One light bulb is selected at random and put into the light fitting of room A.

- (a) What is the probability that the light bulb selected is
- (i) green? (1)
 - (ii) not green? (1)

A second light bulb is selected at random and put into the light fitting in room B.

- (b) What is the probability that
- (i) the second light bulb is green given the first light bulb was green? (1)
 - (ii) both light bulbs are not green? (2)
 - (iii) one room has a green light bulb and the other room does not have a green light bulb? (3)

A third light bulb is selected at random and put in the light fitting of room C.

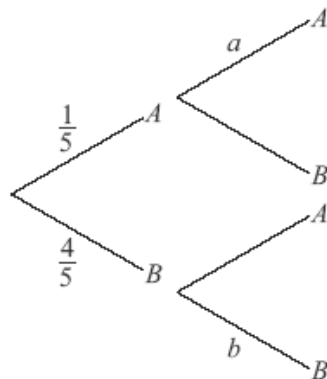
- (c) What is the probability that
- (i) all three rooms have green light bulbs? (2)
 - (ii) only one room has a green light bulb? (3)
 - (iii) at least one room has a green light bulb? (2)
- (Total 15 marks)

7. Let $P(A) = 0.5$, $P(B) = 0.6$ and $P(A \cup B) = 0.8$.

- (a) Find $P(A \cap B)$. (2)
- (b) Find $P(A | B)$. (2)
- (c) Decide whether A and B are independent events. Give a reason for your answer. (2)

(Total 6 marks)

9. (a) Phoebe chooses a biscuit from a blue tin on a shelf. The tin contains one chocolate biscuit and four plain biscuits. She eats the biscuit and chooses another one from the tin. The tree diagram below represents the situation with the four possible outcomes where A stands for chocolate biscuit and B for plain biscuit.



- (i) Write down the value of a .
- (ii) Write down the value of b .
- (iii) Find the probability that both biscuits are plain.

(6)

10. 100 students are asked what they had for breakfast on a particular morning. There were three choices: cereal (X), bread (Y) and fruit (Z). It is found that

10 students had all three
 17 students had bread and fruit only
 15 students had cereal and fruit only
 12 students had cereal and bread only
 13 students had only bread
 8 students had only cereal
 9 students had only fruit

- (a) Represent this information on a Venn diagram.
- (b) Find the number of students who had none of the three choices for breakfast.
- (c) Write down the percentage of students who had fruit for breakfast.
- (d) Describe in words what the students in the set $X \cap Y'$ had for breakfast.
- (e) Find the probability that a student had **at least** two of the three choices for breakfast.
- (f) Two students are chosen at random. Find the probability that both students had all three choices for breakfast.

(4)

(2)

(2)

(2)

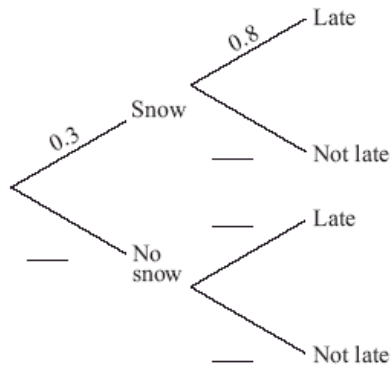
(2)

(3)

(Total 15 marks)

11. The probability that it will snow tomorrow is 0.3.
 If it snows tomorrow the probability that Chuck will be late for school is 0.8.
 If it does not snow tomorrow the probability that Chuck will be late for school is 0.1.

(a) Complete the tree diagram below.



(3)

(b) Find the probability that it does not snow tomorrow and Chuck is late for school.

(1)

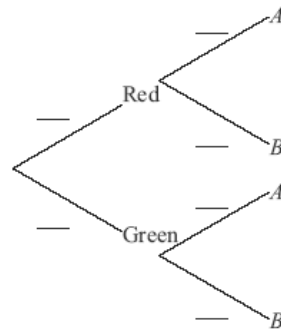
(c) Find the probability that Chuck is late for school.

(2)

(Total 6 marks)

12. On another shelf there are two tins, one red and one green. The red tin contains three chocolate biscuits and seven plain biscuits and the green tin contains one chocolate biscuit and four plain biscuits. Andrew randomly chooses either the red or the green tin and randomly selects a biscuit.

(b) **Copy and complete** the tree diagram below.



(3)

(c) Find the probability that

(i) he chooses a chocolate biscuit;

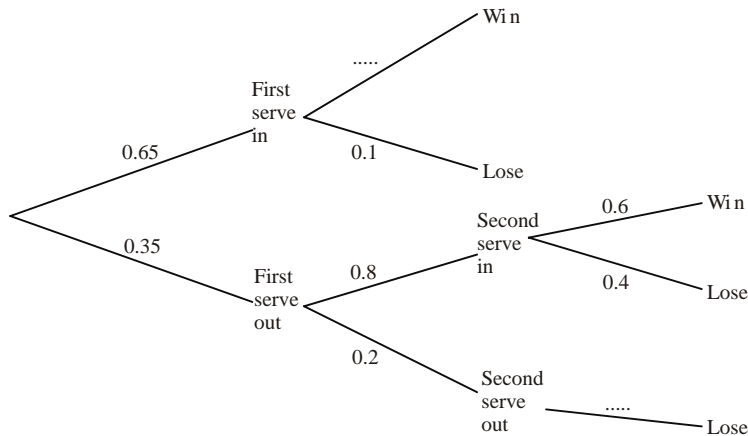
(ii) he chooses a biscuit from the red tin given that it is a chocolate biscuit.

(6)

(Total 15 marks)

12. When Andy plays tennis, 65% of his first serves go into the correct area of the court. If the first serve goes into the correct area, his chance of winning the point is 90%. If his first serve does not go into the correct area, Andy is allowed a second serve and, of these, 80% go into the correct area. If the second serve goes into the correct area, his chance of winning the point is 60%. If neither serve goes into the correct area, Andy loses the point.

(a) Complete the tree diagram below.



(2)

(b) Find the probability that Andy loses the point.

(4)

(Total 6 marks)

13. A group of 50 students completed a questionnaire for a Mathematical Studies project. The following data was collected.

- 18 students own a digital camera (D)
- 15 students own an iPod (I)
- 26 students own a cell phone (C)
- 1 student owns all three items
- 5 students own a digital camera and an iPod but not a cell phone
- 2 students own a cell phone and an iPod but not a digital camera
- 3 students own a cell phone and a digital camera but not an iPod

(a) Represent this information on a Venn diagram.

(4)

(b) Calculate the number of students who own none of the items mentioned above.

(2)

(c) If a student is chosen at random, write down the probability that the student owns a digital camera **only**.

(1)

(d) If two students are chosen at random, calculate the probability that they both own a cell phone **only**.

(3)

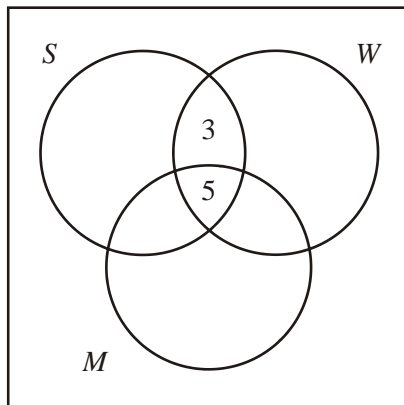
(e) If a student owns an iPod, write down the probability that the student also owns a digital camera.

(2)

(Total 12 marks)

14. There are 49 mice in a pet shop.
 30 mice are white.
 27 mice are male.
 18 mice have short tails.
 8 mice are white and have short tails.
 11 mice are male and have short tails.
 7 mice are male but neither white nor short-tailed.
 5 mice have all three characteristics and
 2 have none.

Copy the diagram below to your examination script.



U
 W represents white mice.
 M represents male mice.
 S represents short-tailed mice.

- (a) Complete the diagram, using the information given in the question. (4)

- (b) Find (i) $n(M \cap W)$
 (ii) $n(M' \cup S)$ (3)

Two mice are chosen without replacement.

- (c) Find P (both mice are short-tailed). (2)
(Total 9 marks)

15. Amos travels to school either by car or by bicycle. The probability of being late for school is $\frac{1}{10}$ if he travels by car and $\frac{1}{5}$ if he travels by bicycle. On any particular day he is equally likely to travel by car or by bicycle.

- (a) Draw a probability tree diagram to illustrate this information. (4)

- (b) Find the probability that
 (i) Amos will travel by car and be late. (2)

- (ii) Amos will be late for school. (3)

- (c) Given that Amos is late for school, find the probability that he travelled by bicycle. (3)
(Total 12 marks)