

1. (a) List the elements of the set  $A = \{x \mid -4 \leq x \leq 2, x \text{ is an integer}\}$ . (1)

A number is chosen at random from set  $A$ .

Write down the probability that the number chosen is

- (b) a negative integer; (2)

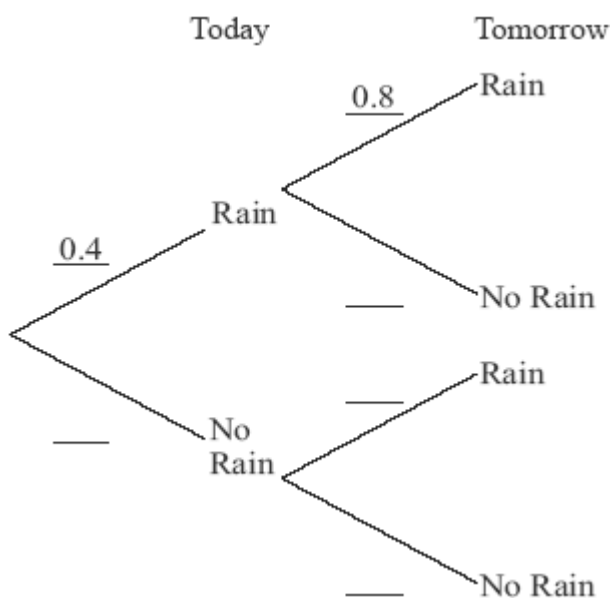
- (c) a positive even integer; (1)

- (d) an odd integer less than  $-1$ . (2)

**(Total 6 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.

- (a) Complete the tree diagram below.



(3)

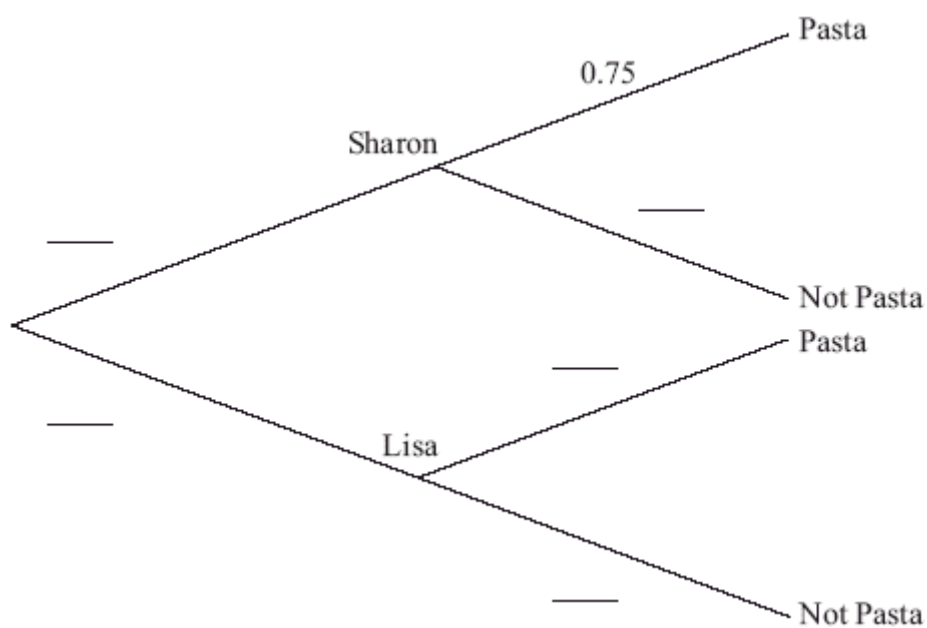
(b) Calculate the probability of rain tomorrow.

(3)

(Total 6 marks)

3. Sharon and Lisa share a flat. Sharon cooks dinner three nights out of ten. If Sharon does not cook dinner, then Lisa does. If Sharon cooks dinner the probability that they have pasta is 0.75. If Lisa cooks dinner the probability that they have pasta is 0.12.

(a) **Copy and complete** the tree diagram to represent this information.



(3)

(b) Find the probability that Lisa cooks dinner and they do not have pasta.

(2)

(c) Find the probability that they do not have pasta.

(3)

(d) Given that they do not have pasta, find the probability that Lisa cooked dinner.

(3)

(Total 11 marks)

4.  $U$  is the set of all the **positive** integers less than or equal to 12.  
 $A$ ,  $B$  and  $C$  are subsets of  $U$ .

$$A = \{1, 2, 3, 4, 6, 12\}$$

$$B = \{\text{odd integers}\}$$

$$C = \{5, 6, 8\}$$

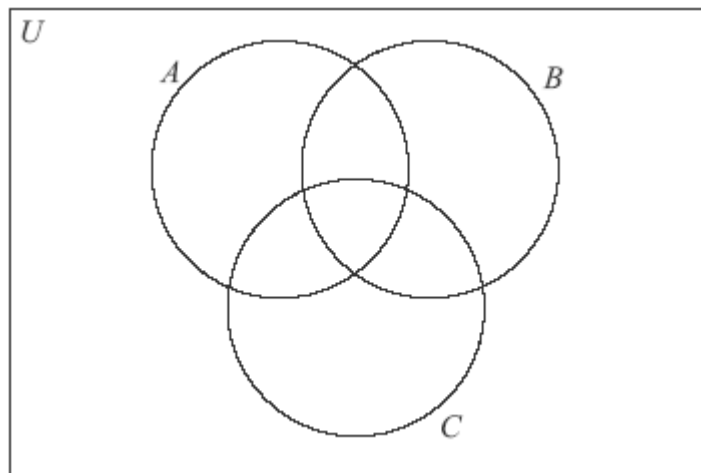
- (a) Write down the number of elements in  $A \cap C$ .

(1)

- (b) List the elements of  $B$ .

(1)

- (c) Complete the following Venn diagram with **all** the elements of  $U$ .



(4)

(Total 6 marks)

5. 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)**

6. One day the number of customers at three cafés, “Alan’s Diner” ( $A$ ), “Sarah’s Snackbar” ( $S$ ) and “Pete’s Eats” ( $P$ ) was recorded and are given below.

17 were customers of Pete’s Eats only  
27 were customers of Sarah’s Snackbar only  
15 were customers of Alan’s Diner only  
10 were customers of Pete’s Eats **and** Sarah’s Snackbar **but not** Alan’s Diner  
8 were customers of Pete’s Eats **and** Alan’s Diner **but not** Sarah’s Snackbar

- (a) Draw a Venn Diagram, using sets labelled  $A$ ,  $S$  and  $P$ , that shows this information. (3)

There were 48 customers of Pete’s Eats that day.

- (b) Calculate the number of people who were customers of all three cafés. (2)

There were 50 customers of Sarah’s Snackbar that day.

- (c) Calculate the total number of people who were customers of Alan’s Diner. (3)

(d) Write down the number of customers of Alan's Diner that were also customers of Pete's Eats. (1)

(e) Find  $n[(S \cup P) \cap A']$ . (2)

(Total 11 marks)

7. A survey of 100 families was carried out, asking about the pets they own. The results are given below.

56 owned dogs ( $S$ )  
38 owned cats ( $Q$ )  
22 owned birds ( $R$ )  
16 owned dogs and cats, but not birds  
8 owned birds and cats, but not dogs  
3 owned dogs and birds, but not cats  
4 owned all three types of pets

(a) Draw a Venn diagram to represent this information. (5)

(b) Find the number of families who own no pets. (2)

(c) Find the percentage of families that own exactly one pet. (3)

(d) A family is chosen at random. Find the probability that they own a cat, given that they own a bird. (2)

(Total 12 marks)

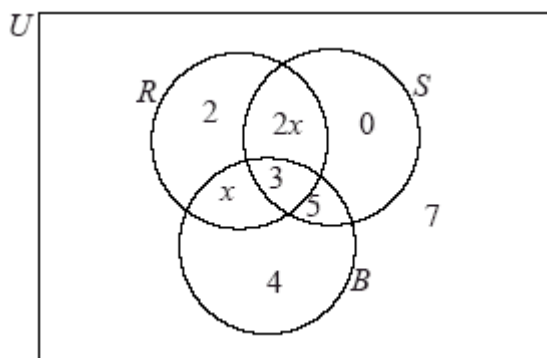
8. 100 students are asked what they had for breakfast on a particular morning. There were three choices: cereal ( $X$ ), bread ( $Y$ ) and fruit ( $Z$ ). It is found that

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. (4)
- (b) Find the number of students who had none of the three choices for breakfast. (2)
- (c) Write down the percentage of students who had fruit for breakfast. (2)
- (d) Describe in words what the students in the set  $X \cap Y$  had for breakfast. (2)
- (e) Find the probability that a student had **at least** two of the three choices for breakfast. (2)
- (f) Two students are chosen at random. Find the probability that both students had all three choices for breakfast. (3)

(Total 15 marks)

9. A survey was carried out in a year 12 class. The pupils were asked which pop groups they like out of the *Rockers* ( $R$ ), the *Salseros* ( $S$ ), and the *Bluers* ( $B$ ). The results are shown in the following diagram.



(a) Write down  $n(R \cap S \cap B)$ . (1)

(b) Find  $n(R')$ . (2)

(c) Describe which groups the pupils in the set  $S \cap B$  like. (2)

(d) Use set notation to describe the group of pupils who like the *Rockers* and the *Bluers* but do not like the *Salseros*. (2)

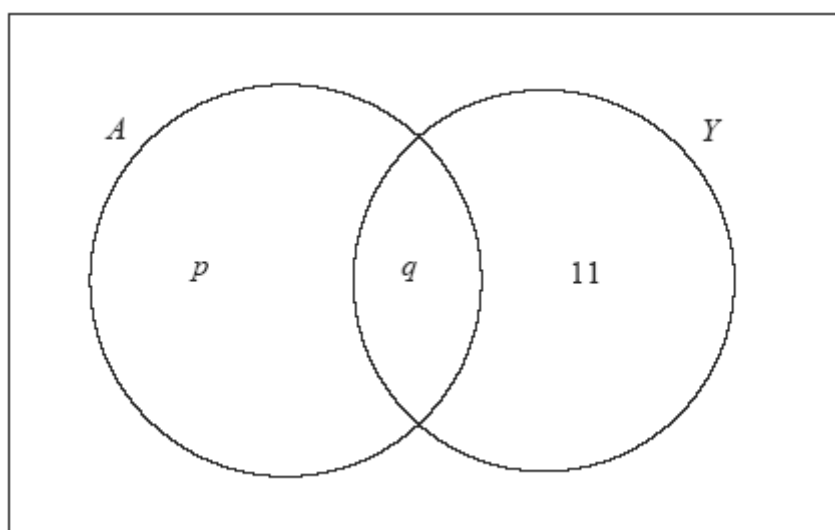
There are 33 pupils in the class.

(e) (i) Find  $x$ .

(ii) Find the number of pupils who like the *Rockers*.

(3)  
(Total 10 marks)

10. A fitness club has 60 members. 35 of the members attend the club's aerobics course ( $A$ ) and 28 members attend the club's yoga course ( $Y$ ). 17 members attend both courses. A Venn diagram is used to illustrate this situation.

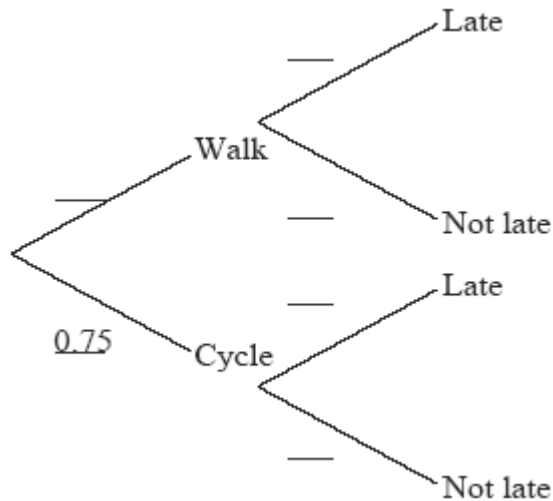


- (a) Write down the value of  $q$ . (1)
- (b) Find the value of  $p$ . (2)
- (c) Calculate the number of members of the fitness club who attend neither the aerobics course ( $A$ ) nor the yoga course ( $Y$ ). (2)
- (d) Shade, on your Venn diagram,  $A' \cap Y$ . (1)
- (Total 6 marks)**

- 11.** 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.





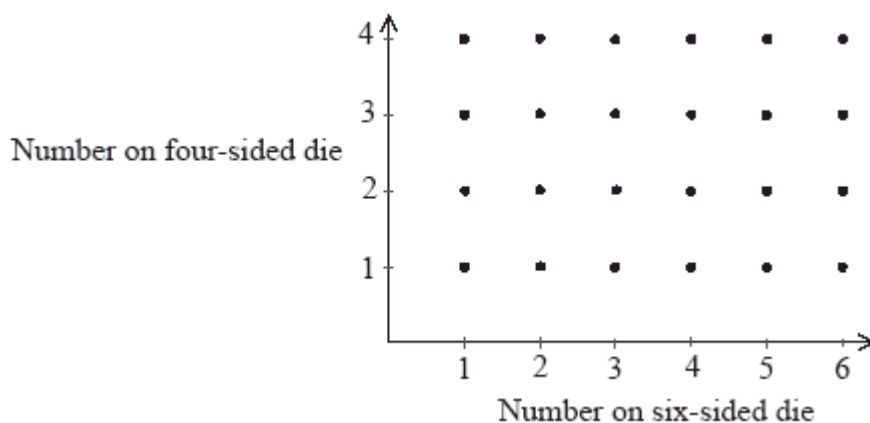
- (b) Find the probability that Maria is late for school.

(3)

(Total 6 marks)

12. A fair six-sided die has the numbers 1, 2, 3, 4, 5, 6 written on its faces. A fair four-sided die has the numbers 1, 2, 3, and 4 written on its faces. The two dice are rolled.

The following diagram shows the possible outcomes.



- (a) Find the probability that the two dice show the same number.

(2)

- (b) Find the probability that the difference between the two numbers shown on the dice is 1.

(2)

- (c) Find the probability that the number shown on the four-sided die is greater than the number shown on the six-sided die, given that the difference between the two numbers is 1.

(2)

(Total 6 marks)

13. 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

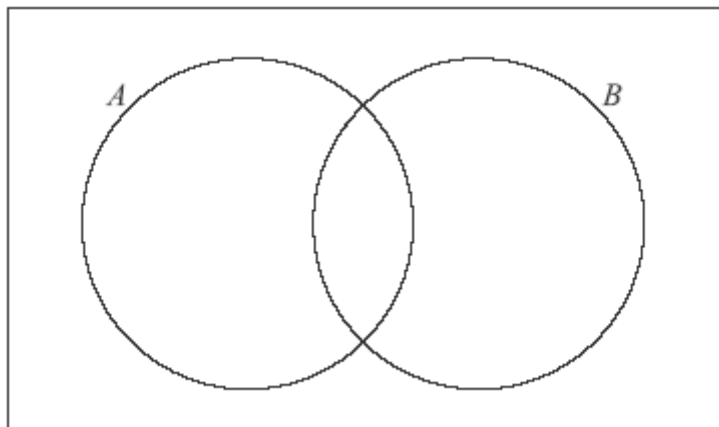
- (a) is male; (2)
- (b) is either male or studies Chemistry; (2)
- (c) studies Physics, given that the student is male. (2)

**(Total 6 marks)**

14. 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)**

15. Consider the universal set  $U = \{x \in \mathbb{N} \mid 3 < x < 13\}$ , and the subsets  $A = \{\text{multiples of 3}\}$  and  $B = \{4, 6, 12\}$ .

(a) List the elements of the following sets.

(i)  $A$

(ii)  $A \cap B'$

(2)

(b) Write down one element of  $(A \cup B)'$ .

(2)

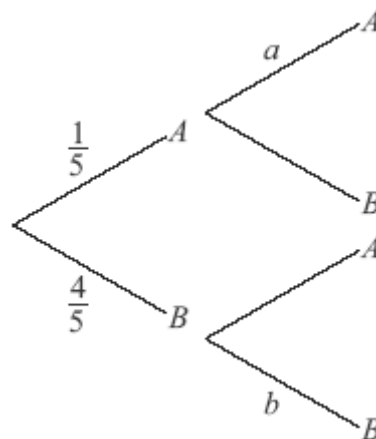
(c) One of the statements in the table below is false. Indicate with an **X** which statement is false. Give a reason for your answer.

$n(A \cup B) = 4$	
$15 \in A'$	
$A \subset A \cup B$	

(2)

(Total 6 marks)

16. (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.

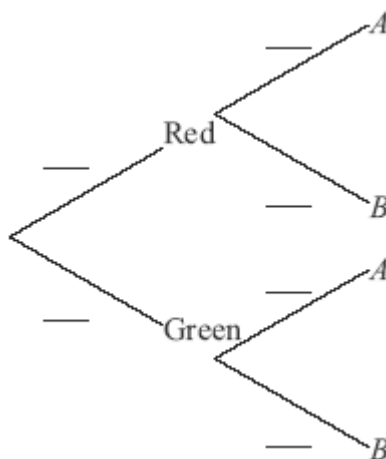


- (i) Write down the value of  $a$ .
- (ii) Write down the value of  $b$ .
- (iii) Find the probability that both biscuits are plain.

(6)

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)**

17. A survey was carried out in a group of 200 people. They were asked whether they smoke or not. The collected information was organized in the following table.

	<b>Smoker</b>	<b>Non-smoker</b>
<b>Male</b>	60	40
<b>Female</b>	30	70

One person from this group is chosen at random.

- (a) Write down the probability that this person is a smoker. (2)
- (b) Write down the probability that this person is male given that they are a smoker. (2)
- (c) Find the probability that this person is a smoker or is male. (2)

**(Total 6 marks)**