Mutually exclusive & independent

Question Paper 1

Level	A LEVEL
Exam Board	Edexcel
Subject	Mathematics
Module	Mechanics and Statistics
Topic	Probability
Sub-Topic	Mutually exclusive & independent
Booklet	Question Paper 1

Time Allowed: 25 minutes

Score: /20

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

1   The Venn diagram in Figure 1 shows the number of students in a class who read any of 3 popular magazines *A*, *B* and *C*.
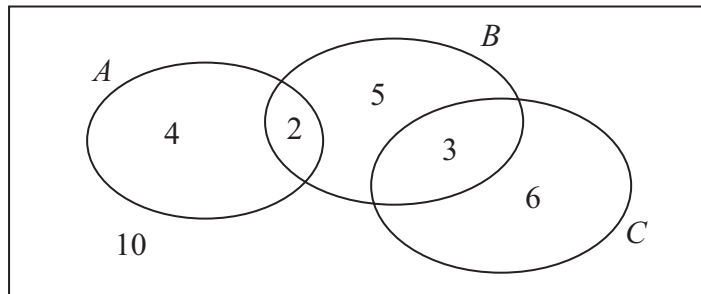

Figure 1

One of these students is selected at random.

(a) Show that the probability that the student reads more than one magazine is $\frac{1}{6}$.

(2)

(b) Find the probability that the student reads *A* or *B* (or both).

(2)

(c) Write down the probability that the student reads both *A* and *C*.

(1)

(d) Determine whether or not reading magazine *B* and reading magazine *C* are statistically independent.

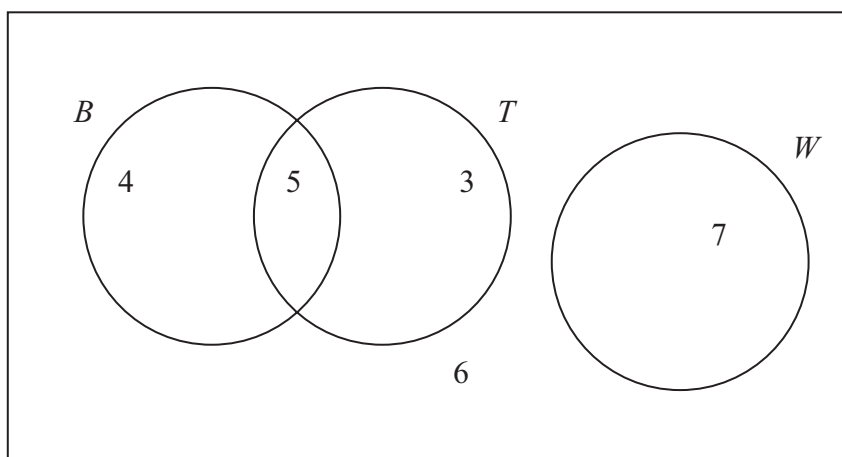**(3)**

(Total 8 marks)

2

Figure 1

Figure 1 shows how 25 people travelled to work.

Their travel to work is represented by the events

B bicycle

T train

W walk

(a) Write down 2 of these events that are mutually exclusive. Give a reason for your answer.   **(2)**

(b) Determine whether or not B and T are independent events.   **(3)**

(Total 5 marks)

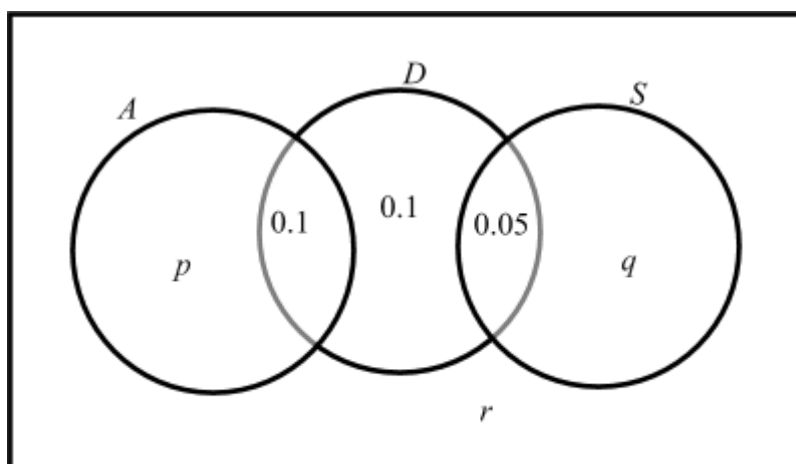3   Alyona, Dawn and Sergei are sometimes late for school.

The events A, D and S are as follows:

A Alyona is late for school

D Dawn is late for school

S Sergei is late for school

The Venn diagram below shows the three events A, D and S and the probabilities associated with each region of D. The constants p, q and r each represent probabilities associated with the three separate regions outside D.

(a) Write down 2 of the events A, D and S that are mutually exclusive. Give a reason for your answer.

(1)

The probability that Sergei is late for school is 0.2. The events A and D are independent.

(b) Find the value of r.

(4)

Dawn and Sergei's teacher believes that when Sergei is late for school, Dawn tends to be late for school.

(c) State whether or not D and S are independent, giving a reason for your answer.

(1)

(d) Comment on the teacher's belief in the light of your answer to part (c).

(1)

(Total 7 marks)