

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

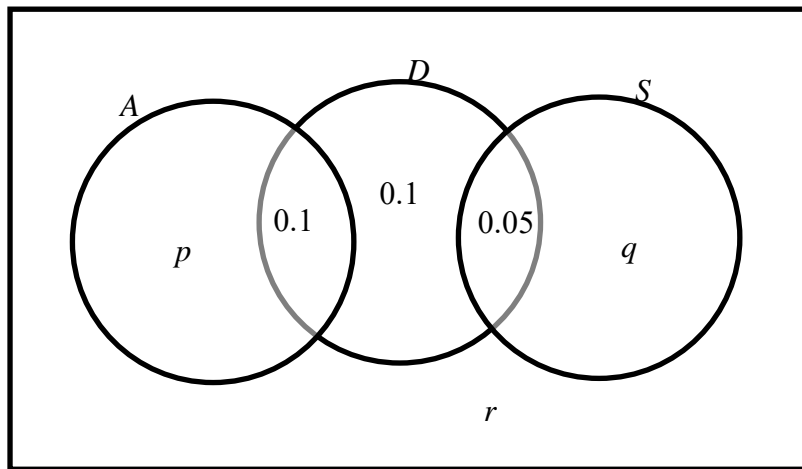
The events  $A$ ,  $D$  and  $S$  are as follows:

$A$  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 for Question 4 is 7 marks)