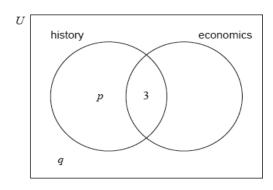
Review: Probability exam problems

**1a.** In a group of 20 girls, 13 take history and 8 take economics. Three girls take both history and economics, as shown in the following Venn diagram. The values p and q represent numbers of girls.



Find the value of p; [2 marks]

**1b.** Find the value of q. [2 marks]

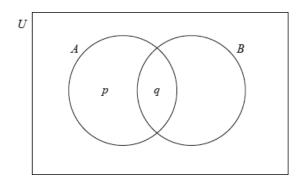
**1c.** A girl is selected at random. Find the probability that she takes economics but not history. [2 marks]

**2a.** Events A and B are independent with  $\mathrm{P}(A\cap B)=0.2$  and  $\mathrm{P}(A'\cap B)=0.6$ 

Find P(B). [2 marks]

**2b.** Find  $P(A \cup B)$ .

**3a.** The following Venn diagram shows the events A and B, where P(A)=0.4,  $P(A\cup B)=0.8$  and  $P(A\cap B)=0.1$ . The values p and q are probabilities.



(i) Write down the value of q.

(ii) Find the value of p. [3 marks]

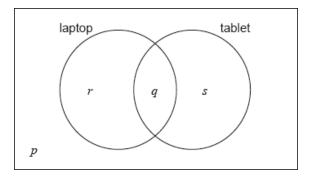
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 $\mathbf{3b.} \operatorname{Find} \mathbf{P}(B)$ . [3 marks]

**4a.** In a class of 21 students, 12 own a laptop, 10 own a tablet, and 3 own neither.

The following Venn diagram shows the events "own a laptop" and "own a tablet".

The values p, q, r and s represent numbers of students.



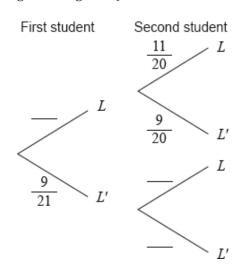
- (i) Write down the value of p.
- (ii) Find the value of q.
- (iii) Write down the value of r and of s.

[5 marks]

- **4b.** A student is selected at random from the class.
  - (i) Write down the probability that this student owns a laptop.
  - (ii) Find the probability that this student owns a laptop or a tablet but not both. [4 marks]

**4c.** Two students are randomly selected from the class. Let L be the event a "student owns a laptop".

(i) **Copy** and complete the following tree diagram. (Do **not** write on this page.)



(ii) Write down the probability that the second student owns a laptop given that the first owns a laptop.

[4 marks]

**5a.** A factory has two machines, A and B. The number of breakdowns of each machine is independent from day to day.

Let A be the number of breakdowns of Machine A on any given day. The probability distribution for A can be modelled by the following table.

а	0	1	2	3
P(A = a)	0.55	0.3	0.1	k

Find k. [2 marks]

**5b.** (i) A day is chosen at random. Write down the probability that Machine A has no breakdowns.

(ii) Five days are chosen at random. Find the probability that Machine A has no breakdowns on exactly four of these days. [3 marks]

 ${f 5c.}$  Let B be the number of breakdowns of Machine B on any given day. The probability distribution for B can be modelled by the following table.

ь	0	1	2	3
P(B=b)	0.7	0.2	0.08	0.02

Find E(B). [2 marks]

**5d.** On Tuesday, the factory uses both Machine A and Machine B. The variables A and B are independent.

- (i) Find the probability that there are exactly two breakdowns on Tuesday.
- (ii) Given that there are exactly two breakdowns on Tuesday, find the probability that both breakdowns are of Machine A. [8 marks]

**6a.** Let 
$$C$$
 and  $D$  be independent events, with  $\mathrm{P}(C) = 2k_{ ext{ and }}\mathrm{P}(D) = 3k_{ ext{ , where }}^2$ 0 <  $k < 0.5$ 

Write down an expression for  $\mathrm{P}(C\cap D)$  in terms of k.

[2 marks]

**6b.** Find P(C'|D)

[3 marks]