Probability : Venn Diagrams - Edexcel Past Exam Questions

1. Articles made on a lathe are subject to three kinds of defect, *A*, *B* or *C*. A sample of 1000 articles was inspected and the following results were obtained.

> 31 had a type *A* defect
> 37 had a type *B* defect
> 42 had a type *C* defect
> 11 had both type *A* and type *B* defects
> 13 had both type *B* and type *C* defects
> 10 had both type *A* and type *C* defects
> 6 had all three types of defect.

(*a*) Draw a Venn diagram to represent these data. **(6)**

Find the probability that a randomly selected article from this sample had

(*b*) no defects, **(1)**

(*c*) no more than one of these defects. **(2)**

Two different articles were selected at random from this sample.

(*d*) Find the probability that both had type *B* defects. **(2)**

Jan 05 Q5 *(edited)*

2. In a school there are 148 students in Years 12 and 13 studying Science, Humanities or Arts subjects. Of these students, 89 wear glasses and the others do not. There are 30 Science students of whom 18 wear glasses. The corresponding figures for the Humanities students are 68 and 44 respectively.

A student is chosen at random.

Find the probability that this student

(*a*) is studying Arts subjects, **(4)**

Amongst the Science students, 80% are right-handed. Corresponding percentages for Humanities and Arts students are 75% and 70% respectively.

A student is again chosen at random.

(*b*) Find the probability that this student is right-handed. **(3)**

June 05 Q7 *(edited)*

3. For the events *A* and *B*,

$$P(A \cap B') = 0.32, \ P(A' \cap B) = 0.11 \text{ and } P(A \cup B) = 0.65.$$

(*a*) Draw a Venn diagram to illustrate the complete sample space for the events *A* and *B*. **(3)**

(*b*) Write down the value of P(*A*) and the value of P(*B*). **(3)**

(*c*) Determine whether or not *A* and *B* are independent. **(3)**

Jan 06 Q6 *(edited)*

4. A group of 100 people produced the following information relating to three attributes. The attributes were wearing glasses, being left-handed and having dark hair.

Glasses were worn by 36 people, 28 were left-handed and 36 had dark hair. There were 17 who wore glasses and were left-handed, 19 who wore glasses and had dark hair and 15 who were left-handed and had dark hair. Only 10 people wore glasses, were left-handed and had dark hair.

(*a*) Represent these data on a Venn diagram. **(6)**

A person was selected at random from this group.

Find the probability that this person

(*b*) wore glasses but was not left-handed and did not have dark hair, **(1)**

(*c*) did not wear glasses, was not left-handed and did not have dark hair, **(1)**

(*d*) had only two of the attributes, **(2)**

June 06 Q6 *(edited)*

5. A survey of the reading habits of some students revealed that, on a regular basis, 25% read quality newspapers, 45% read tabloid newspapers and 40% do not read newspapers at all.

(*a*) Find the proportion of students who read both quality and tabloid newspapers. **(3)**

(*b*) Draw a Venn diagram to represent this information. **(3)**

June 07 Q4 *(edited)*

6. The following shows the results of a wine tasting survey of 100 people.

> 96 like wine *A*,
> 93 like wine *B*,
> 96 like wine *C*,
> 92 like *A* and *B*,
> 91 like *B* and *C*,
> 93 like *A* and *C*,
> 90 like all three wines.

(*a*) Draw a Venn Diagram to represent these data. **(6)**

Find the probability that a randomly selected person from the survey likes

(*b*) none of the three wines, **(1)**

(*c*) wine *A* but not wine *B*, **(2)**

(*d*) any wine in the survey except wine *C*, **(2)**

(*e*) exactly two of the three kinds of wine. **(2)**

Jan 08 Q5 (*edited*)

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7. A person's blood group is determined by whether or not it contains any of 3 substances *A*, *B* and *C*.

A doctor surveyed 300 patients' blood and produced the table below.

Blood contains	No. of Patients
only *C*	100
A and *C* but not *B*	100
only *A*	30
B and *C* but not *A*	25
only *B*	12
A, *B* and *C*	10
A and *B* but not *C*	3

(*a*) Draw a Venn diagram to represent this information. **(4)**

(*b*) Find the probability that a randomly chosen patient's blood contains substance *C*. **(2)**

Patients whose blood contains none of these substances are called universal blood donors.

(*d*) Find the probability that a randomly chosen patient is a universal blood donor. **(2)**

June 08 Q5 (*edited*)

8. There are 180 students at a college following a general course in computing. Students on this course can choose to take up to three extra options.

> 112 take systems support,
> 70 take developing software,
> 81 take networking,
> 35 take developing software and systems support,
> 28 take networking and developing software,
> 40 take systems support and networking,
> 4 take all three extra options.

(*a*) Draw a Venn diagram to represent this information. **(5)**
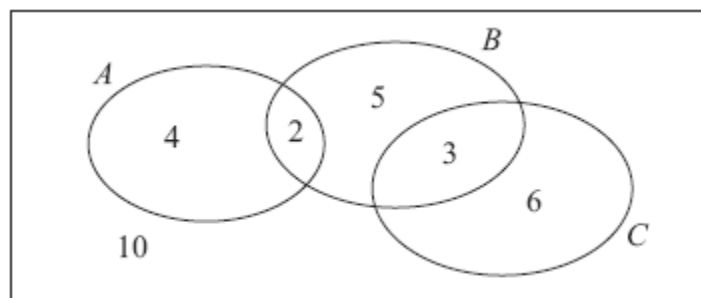
A student from the course is chosen at random.

Find the probability that the student takes

(*b*) none of the three extra options, **(1)**

(*c*) networking only. **(1)**

Jan 10 Q4 (*edited*)

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9. 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)**

June 10 Q4 (*edited*)