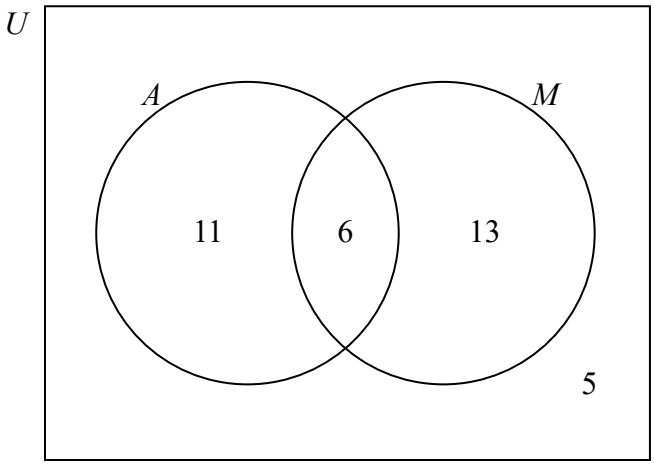
Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. In particular, solutions found from a graphic display calculator should be supported by suitable working, for example if graphs are used to find a solution, you should sketch these as part of your answer. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. You are therefore advised to show all working.

Section A

Answer **all** questions. Answers must be written within the answer boxes provided. Working may be continued below the lines if necessary.

1. [Maximum mark: 6]

In a group of 35 students, some take art class (A) and some take music class (M). 5 of these students do not take either class. This information is shown in the following Venn diagram.



(a) Write down the number of students in the group who take art class. [2]

(b) One student from the group is chosen at random. Find the probability that

(i) the student does not take art class;

(ii) the student takes either art class or music class, but not both. [4]

(This question continues on the following page)

(Question 1 continued)

(a) $n(Art) = 6+11 = 17$

(b) i) $P(A') = \frac{35-17}{35}$

$= \frac{18}{35}$

ii) $P(\text{Art or Music, not both})$

$= \frac{11+13}{35}$

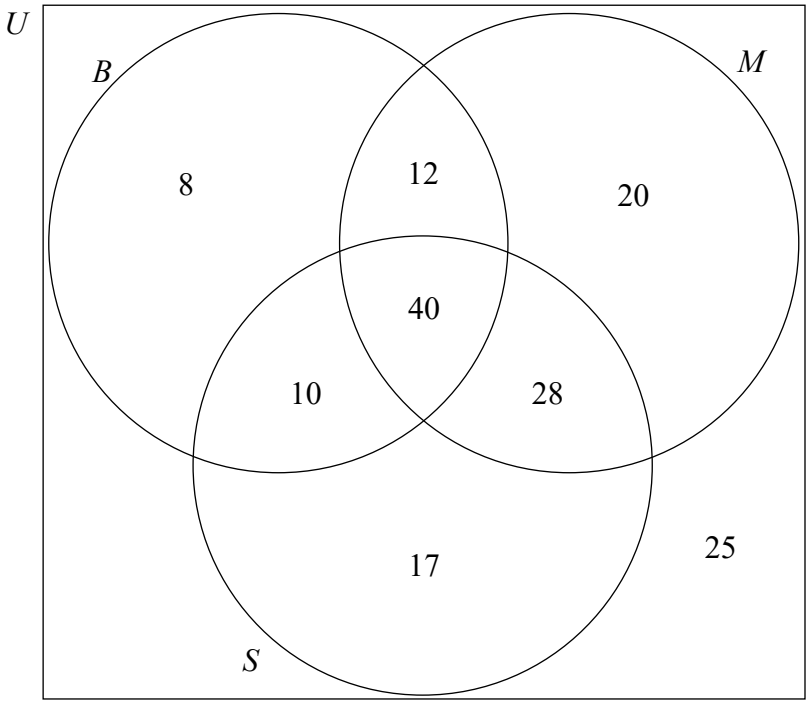
$= \frac{24}{35}$

2. [Maximum mark: 14]

160 students attend a dual language school in which the students are taught only in Spanish or taught only in English.

A survey was conducted in order to analyse the number of students studying Biology or Mathematics. The results are shown in the Venn diagram.

Set S represents those students who are **taught** in Spanish.
Set B represents those students who **study** Biology.
Set M represents those students who **study** Mathematics.



(a) Find the number of students in the school that

(i) are taught in Spanish;

(ii) study Mathematics in English;

(iii) study both Biology and Mathematics. [6]

(This question continues on the following page)

(Question 2 continued)

(b) Write down

(i) $n\big(S \cap (M \cup B)\big)$;

(ii) $n\big(B \cap M \cap S'\big)$. [2]

A student from the school is chosen at random.

(c) Find the probability that this student

(i) studies Mathematics;

(ii) studies neither Biology nor Mathematics;

(iii) is taught in Spanish, given that the student studies Biology. [6]

10 Dec 2025

4.2 Venn diagrams & Probability — Solution

(2)

a) i) $n(S) = 10 + 40 + 28 + 17$
$= 95$

ii) $n(M \cap S') = 12 + 20$
$= 32$

iii) $n(B \cap M) = 12 + 40$
$= 52$

b) i) $n(S \cap (M \cup B)) = 10 + 40 + 28$
$= 78$

ii) $n(B \cap M \cap S') = 12$

c) i) $P(M) = \frac{12+20+40+28}{160} = \frac{100}{160}$

ii) $P(B' \cap M') = \frac{17+25}{160} = \frac{42}{160}$

iii) $P(S|B) = \frac{10+40}{10+40+8+12} = \frac{50}{70}$