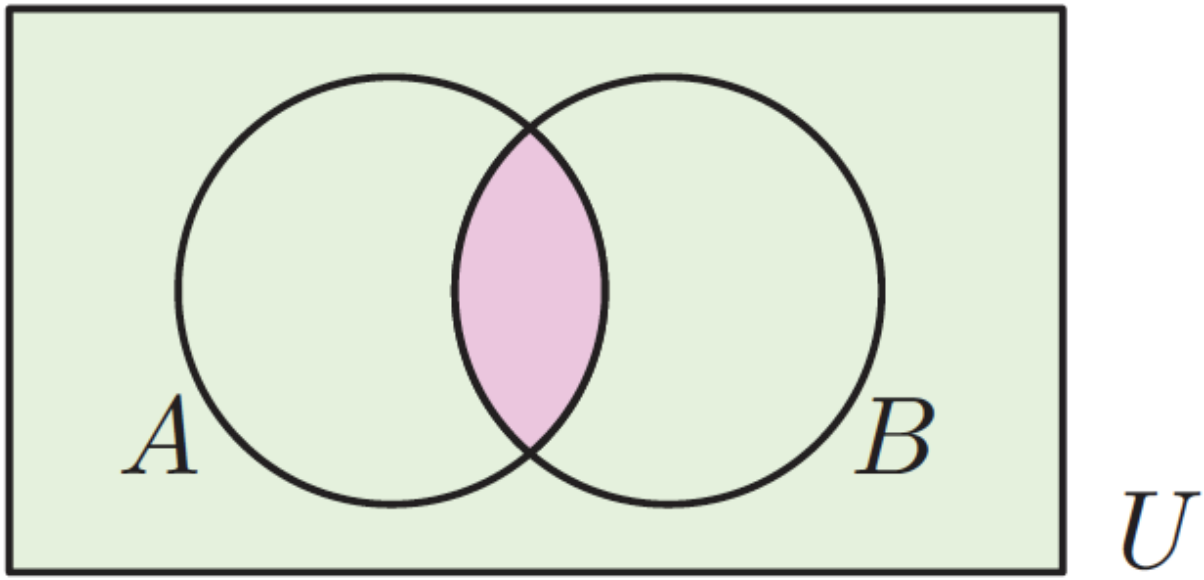
Venn diagram

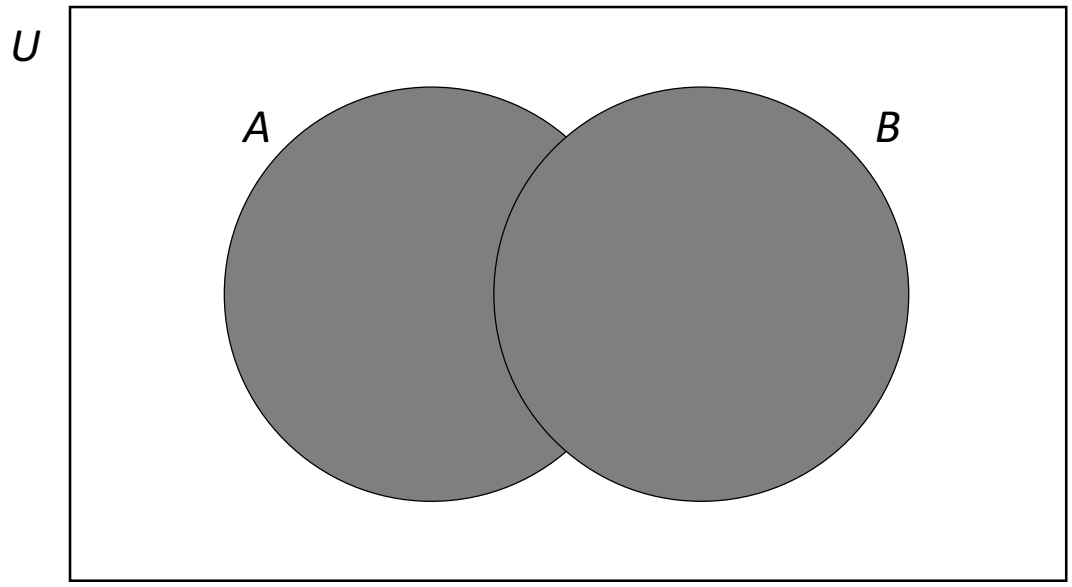
P(A ∩ B)

Intersection of sets A and B and this set contains all elements common to both sets.



P(A ∪ B)

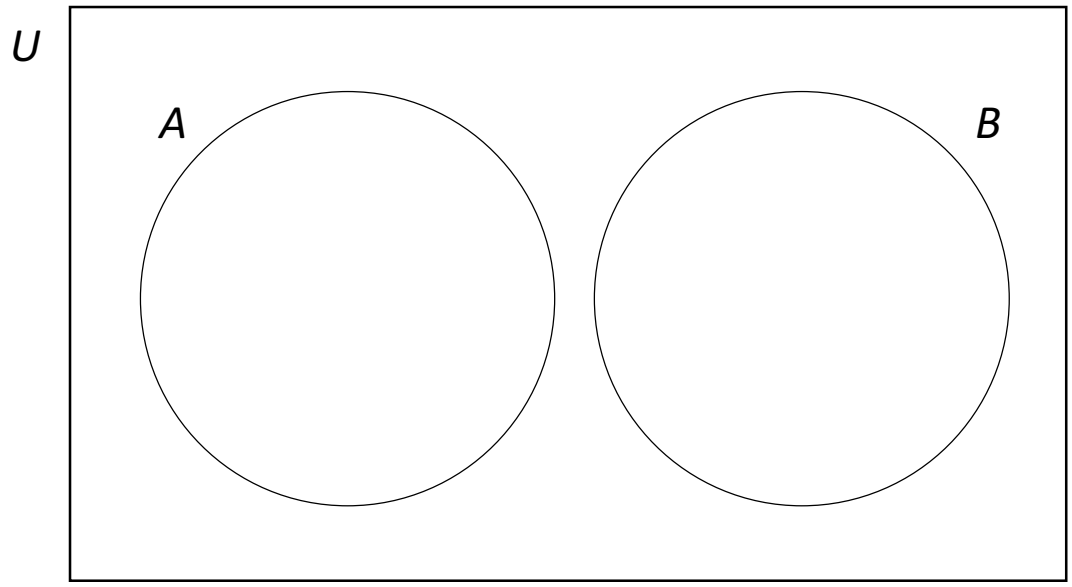
The union of sets A and B and this set contains all elements belonging to both A and B.



Mutually exclusive

$A \cap B = \emptyset$, where $\emptyset$ denotes the empty set.

$P(A \cap B) = 0$



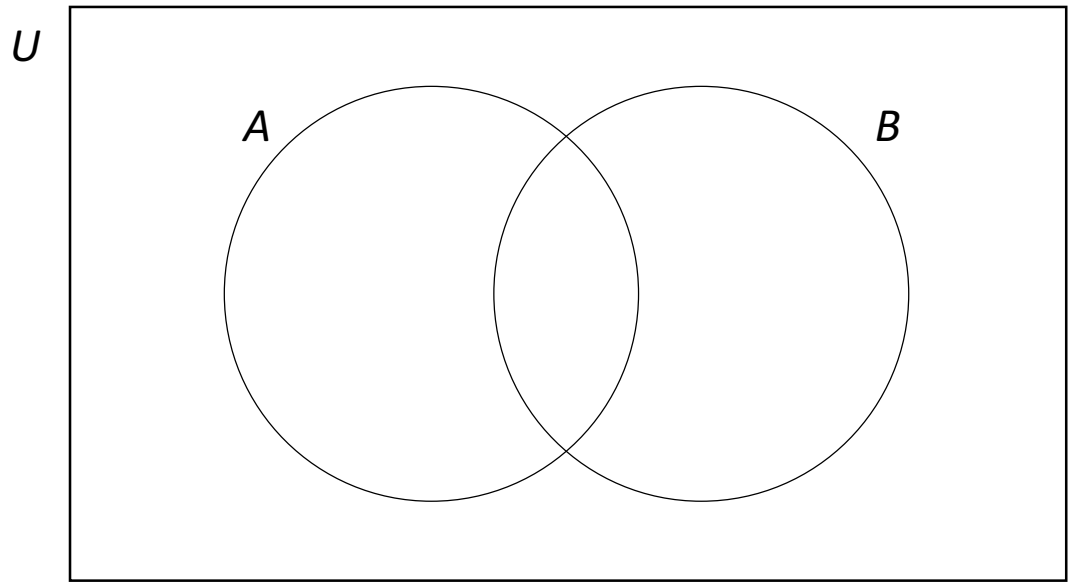
Question 1

U = {1, 2, 3, 4, 5, 6, 7, 8}

A = {1, 5, 7, 8}

B = {2, 3, 4, 5, 7}

(a) Complete the following Venn diagram.



(b) Find A’

(c) Find A ∩ B

(d) Find A ∪ B

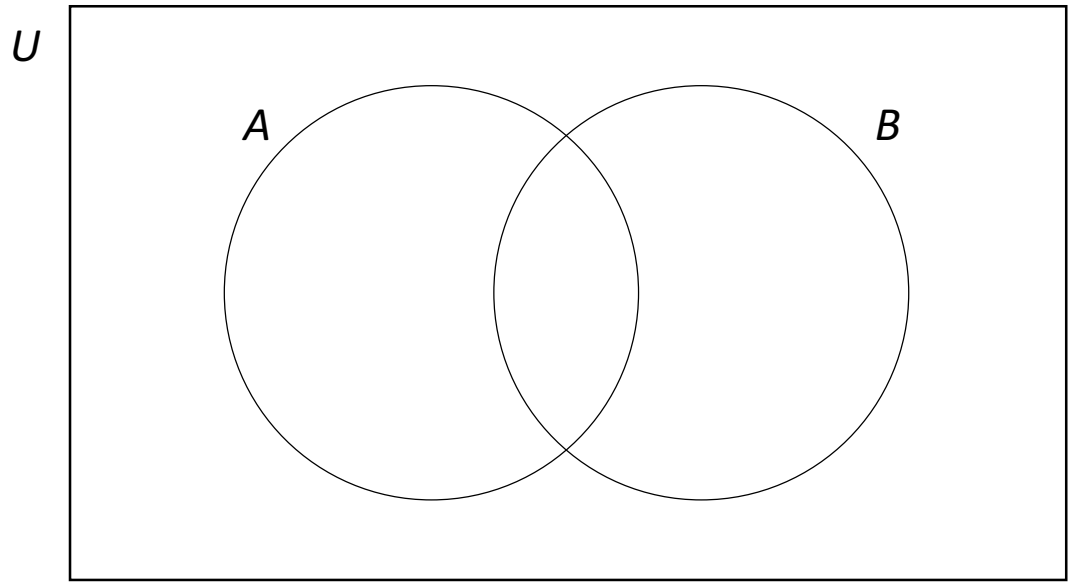
Question 2

U = {All real numbers from 1 to 20}

A = {Even numbers}

B = {All factors of 20}

(a) Complete the following Venn diagram.



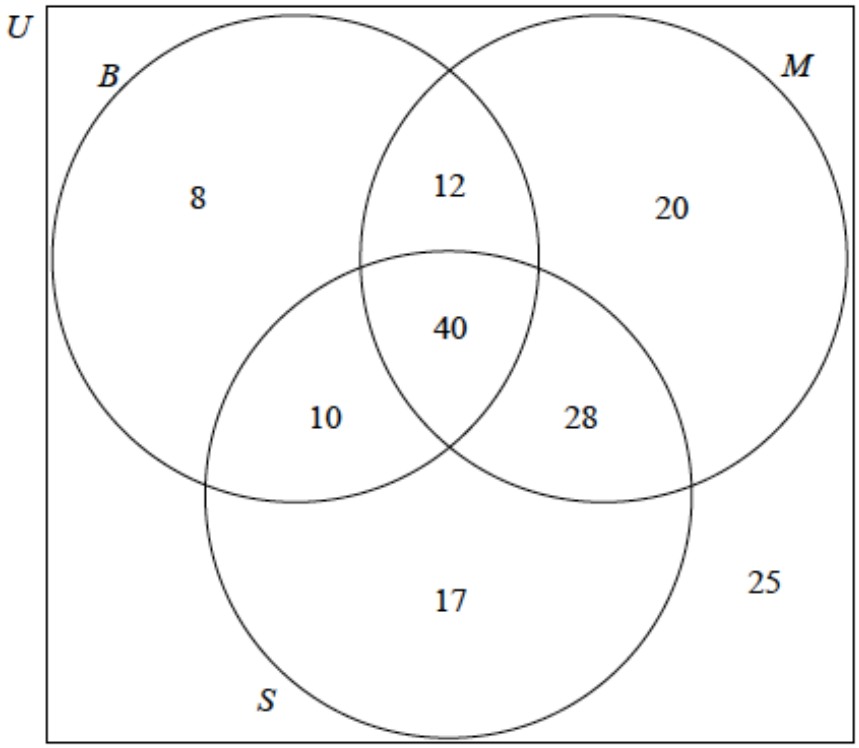
(b) Find A’

(c) Find A ⋂ B

(d) Find A ⋃ B

Exercise

1. 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.

(This question continues on the next page.)

(b) Write down

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

(ii) $n(B \cap M \cap S')$.

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;

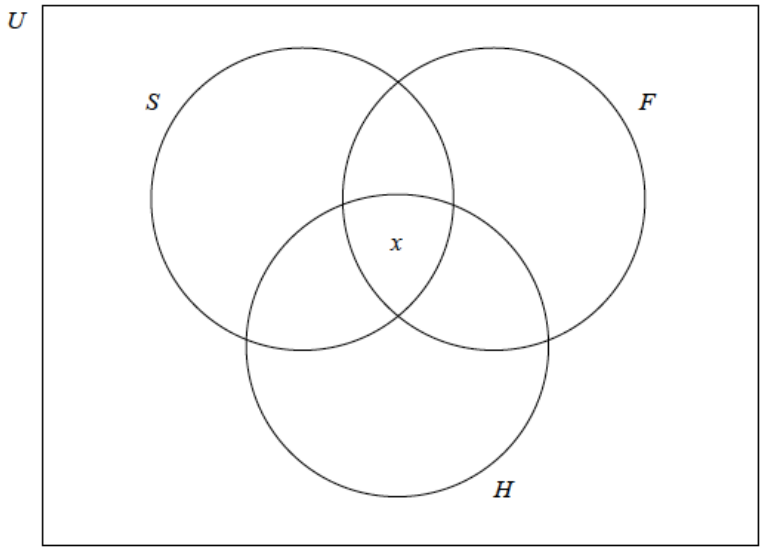
(iii) is taught in Spanish, given that the student studies Biology.

2. A group of 60 sports enthusiasts visited the PyeongChang 2018 Winter Olympic games to watch a variety of sporting events.
The most popular sports were snowboarding (*S*), figure skating (F) and ice hockey (H).

For this group of 60 people:

4 did not watch any of the most popular sports,
x watched all three of the most popular sports,
9 watched snowboarding only,
11 watched figure skating only,
15 watched ice hockey only,
7 watched snowboarding and figure skating,
13 watched figure skating and ice hockey,
11 watched snowboarding and ice hockey.

(a) Complete the Venn diagram using the given information.



(b) Find the value of x.

(c) Write down the value of $n((F \cup H \cap S'))$.

3. Consider the following Venn diagrams.

Diagram 1

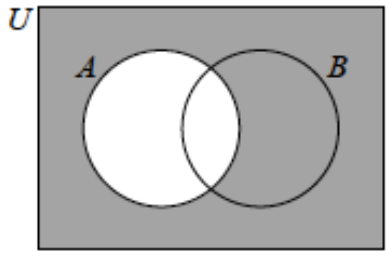


Diagram 2

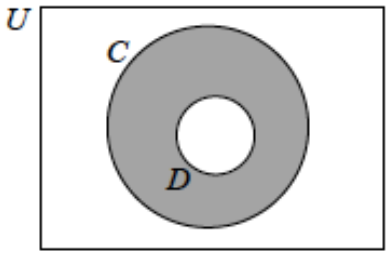
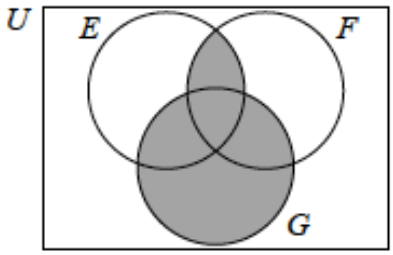


Diagram 3



(a) Write down an expression, in set notation, for the shaded region represented by

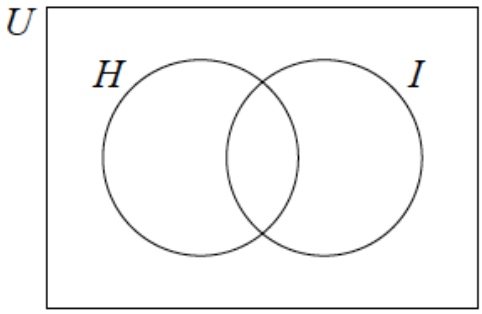
(i) Diagram 1;

(ii) Diagram 2;

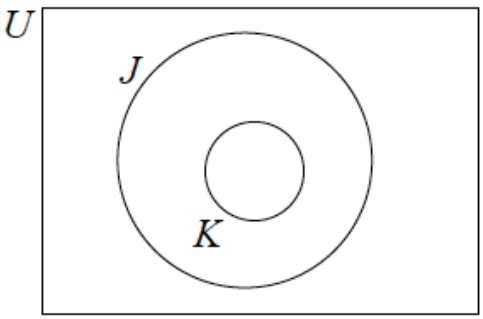
(iii) Diagram 3.

(b) Shade, on the Venn diagram, the region represented by the set

(i) $(H \cup I)'$;



(ii) $J \cap K$.

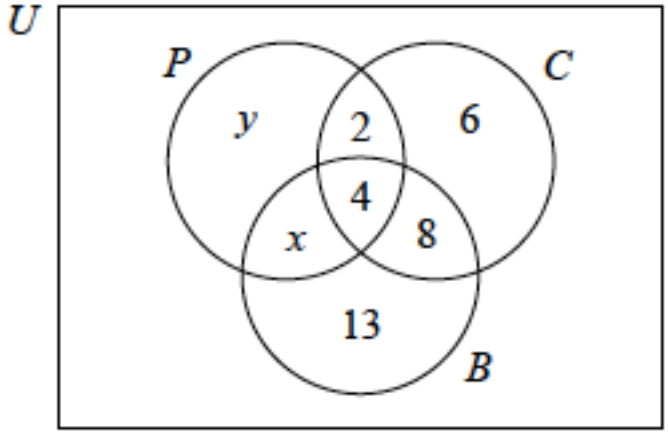


(This question continues on the next page.)

The company investigates the different means of transport used by their employees in the past year to travel to work. It was found that the three most common means of transport used to travel to work were public transportation (P), car (C) and bicycle (B).

The company finds that 20 employees travelled by car, 28 travelled by bicycle and 19 travelled by public transportation in the last year.

Some of the information is shown in the Venn diagram.



(c) Find the value of

(i) x;

(ii) y.

There are 54 employees in the company.

(d) Find the number of employees who, in the last year, did not travel to work by car, bicycle or public transportation.

(e) Find $n((C \cup B) \cap P')$.