Lesson 2

A-Level Applied Mathematics : Year 1
Statistics : Set Theory & Probability

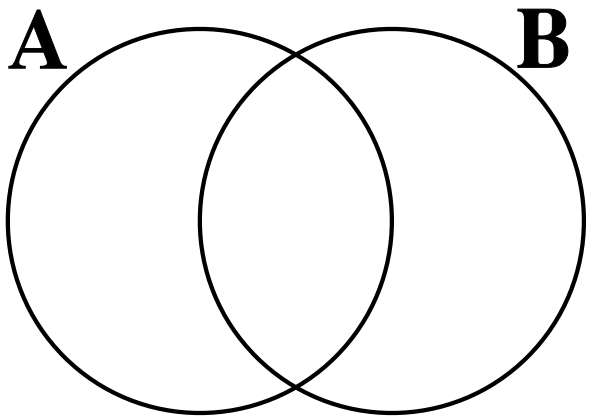
2.1 Venn Diagram Example 1

The factors of a number are the integers that divide into that number exactly.
For example, the factors of 14 are 1, 2, 7, 14.

(i) A = { factors of 30 }. List the eight factors of 30.

(ii) B = { factors of 54 }. List the eight factors of 54.

(iii) Complete the Venn diagram to show the relationship between set A and B.



(iv) The ***highest common factor*** of 30 and 54 is the biggest number that divides into 30 exactly, and also 54 exactly. What is hcf{30, 54} ?

Where is this on the Venn Diagram ?

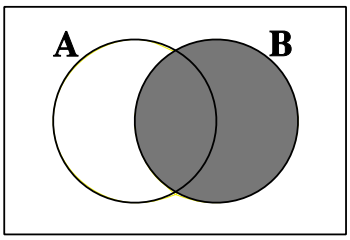
(v) The ***lowest common multiple*** of 30 and 54 is the smallest number that is in both the 30 times table and the 54 times table.
Also, $\text{hcf}\{30, 54\} \times \text{lcm}\{30, 54\} = 30 \times 54$.
What is lcm{30, 54} ?

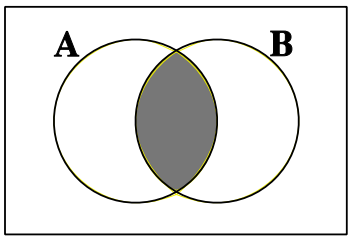
(vi) From the Venn diagram, one number is chosen at random.
What is
(a) p (factor of 30)
(b) p (factor common to 30 and 54)
(c) p (divisible by 3)

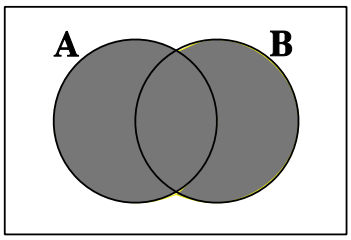
(vii) If you are told that the number chosen is a factor of 54, what is the probability that it is also a factor of 30 ?

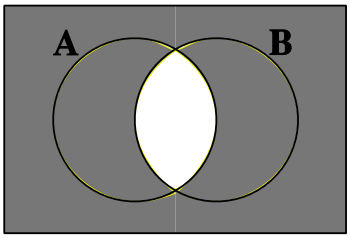
2.2 Venn Diagram Example 2

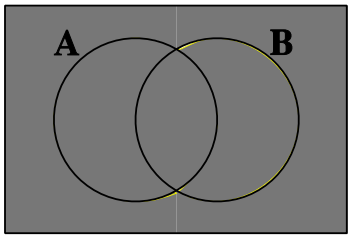
For each of the Venn diagrams below use set notation to describe the shading.

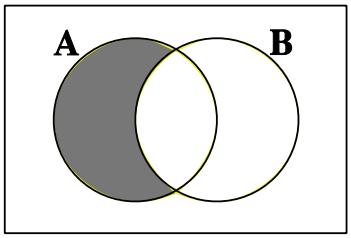












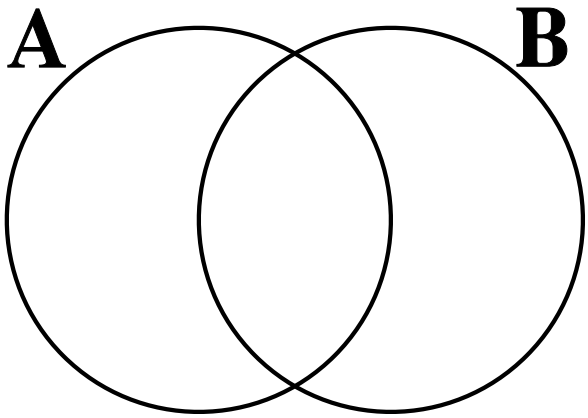
2.3 Exercise

Question 1

(i) A = { factors of 147 }. List the six factors of 147.

(ii) B = { factors of 182 }. List the eight factors of 182.

(iii) Complete the Venn diagram to show the relationship between set A and B.



(iv) The ***highest common factor*** of 147 and 182 is the biggest number that divides into 147 exactly, and also 182 exactly. What is hcf{147, 182}

Where is this on the Venn Diagram ?

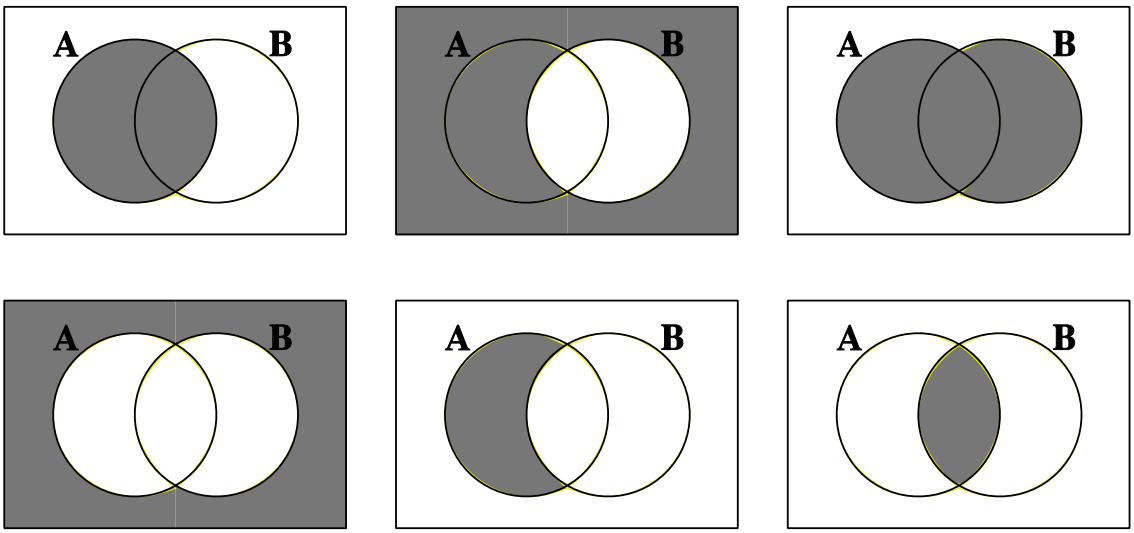
(v) The ***lowest common multiple*** of 147 and 182 is the smallest number that is in both the 147 times table and the 182 times table.
Also, hcf{147, 182} $\times$ lcm{147, 182} = 147 $\times$ 182.
What is lcm{147, 182} ?

(vi) From the Venn diagram, one number is chosen at random.
What is
(a) p (factor of 182)
(b) p (factor common to 147 and 182)
(c) p (divisible by 7)

(vii) If you are told that the number chosen is a factor of 182, what is the probability that it is also a factor of 147 ?

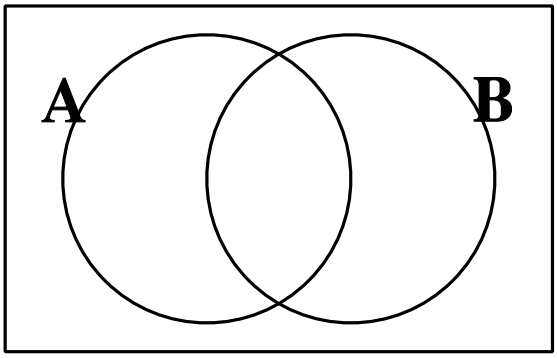
Question 2

For each of the Venn diagrams below use set notation to describe the shading.



Question 3

Given that, $p(A) = 0.7$, $p(B) = 0.5$ and $p(A \cap B) = 0.45$
complete the Venn Diagram to show the relationship between sets A and B.



What is;

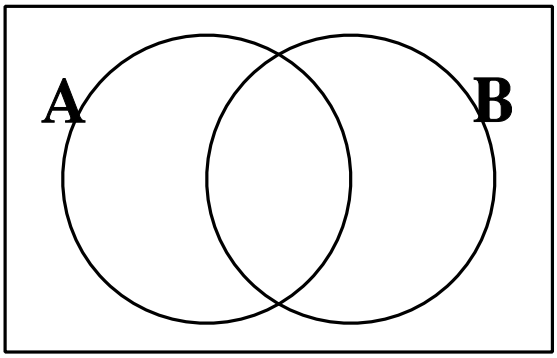
(i) $p(A')$ **(ii)** $p(A \cup B)$

(iii) $p(A \cap B')$ **(iv)** $p(A \mid B)$

Question 4

HINT : $p(A \mid B) = \frac{P(A \cap B)}{p(B)}$

Given that, $p(A) = 0.7$, $p(B) = 0.5$ and $p(A \mid B) = 0.6$
complete the Venn Diagram to show the relationship between sets A and B.



What is;

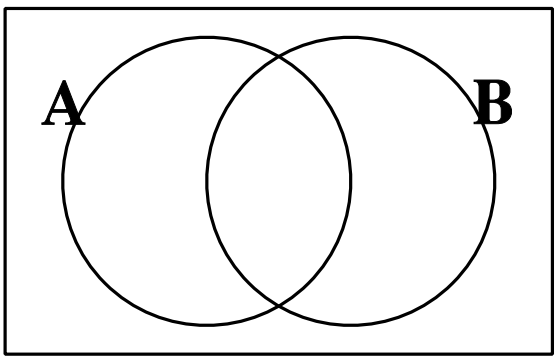
(i) $p(A \cap B)$ **(ii)** $p(B')$

(iii) $p(A \cup B)'$ **(iv)** $p(B \mid A)$

Question 5

HINT : $p(A \cup B) = p(A) + p(B) - p(A \cap B)$

Given that, $p(A) = 0.6$, $p(B) = 0.8$ and $p(A \cup B) = 0.9$
complete the Venn Diagram to show the relationship between sets A and B.



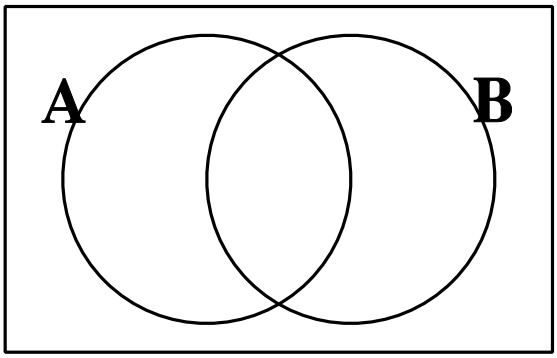
What is;

(i) $p(A \cap B)$ **(ii)** $p(A \cap B)'$

(iii) $p(A' \cup B')$ **(iv)** $p(A \mid B')$

Question 6

Given that, $p(A) = 0.3$, $p(A \mid B) = 0.5$ and $p(B \mid A) = 0.8$
complete the Venn Diagram to show the relationship between sets A and B.



What is;

(i) $p(A \cap B')$ **(ii)** $p(A' \cap B)$

(iii) $p(A' \cup B)$ **(iv)** $p(A \cup B')$