GS FOUNDATION (2023-24) BOOKLET 23
&
CSAT FOUNDATION 1.0 (2023-24) BOOKLET 24
SYLLOGISM AND VENN DIAGRAM

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1) INTRODUCTION:

Syllogism is about drawing inferences from given information.
We assume that given information is true and try to bring out the definitive conclusions that might follow due to given information.
Technique to solve syllogism involves drawing Venn diagram from given information.

2) VENN DIAGRAM:

A Venn diagram is a diagram that helps us visualize the logical relationship between sets and their elements and helps us solve examples based on these sets. A Venn diagram typically uses intersecting and non-intersecting circles (although other closed figures like squares may be used) to denote the relationship between sets.

A Venn diagram is **an illustration that uses circles to show the relationships among things or finite groups of things**. Circles that overlap have a commonality while circles that do not overlap do not share those traits. Venn diagrams help to visually represent the similarities and differences between two concepts.

3) IMPORTANT TERMS:

Set: A collection of distinct elements that have something in common.

Universal set:
It is easier to first consider a larger set called a universal set that contains all of the elements in all of the sets that are being considered.

Sub-set: A subset is actually a set that is contained within another set.
For instance, set of multiples of 4 is a subset of even numbers and natural numbers is subset of integers.

Proper sub-set: One set is entirely contained within another

Disjoint sets: If there's no common element between sets

Examples:
A set of all even numbers from 1 to 30 and set of all multiples of 5 from 1 to 30
A set with various types of fruits, A = {guava, orange, mango, custard apple, papaya, watermelon, cherry}. Represent these subsets using sets notation: a) Fruit with one seed b) Fruit with more than one seed

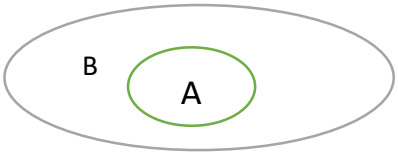
4) OPERATIONS ON SETS:

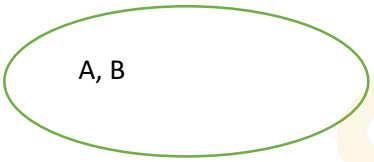
- Union: set of all elements that belong to either set
- Intersections: Elements that belong to both sets

- Complement: Elements that don't belong to set (those outside set but inside universal set)
- Difference of set (A – B): elements that are in set A but not in B

5) VARIOUS PREMISES AND CORRESPONDING VENN DIAGRAMS:

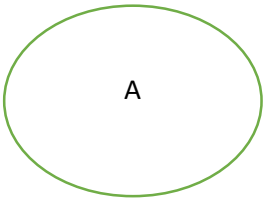
1. All As are B

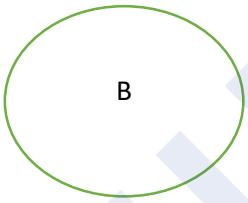




We cannot conclude all Bs are As or A is completely inside B.

2. When no A is B

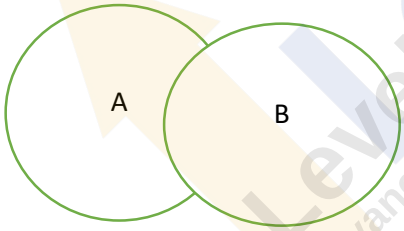


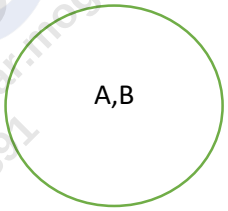


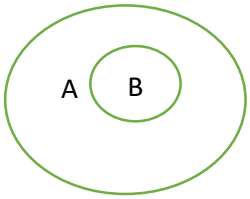
We can infer "No B is A"
We can infer "All As are not B"

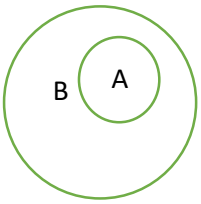
3. Some A are B

NOTE: Some includes case where all A are B as well





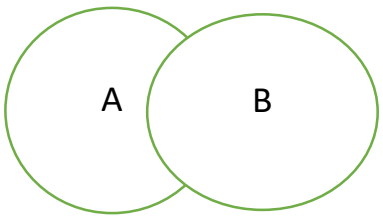


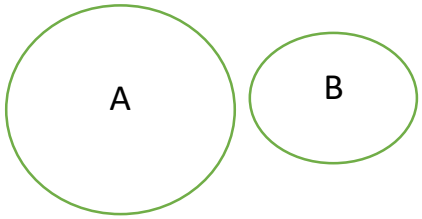


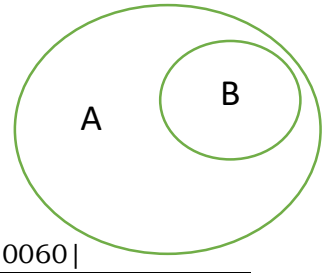
At least 1 element is common in both A and B
Can't infer "Some A are not B"
We can infer some Bs are A

4. Some A are not B

NOTE: Includes case where no A are B







There is at least 1 element in A that is not in B
Cannot infer “Some A are B”
Cannot infer “Some B are not A”

Example:
In a class of 60 students, 17 like pizza; 18 like burger and 20 like roti-sabji. 5 students like both pizza and burger, while 8 like roti-sabji and burger. 2 students like all three dishes. Plot Venn diagram.
How many students do not like pizza and burger?
How many students do not like any of the dishes?
How many like only pizza?
How many like only burger?
How many like only roti-sabji?
How many like both pizza and burger but not roti-sabji?
How many students like at least one of the three dishes?

6) IMPORTANT FORMULAE IN SET THEORY:

Number of elements in A U B:
n (A U B) = n(A) + n(B) – n(A∩B)
Further,

Number of Elements in A U B U C
N (A U B U C) = n(A) + n(B) + n(C) – n(A ∩ B) – n(B ∩ C) – n (A ∩ C) + n(A∩B∩C)

De Morgan’s Laws:
$(A \cup B)^c = A^c \cap B^c$
$(A \cap B)^c = A^c \cup B^c$

Let us understand De Morgan's Law with the help of a simple example. Let the universal set U = {7, 8, 9, 10, 11, 12, 13}. The two subsets are given by A = {11, 12, 13} and B = {7, 8}.
De Morgan's Law of Union Example: (A ∪ B) = {7, 8, 11, 12, 13}, (A ∪ B)’ = {9, 10}. A’ = {7, 8, 9, 10} and B' = {9, 10, 11, 12, 13}. A’ ∩ B’ = {9, 10}. Thus, (A ∪ B)’ = A’ ∩ B’
De Morgan's Law of Intersection Example: (A ∩ B) = Ø, (A ∩ B)' = {7, 8, 9, 10, 11, 12, 13}. A’ ∪ B’ = {7, 8, 9, 10, 11, 12, 13}. Hence, (A ∩ B)’ = A’ ∪ B’

NOTE: $A => B$ *is equivalent to* $\sim B => \sim A$

7) PYQS

CSE 2022: Two Statements followed by four Conclusions are given below. You have to take the Statements to be true even if they seem to be at variance from the commonly known

facts. Read all the Conclusions and then decide which of the given Conclusions logically follows follow from the Statements, disregarding the commonly known facts:

Statement-1 : All pens are books.

Statement-2 : No chair is a pen.

Conclusion-I : All chairs are books.

Conclusion-II : Some chairs are pens.

Conclusion-III : All books are chairs.

Conclusion-IV : No chair is a book.

Which one of the following is correct?

(a) Only Conclusion-I

(b) Only Conclusion-II

(c) Both Conclusion-III and Conclusion-IV

(d) None of the Conclusion follows

CSE 2022: Three Statements followed by three Conclusions are given below. You have to take the Statements to be true even if they seem to be at variance from the commonly known facts. Read all the Conclusions and then decide which of the given Conclusions logically follows/ follow from the Statements, disregarding the commonly known facts:

Statement-1 : Some doctors are teachers

Statement-2 : All teachers are engineers.

Statement-3 : All engineers are scientists.

Conclusion-I : Some scientists are doctors.

Conclusion-II : All engineers are doctors.

Conclusion-III: Some engineers are doctors.

Which one of the following is correct?

(a) Only Conclusion-I

(b) Only Conclusion-II

(c) Both Conclusion-I and Conclusion-III

(d) Both Conclusion-I and Conclusion-II

CSE 2021: In a group of 120 persons, 80 are Indians and rest are foreigners. Further, 70 persons in the group can speak English. The number of Indians who can speak English is

(a) 20

(b) 30

(c) 30 or less

(d) 30 or more

CSE 2021: Half of the villagers of a certain village have their own houses. One-fifth of the villagers cultivate paddy. One-third of the villagers are literate. Four-fifth of the villagers are under 25 years of age. Which one of the following statements is certainly correct?

(a) All the villagers who have their own houses are literate.

(b) Some villagers are under 25 years of age are literate.

(c) Only half of the villagers who cultivate paddy are literate.
(d) No villager under 25 years of age has his own house.

CSE 2021: A Statement followed by Conclusion-I and Conclusion-II is given below. You have to take the Statement to be true even if it seems to be at variance from the commonly known facts. Read all Conclusions and then decide which of the given Conclusion(s) logically follows/follow from the Statement, disregarding the commonly known facts.
Statement: Some cats are almirahs. Some almirahs are chairs. All chairs are tables.
Conclusion-I: Certainly, some almirahs are tables.
Conclusion-II: Some cats may not be chairs.
Which one of the following is correct?
(a) Only Conclusion-I
(b) Only Conclusion-II
(c) Both Conclusion-I and Conclusion-II
(d) Neither Conclusion-I nor Conclusion-II

CSE 2021: A Statement followed by Conclusion-I and Conclusion-II is given below. You have to take the Statement to be true even if it seems to be at variance from the commonly known facts. Read all Conclusions and then decide which of the given Conclusion(s) logically follows/follow from the Statement, disregarding the commonly known facts.
Statement: Some radios are mobiles. All mobiles are computers. Some computers are watches.
Conclusion-I: Certainly some radios are watches.
Conclusion-II: Certainly some mobiles are watches.
Which one of the following is correct?
(a) Only Conclusion-I
(b) Only Conclusion-II
(c) Both Conclusion-I and Conclusion-II
(d) Neither Conclusion-I nor Conclusion-II

CSE 2021: Consider two Statements and four Conclusions given below. You have to take the Statements to be true even if they seem to be at variance from the commonly known facts. Read all Conclusions and then decide which of the given Conclusion(s) logically follows/follow from the Statements, disregarding the commonly known facts.
Statement-1 : Some greens are blues.
Statements-2 : Some blues are blacks.
Conclusion-1 : Some greens are blacks.
Conclusion-2 : No green is black.
Conclusion-3 : All greens are blacks.
Conclusion-4 : All blacks are greens.
Which one of the following is correct?
(a) Conclusion-1 and Conclusion-2 only

(b) Conclusion-2 and Conclusion-3 only
(c) Conclusion-3 and Conclusion-4 only
(d) Neither Conclusion 1 nor 2 nor 3 nor 4

CSE 2021: Two Statements are given followed by two Conclusions
Statements:
All cats are dogs.
All cats are black.
Conclusion-I: All dogs are black.
Conclusion-II: Some dogs are not black.
Which of the above Conclusions logically follows/follow from the two given Statements, disregarding commonly known facts?
(a) Only Conclusion-I
(b) Only Conclusion-II
(c) Neither Conclusion-I nor Conclusion-II
(d) Both Conclusion-I and Conclusion-II

CSE 2019:
In a group of 13 people: 7 can read French, can reat English while 3 of them can read neither of these two languages. The number of people who can read exactly one language is
a. 10
b. 9
c. 5
d. 4

CSE 2019: Consider the following Statements and Conclusions:
Statements:
1. Some rats are cats.
2. Some cats are dogs.
3. No dog is a cow.
Conclusions:
I. No cow is a cat.
II. No dog is a rat
III. Some cats are rats.
Which of the above conclusions is/are drawn from the statements?
a. 1, II and III
b. Only I and II
c. Only III
d. Only II and II

CSE 2019: In a conference, out of a total 100 participants, 70 are Indians. If 60 of the total participants are vegetarian, then which of the following statements is/are correct?
1. At least 30 Indian participants are vegetarian.
2. At least 10 Indian participants are non-vegetarian.
Select the correct answer using the codes given below
a.1 only
b. 2 only
c. Both 1 and 2
d. Neither 1 nor 2

CSE 2019: All members of a club went to Mumbai and stayed in a hotel. On the first day, 80% went for shopping and 50% went for sightseeing, whereas 10% took rest in the hotel. Which of the following conclusion(s) can be drawn from the above data?
1. 40% members went for shopping as well as sightseeing.
2. 20% members went for only shopping.
Select the correct answer using the code given below:
a. 1 only
b. 2 only
c. Both 1 and 2
d. Neither 1 nor 2

CSE 2019: In a school, 60% students play cricket. A student who does not play cricket, plays football. Every football player has got a two-wheeler. Which of the following conclusions cannot be drawn from the above data?
1. 60% of the students do not have two-wheelers.
2. No cricketer has a two-wheeler.
3. Cricket players do not play football.
Select the correct answer using the code given below:
a. 1 and 2 only
b. 2 and 3 only
c. 1 and 3 only
d. 1, 2 and 3

CSE 2018: 19 boys turn out for playing hockey. Of these, 11 are wearing hockey shirts and 14 are wearing hockey pants. There are no boys without shirts and/ or pants. What is the number of boys wearing full uniform?
(a) 3
(b) 5
(c) 6
(d) 8

CSE 2015: In a town, 45% population read magazine A, 55% read magazine B, 40% read magazine C, 30% read
magazines A and B, 15% read magazines Band C, 25% read magazines A and C; and 10% read all the
three magazines. What percentage do not read any magazine?
(a) 10%
(b) 15%
(c) 20%
(d) 25%

CSE 2015: Out of 130 students appearing in an examination, 62 failed in English, 52 failed in Mathematics, whereas 24 failed in both English and Mathematics. The number of students who passed finally is
(a) 40
(b) 50
(c) 55
(d) 60

CSE 2015: In a group of persons travelling in a bus, 6 persons can speak Tamil, 15 can speak Hindi and 6 can speak Gujarati. In that group none can speak any other language. If 2 persons in the group can speak two languages only and one person can speak all the three languages, then how many persons are there in the group?
(a) 21
(b) 22
(c) 23
(d) 24

CSE 2015: The number of persons who read magazine X only is thrice the number of persons who read magazine Y. The number of persons who read magazine Y only is thrice the number of persons who read magazine X. Then, which of the following conclusions can be drawn?
1. The number of persons who read both the magazines is twice the number of persons who read only magazine X.
2. The total number of persons who read either one magazine or both the magazines is twice the number of persons who read both the magazines.
Select the correct answer using the code given below:
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

CSE 2014: There are 50 students admitted to a nursery class. Some students can speak only English and some can speak only Hindi. 10 students can speak both English and Hindi. If the number of students who can speak English 21, then how many students can speak Hindi how many can speak only Hindi and how many can speak only English?
(a) 21, 11 and 29 respectively
(b) 28, 18 and 22 respectively
(c) 37, 27 and 13 respectively
(d) 39, 29 and 11 respectively

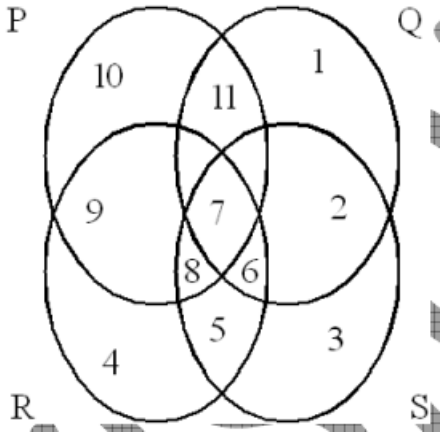
CSE 2014: Out of a total of 120 musicians in a club, 5% can play all the three instruments, guitar, violin and flute. It so happens that the number of musicians who can play any and only two of the above instruments is 30. The number of musicians who can play guitar alone is 40. What is the total number those who can play violin alone or flute alone?
(a) 45
(b) 44
(c) 38

CSE 2013: Consider the following statements:
I. A primary group is relatively smaller in size.
II. Intimacy is an essential characteristic of a primary group.
III. A family may be an example of a primary group.
In the light of the above statements, which one of the following is true?
a) All families are primary groups.
b) All primary groups are families.
c) A group of smaller size is always a primary group.
d) Members of a primary group know each other intimately

CSE 2013: Consider the following statements:
1. All X-brand cares parked here are white.
2. Some of them have radial tyres.
3. All X-brand cars manufactured after 1986 have radial tyres.
4. All cars are not X-brand.
Which one of the following conclusions can be drawn from the above statements?
(a) Only white cars are parked here.
(b) Some white X-brand cars with radial types are parked here
(c) Cars other than X-brand cannot have radial tyres.
(d) Most of the X-brand cars are manufactured before 1986

CSE 2013:

51.



In the above figure, circle P represents hardworking people, circle Q represents hardworking peopl R represents truthful people, and circle S represents honest people. Which region represents the people who are intelligent, honest and truthful but not hardworking?

(a) 6

(b) 7

(c) 8

(d) 11

CSE 2013: Consider the following statements:

1. All artists are whimsical.
2. Some artists are drug addicts.
3. Frustrated people are prone to become drug addicts.

From the above three statements it may be concluded that

(a) Artists are frustrated.

(b) Some drugs addicts are whimsical.

(c) All frustrated people are drug addicts.

(d) Whimsical people are generally frustrated.

CSE 2011: There are 100 students in a particular class. 60% students play cricket, 30% student play football and 10% student play both the games. What is the number of students who play neither cricket nor football?

(a) 25

(b) 20

(c) 18

(d) 15

8) COMPREHENSION

The intake pipes of nuclear plants and water plants along Great lakes are clogged by a certain variety of mussels that proved to be causing nuisance to the working systems. But it is found that the bags of these calms when suspended in the effluent streams of chemical plants, not

only improves quality of water significantly but also remove some hazardous wastes from effluents just by feeding voraciously on the algae that they filter from water that passes by it. Which one of the inferences given below, if true, is most strongly supported on the basis of information given in the above paragraph?

(1) If these mussels spread to areas of the river and displace native calms that support cultured pearl industry for decades, that industry will collapse.

(2) If the mussels failed to consume the quantity of algae available to them, then the intake pipes of the nuclear plants and water plants will get clogged by it.

(3) If the wastes from the effluents are not transformed into non-hazardous chemicals by these mussels themselves will become hazardous pollutants.

(4) These mussels are brought in this area through freighters and are thriving here since their population is not controlled naturally in the ecosystem

Study the reasoning used in the argument given below and select the option that most closely follows the same reasoning.

If heat or light is emitted by a body, then its energy decreases. It follows that, if a body's energy remains constant, it has emitted neither heat nor light.

(1) When either freedom of speech or freedom of assembly is present in society, democratic government inevitably results. If you live under a dictatorship, you must therefore lack both of these key liberties.

(2) Either the fans are very loyal or they don't mind the team losing week after week. No fans like to watch their team being beaten, so they must be very loyal.

(3) With water and sunlight this plant will thrive, since both water and sunlight are necessary for a plant's survival.

(4) Anybody over 21 who holds a university degree or equivalent is eligible for selection. Since Amina is 19 and still an undergraduate, she cannot be eligible.

Rala (Italian Millet), Sava (Little Millet), Harik (Vargu), Varai (Barnyard Millet) are rich in amino acids, fatty acids and other vitamins. They contain minerals that are iron, calcium, magnesium, phosphorus and potassium. These food components assist in the functioning of hormones in the body. The amount of glucose and insulin produced in the body is controlled by them. Since their digestion is slow, they stay in the stomach for a long time, so you get the satisfaction of being full by eating less. They are high in lecithin which strengthens the nervous system. Its phytochemicals reduce the risk of cancer. Blood cholesterol is reduced. Whole grains provide 12.5% more protein than wheat. Sava is used in liver disorders. Since millets are gluten-free, they can be consumed by people with gluten intolerance. In short, whole grains are useful for body health due to various characteristics.

Choose the one most reasonable fact that would weaken the above argument if true.

(1) South Indians whose food mainly consists of rice, nachani, kuttu chana, tur, udad do not suffer from digestive problems.
(2) If wheat is completely excluded from food, the person does not get B-vitamins, zinc, bran, which are important elements along with gluten, and as a result, the beneficial bacteria in the intestine
s are depleted and the immunity of the intestine increases unbridled and rarely invites cancer.
(3) People with congenital celiac sprue cannot digest gluten in their small intestine, so they have to eat foods where gluten is not detectable.
(4) Eating wheat is not inevitable as pulses, oil, milk, meat, fish, eggs, vegetables, fruits etc. are consumed along with jowar, bajri, rajgira, nachani, kuttu grains.