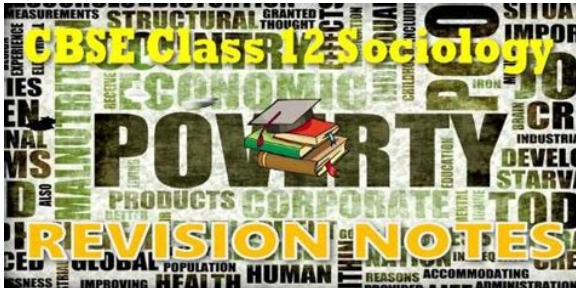
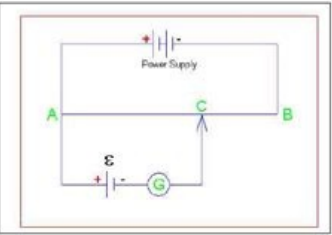


I'm not robot!



It is an accurate instrument for measuring the emf of a cell or the potential difference between two points of an electric circuit.

Principle: It consists essentially of a long and uniform metallic wire AB. Its one end A is connected to the positive terminal of the storage battery and whose negative terminal B is connected to the other end of the wire through a key and a rheostat. The current in the wire can be varied by means of the rheostat. It is the emf of the cell to be measured. Its positive terminal is connected to the end A of the wire and the negative terminal is connected through a galvanometer G to jockey J which can be slid



"The potential difference across any length of a wire of uniform cross-section and uniform composition is proportional to its length when a constant current flows through it."

The battery in primary circuit creates a potential difference across the length of the potentiometer wire. A potential gradient K is also developed across the wire. (K=Potential supplied by main battery divided by length of wire). The potentiometer wire is thus a source of variable potential difference. That is, potential depends on length of wire selected. (Potential = length × potential gradient).

The cell in secondary is connected opposite to that in primary. This current opposes the current flowing across the potentiometer. When the both potential, i.e., potential difference across the chosen length of potentiometer wire and potential difference caused by the cell in secondary circuit, becomes equal and opposite, no current flows through the secondary circuit. Thus the galvanometer shows null deflection.

Sensitivity: If on displacing the jockey slightly from the null-point position, the galvanometer shows a large deflection then the potentiometer is said to be sensitive. The sensitivity of the potentiometer depends upon the potential gradient along the wire. Smaller the potential gradient, greater will be the sensitivity. The potential gradient can be reduced by employing a long wire in the potentiometer.

Potentiometer over Voltmeter:

- When we measure the emf of a cell by a potentiometer, then in the position of null-point no current flows in the cell circuit, that is, the cell is in open-circuit. Hence, we obtain the actual value of the emf of the cell. Thus, a potentiometer is equivalent to an ideal voltmeter of infinite resistance.
- For measuring the emf by voltmeter, the deflection in the voltmeter is to be read. There may be some error in reading the deflection. On the other hand, the potentiometer method is a null method. One has to read null point position on the wire. In reading the null-point position there can be a maximum error of 1 mm. For example: If the wire is 4 meter long and its ends are directly connected to a cell of emf 2 volt, then the potential gradient along the wire per mm will be 2/4000=0.0005 volt. Thus, there can be maximum error of 0.0005 volt in the emf. This can further reduced by taking a still longer wire.

Similarities

- Both of them are social
- Scholars are accepted. Strong relationship between both social
- History is sociology of past
- Sociology is a history of present
- Sociology has achieved support to explain the present events by helping ancient event of history.
- For example:
 - History studies of the war
 - Sociology analyses its socio-impact

Differences

- | | |
|---|--|
| 1. It is concerned with the study of present and past societies, with all their complexities. | 1. It is a study of the past and present societies, with all their complexities. |
| 2. It is a scientific and systematic study of society. | 2. It is a scientific and systematic study of society. |
| 3. It is a general study of society. | 3. It is a general study of society. |
| 4. It is a study of the past and present societies, with all their complexities. | 4. It is a study of the past and present societies, with all their complexities. |
| 5. It is a study of the past and present societies, with all their complexities. | 5. It is a study of the past and present societies, with all their complexities. |
| 6. It is a study of the past and present societies, with all their complexities. | 6. It is a study of the past and present societies, with all their complexities. |

Sociology and Economic

- Similarities**
- Economic relation is an aspect of social relation. This point view explains that both sciences are inter-dependent with each other.
 - The fact that society is influenced by economic factors while economic processes are largely determined by the social environments clearly proves that the relationship between sociology and economics is very

Differences

- | | |
|---|--------------------------|
| Sociology | Economics |
| 1. Sociology studies the social relationship. | 1. Economics studies the |

Sociology: Chapter B

Intro: We're All Immigrants

- 1 of 5 Canadians was born outside of Canada
- Canada has the highest foreign-born population of any G8 country.
- All Canadians, Aboriginal people included, are either immigrants themselves or descendants of immigrants
- As a result of this vast immigration, multiculturalism is the norm in Canada's major cities, not the exception.
- Globalization and new technology have made the exchange of ideas, products and even people across cultural regions easier than ever before
- Sociologist studying issues of race and ethnicity are concerned with the effect of race or ethnicity on educational attainment, employment opportunities and health and well-being

Race, Ethnicity and Racialization

- Ethnicity:** refers to the existence of social groups with shared national or cultural traditions
- Ethnic group:** defined by a common ancestry and shared language and customs. A set of people commonly defined as belonging to the same group by virtue of a common birthplace, ancestry, language or culture
- Racial group:** not necessarily ethnic groups. Distinguished by visible physical features such as colour, facial features and hair type, though many have pointed out that owing to racial mixing, human appearances differ on a continuum, not according to easily distinguished categories or racial types.
- Visible minority:** refers to people "other than aboriginal persons, who are non-Caucasian in race or non-white in colour". Replaced by the term racialized minority.
- One of the biggest advances in the sociological study of race can be attributed to the study of genetics, an area outside of sociology.**
- Analyses of the genetic makeup of humanity have shown clearly that racial differences are merely social constructs. In short, from a biological standpoint, there is only one human race and we all belong to it.
- Racialization:** views and to group humans according to their visible characteristics. It effectively preserves the notion of race in the sociological literature despite the fact that biologist and geneticists have rejected the idea that different human race exist. The differentiation or categorization of people according to their race or ethnicity. Modern practices of racialization mean that historically oppressed people always need to be on the lookout for evidence or threats of racial mistreatments
- Racialized group:** a set of people commonly defined as belonging to the same group by virtue of a common birthplace, ancestry or culture
- Race:** a set of people commonly defined as belonging to the same group by virtue of common visible features, such as skin colour or facial characteristics

Why is racialization a problem?

- It encourages prejudice and discrimination based on the mistaken belief that certain intellectual, emotional and behavioural traits are inherent among all members of certain racialized groups (Ex. all asians are naturally good at math)
- Racialization often entails minimizing historical, cultural and linguistic differences among peoples from the same region, such as Asia, Africa or Latin America. It would be wrong for ex. To view all people of Arabic background as a single cultural group while ignoring the important differences among people of, say, Iranian and Lebanese ancestry.
- Critical Race Theory (CRT):** strongly views race as a performance, not an innate quality. The boldest movement towards identifying the causes and effects of racialization.

Illustration 6: Consider the equation $(\sin^{-1} x)^3 + (\cos^{-1} x)^3 = a\pi^3$. Find the values of parameter 'a' so that the given equation has a solution.

Solution:

$$(\sin^{-1} x)^3 + (\cos^{-1} x)^3 = a\pi^3$$
$$\Rightarrow (\sin^{-1} x + \cos^{-1} x)((\sin^{-1} x + \cos^{-1} x)^2 - 3\sin^{-1} x \cos^{-1} x) = a\pi^3$$
$$\Rightarrow \frac{\pi^3}{4} - 3\sin^{-1} x \cos^{-1} x = 2a\pi^2$$
$$\Rightarrow \sin^{-1} x \left(\frac{\pi}{2} - \sin^{-1} x \right) = \frac{\pi^2}{12} (1 - 8a)$$
$$\Rightarrow (\sin^{-1} x)^2 - \frac{\pi}{2} \sin^{-1} x = -\frac{\pi^2}{12} (1 - 8a)$$
$$\Rightarrow \left(\sin^{-1} x - \frac{\pi}{4} \right)^2 = \frac{\pi^2}{12} (8a - 1) + \frac{\pi^2}{16}$$
$$\Rightarrow \left(\sin^{-1} x - \frac{\pi}{4} \right)^2 = \frac{\pi^2}{48} (32a - 4 + 3)$$
$$\Rightarrow \left(\sin^{-1} x - \frac{\pi}{4} \right)^2 = \frac{\pi^2}{48} (32a - 1)$$

Now, $\sin^{-1} x \in \left[-\frac{\pi}{2}, \frac{\pi}{2} \right]$

$$\Rightarrow -\frac{3\pi}{4} \leq \sin^{-1} x - \frac{\pi}{4} \leq \frac{\pi}{4}$$
$$\Rightarrow 0 \leq \left(\sin^{-1} x - \frac{\pi}{4} \right)^2 \leq \frac{9\pi^2}{16}$$
$$\Rightarrow 0 \leq \frac{\pi^2}{48} (32a - 1) \leq \frac{9\pi^2}{16}$$
$$\Rightarrow 0 \leq (32a - 1) \leq 27$$
$$\Rightarrow \frac{1}{32} \leq a \leq \frac{7}{8}$$

Thus, the required values of 'a' are $\left[\frac{1}{32}, \frac{7}{8} \right]$.

Illustration 7: Solve for x; $\tan^{-1} x + \tan^{-1} (1 - x) = \cot^{-1} \frac{7}{9}$, given that $x \in (0, 1)$

Solution:

$$\tan^{-1} x + \tan^{-1} (1 - x) = \cot^{-1} \frac{7}{9} = \tan^{-1} \frac{9}{7}$$

We have $0 < x(1 - x) < 1 \quad \forall x \in (0, 1)$

$$\tan^{-1} x + \tan^{-1} (1 - x) = \tan^{-1} \left(\frac{x + 1 - x}{1 - x(1 - x)} \right) = \tan^{-1} \left(\frac{1}{1 - x(1 - x)} \right)$$
$$\Rightarrow \frac{1}{1 - x(1 - x)} = \frac{9}{7} \Rightarrow 7 = 9 - 9(x)(1 - x) \Rightarrow 9x^2 - 9x + 2 = 0 \Rightarrow x = \frac{2}{3}, \frac{1}{3}.$$

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