

# Intelligence And Aptitude

## NCERT TEXTBOOK QUESTIONS SOLVED

### 1. How do psychologists characterize and define intelligence?

**Ans.** Psychological notion of intelligence is quite different from the common sense notion of intelligence.

Generally people saw intelligence as mental alertness, ready art, quickness in learning and ability to understand relationships.

Oxford dictionary explained intelligence as the power of perceiving, learning understanding and knowing.

Accordingly Alfred Binet also used these attributes and defined intelligence as ability to judge well, understand well and reason well. Later Wechsler gave a comprehensive definition in terms of its functionality, i.e., its value for adaptation to environment. He defined intelligence as "the global and aggregate capacity of an individual to think rationally, act purposefully and to deal effectively with his/her environment."

Present day psychologists such as Gardner and Sternberg emphasized that "Intelligent individual not only adapts to the environment, but actively modifies or shapes it."

Sternberg views intelligence as "the ability to adapt, to shape and select environment to accomplish one's goals and those of one's society and culture."

### 2. What extent is our intelligence the result of heredity (nature) and environment (nurture)?

#### Discuss. (CBSE 2014)

**Ans.** (i) Whether intelligence is evolved or it is developed due to the environment, is a question of debate.

(ii) Lot of studies have been done to determine the role of nature and nurture.

(iii) Here we will discuss the controversy with the help of various twin studies, adoption studies and environmental studies.

On the basis of twin studies co-relation results are as follows:

(i) Identical twins reared together correlate 0.90

(ii) Identical twins reported early in childhood and reared in different environments correlate 0.72

(iii) Fraternal twins reared together correlate 0.60

(iv) Siblings reared together correlate 0.50

(v) Siblings reared apart correlate 0.25

#### •Adoption Studies before the Age of 6-7 Years

These studies of adopted children show that children's intelligence is more similar to their biological parents.

These studies provide evidence that intelligence is determined because of nature.

#### •Adoption Studies after the Age of 6-7 Years

According to these studies as children grew older tends to more closer to that of their adoptive parents.



### Environmental Studies

Evidence for the influence of environment (**Nurture**) on the basis of **Twin studies**.

- (i) The intelligence score of twins reared apart as they grew older, tends to move closer to that of their adoptive parents.
- (ii) On the basis of differences in environment, children from disadvantaged homes adopted into families with higher, socio-economic status exhibit an increase in their intelligence scores.
- (iii) Environmental deprivation lowers intelligence. Factors such as **nutrition, good family background and quality schooling** increase growth rate of intelligence.
- (iv) There is general consensus among psychologists that intelligence is a product of complex interaction of heredity (Nature) and environment (Nurture).
- (v) Heredity provides the potentials and sets a range of growth whereas environment facilitates the development of intelligence.

### 3. Explain briefly the multiple intelligences identified by Gardner. (CBSE 2008)

**Ans. Gardner's theory** based on information processing approaches functions on three basic principles:

- (i) Intelligence is not a single entity, there exist multiple intelligences.
- (ii) The intelligences are independent from each other.
- (iii) Different types of intelligences work together to provide a solution of problem. Gardner has so far proposed eight intelligences, however all individuals do not possess them in equal proportion. The particular situation or the context decides the prominence of one type of intelligence over the others.

Following are the eight types of intelligence:

**1. Linguistic:** This is related to reading, writing, listening, talking, understanding etc. Poets exhibit this ability better than others.

**2. Logical-Mathematical:** This type of intelligence deals with abstract reasoning and manipulation of symbols involved in numerical problems. It is exhibited in scientific work.

**3. Spatial:** This type of intelligence is involved in perceiving third dimension formation of images. It is used while navigating in space, forming, transforming and using mental images. Sailors, engineers, surgeons, pilots, care drivers, sculptors and painters have highly developed spatial intelligence.

**4. Musical:** Persons with musical intelligence show sensitivity to pitch and tone required for singing, playing and instrument, composing and appreciating music etc.

**5. Bodily Kinesthetic:** It requires the skills and dexterity for fine coordinated motor movements, such as those required for dancing, athletics, surgery, craft making etc.

**6. Inter-personal:** It requires understanding of motives, feelings and behaviours of other people. sales people, politicians, teachers, clinicians and religious readers have high degree of inter-personal intelligence.

**7. Intra-personal:** It is related to understanding one's self and developing a sense of identity, e.g., philosophers and spiritual leaders.

**8. Naturalistic:** It is related to recognizing the flora and fauna, i.e., natural world and making a distinction in the natural world. It is more possessed by hunters, farmers, tourists, students of



biological sciences etc.

#### 4. How does the Triarchic theory help us to understand intelligence? (CBSE 2012-13)

**Ans.** 1. **Robert J. Sternberg** proposes a theory of intelligence based on information processing approach in 1985 known as the Triarchic theory of intelligence.

2. According to Sternberg, intelligence is an ability to adapt, to shape and select environment to accomplish ones goals and those of ones society and culture.

3. This theory attempts to understand the cognitive processes involved in problem solving.

4. According to him there are three types of intelligences:

**(i)Componential intelligence (Analytical):** This dimension specifies the cognitive processes that underlie an intelligent behaviour.

This dimension serves three different functions:

**(a)Knowledge acquisition components:** These are the processes used in learning, encoding, combining and comparing information.

**(b)Metacomponents:** 'Meta' means higher. These are executive processes. They control monitor and evaluate cognitive processing.

**(c)Performance components:** These components execute strategies prepared by metacomponents to perform a task. For example, While studying students plan the lesson chapterwise, they make

schedules, categorise the learning material and do integrate the information to comprehend well.

**(ii)Experiential intelligence (Creative):** This dimension specifies how experiences effect intelligence and how intelligence effects a person's experiences.

**(a)**Experiential intelligence refers to an individual's ability to make use of one's past experiences to deal with novel situations creatively and effectively.

**(b)**This intelligence is mostly high among scientists and creative people.

**(c)** For example if a person is trapped in a room, he finds out a way of coming out of the room using rope or ladder etc. in a creative way. He had some knowledge of getting out from this situation by watching out a movie few years back.

**(iii)Contextual intelligence (Practical):** This dimension specifies the ability to deal with environmental demands on daily basis.

**(a)**It is individual's ability to make use of his/her potential to deal with day-to-day life.

**(b)**It may be called street smartness or 'business sense'.

**(c)**People high in this ability are successful in life.

•It deals with the ways people handle effectively their environmental demands and adapt to different contexts with available resources.

#### 5. Any intellectual activity involves the independent functioning of three 'neurological systems'. Explain with reference to PASS model.

**Ans.** According to PASS model, theory based on information processing approach, intellectual activity involves the interdependent functioning of the three neurological systems called the **functional units of the brain.**

These units are responsible for:

- the arousal and attention.
- the simultaneous and successive processing.
- the planning.

##### **Arousal and Attention**

(i)State of arousal helps in attending to the stimuli.

(ii)Arousal and attention enable a person to process information.

(iii)Optimal level of arousal focuses our attention on relevant aspects of a problem.

(iv)Too much or too little arousal interferes with attention and performance. **Example:** Arousal helps the individual to focus ones attention on reading, learning and revising the contents of the material to be learnt.



### Simultaneous and Successive Processing:

**Simultaneous Processing** refers to **perceiving relations amongst various concepts and integrate them into meaningful patterns for comprehension!**

For e.g., in Raven's standard progressive matrices (RSPM Test) choosing appropriate pattern by comprehending relationship.

**Successive Processing** refers to recalling information serially so that one recall leads to another recall. For example, learning of digits and letters and multiplication tables.

### Planning:

1. After the information is attended to and processed, planning is activated.
2. Planning involves reaching to the target and evaluating their effectiveness. Planning allows us to think of possible courses of action and implementing them.
3. If a plan does not work, it is modified to suit the requirements of the task or the situation.
4. For example, to take a test scheduled by your teacher, you'd have to set goals, plan a time schedule of studies, get clarifications in case of problems or think of other ways to meet your goals.

### 6. Are there cultural differences in the conceptualisation of intelligence?

**Ans.** Yes, culture, which is a set of beliefs, customs, attitudes and achievements in art of literature, affects the process of intellectual development.

- According to Sternberg, intelligence is a product of culture.
- Vyotsky believes that while elementary mental operations are common, higher mental activities like problem-solving and thinking are culturally produced.

#### • Technological Intelligence

- (i) Promotes an individualistic pattern of action.
- (ii) Individuals in technologically educated western societies possess this kind of intelligence.
- (iii) They are well versed in skills of attention, observation, analysis, speed, moves abstraction, generalisation, creativity, Minimum moves etc.

#### • Integral Intelligence

- (i) Intelligence in the Indian tradition is integral intelligence.
- (ii) It views intelligence from a holistic perspective.
- (iii) It gives equal attention to cognitive and non-cognitive processes, as well as their integration.
- (iv) 'Buddhi' is the knowledge of one's own self based on conscience, will and desire.
- (v) It has effective, motivational as well as cognitive components. .

It includes:

- (i) Cognitive competence (discrimination, problem-solving).
- (ii) Social competence (respect for elders, concern for others, respecting opinions of others).
- (iii) Emotional competence (self regulation, self monitoring). '
- (iv) Entrepreneurial competence commitment, persistence, patience).

### 7. What is IQ? How do psychologists classify people on the bases of their IQ scores?

**Ans.** (i) IQ is an index of brightness.

(ii) It is the ratio of mental age to chronological age.

(iii) The concept of IQ was given by William. Stern who gave the formula to calculate IQ i.e.,

$$IQ = \frac{MA}{CA} \times 100$$

• If MA > CA	Above average
MA < CA	Below average
MA = CA	Average

- IQ is relatively stable.
- It is a good predictor of potential.
- IQ scores are distributed in a population in such a way that most people tend to fall in the middle range of the distribution.



• This can be shown in the form of following table.

**Classification of People on the Basis of IQ**

<b>IQ Range</b>	<b>Descriptive Label</b>	<b>Per cent in the Population</b>
Above 130	Very superior	2.2
120–130	Superior	6.7
110–119	High average	16.1
90–109	Average	50.0
80–89	Low average	16.1
70–79	Borderline	6.7
Below 70	Mentally challenged/retarded	2.2

**8. Discuss various types of intelligence tests.**

Or

**How can you differentiate between verbal and performance tests of intelligence?**

**(CBSE 2008, 2014)**

**Ans. Types of Intelligence Tests:**

**Individual or group tests based on contact:**

**Individual Test:**

- (i) Administered to one individual at a time.
- (ii) Requires the administrator to establish a rapport with the subject and be sensitive to his/her feelings, mood and expressions during the testing sessions which provides understanding of other aspects of subjects personality.
- (iii) Allows people to answer orally or in written form or manipulate the objects as per the tester's instructions.

• Example: Stanford Binet intelligence scale, WAIS, WISSC, Alexander Pass along test.

**Group Test:**

- (i) Administered to several individuals at a time simultaneously.
- (ii) Do not allow an opportunity to be familiar with the subjects' feelings.
- (iii) Seek answers in a Multiple-choice format.
- (iv) It is relatively economical and less time consuming.
- (v) Example: Group Test of Intelligence by Prayag Mehta, Group Test on Intelligence by S. Jalota.

**Verbal, Non-verbal and Performance Tests based on Mode of Administration: Verbal Tests:**

- (i) Requires subject to give verbal responses either orally or in written form.
- (ii) Can be administered to literates only.
- (iii) Example: CIE, Verbal Group Test, Stanford Binet Intelligence Scale.

**Non-verbal Test:**

- Has pictures or illustrations as test items.
- Example: Ravens progressive matrices. In this test the subject examines an incomplete pattern and chooses a figure from the alternatives that will complete the pattern.
- Reduces culture biases.
- Example: SRPM, CIE Non-verbal group test of Intelligence.

**Performance Test:**

- Requires the subject to manipulate objects to perform the test.
- Written language is not necessary for answering the items.
- Example: Kohs's Block designs test. Here the subject is asked to arrange the blocks in a specified period to produce a given design, Bhatia's Battery performance test.
- Can be administered to persons from different cultures and reduce culture biases.
- Example: Draw a Man Test by Pramila Pathak, Kohs Block designs test.



### Culture Biased or Culture Fair Tests based on Nature of Items used:

- Psychological tests that show a bias toward the culture in which they are developed are Culture Biased Tests.
- Tests developed in America and Europe represent an urban and middle class cultural ethos. (Middle class white subjects perform well on these tests). The items do not consider favourably to Asians and Africans.
- Culture Fair Tests: One does not discriminate against as individuals belong to different cultures.
- Non-verbal and Performance Tests reduce cultural influences.

To overcome the limitation of Culture biased tests, Culture fair tests were developed, e.g. non-verbal and performance tests are called so because people of any culture could take them. For e.g. Standard progressive Matrices and Bhatia's Battery Performance Test.

### 9. Discuss how interplay of Nature and Nurture influences intelligence.

Or

**All persons do not have the same intellectual capacity. How do individuals vary in their intellectual ability? Explain. (CBSE 2014)**

**Ans.** All persons do not have the same intellectual capacity. They vary in their intellectual ability. Some are exceptionally bright and some are below average. Some possess high IQ range while others have average or below average.

All the scores gradually and symmetrically decline towards both the sides but never touch the X-axis.

- The frequency distribution for the IQ scores tends to approximate a bell-shaped curve, called the **normal curve**. This type of distribution is symmetrical around the central value, called the **mean**.
  - On the basis of IQ, people are classified in different groups. It is clear that only 2.2 percent people who possess above 130 IQ range are very intelligent or very superior, their IQ score is more than 130.
  - People falling between 90-109 IQ range are considered as average. The mean IQ score in a population is 100. People with IQ scores in the range of 90-110 have normal intelligence.
  - Those with IQ below 70 are suspected to have 'mental retardation'. Mental retardation refers to sub-average intellectual functioning. The behaviour is maladaptive and manifest in four forms i.e., mild, moderate, severe and profound mental retardation.
- The extreme right also lie to 2.2 percent population which are known as gifted i.e., they enjoy exceptional intelligence, exceptional talent and exceptional creativity.

#### Classification of People on the Basis of IQ

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### 10. Which of the two IQ or EQ, do you think would be more related to success in life and Why?

**Ans.** (i) IQ is a good predictor of potential.

(ii) EQ is a good predictor of success.

-Researchers had proved that EQ helps in dealing with students who are stressed and face



challenges of the outside world.

-It improves the academic performance.

-It is very useful in preparing students to face the challenges of life outside the classroom.

-They are less anti-social and more co-operative.

### 11. How is 'Aptitude' different from 'interest and intelligence'?

#### Ans. Aptitude:

(i) Aptitude refers to combination of characteristics indicative of an individual's potential to acquire some specific skills with training.

(ii) It is specific mental ability or teach ability of an individual to learn a particular skill.

(iii) It is the potentiality to perform a particular activity.

(iv) Aptitude is a determiner to learn a particular skill.

#### Interest:

(i) Interest refers to preference for a particular activity or what one enjoys doing.

(ii) Interest are acquired/learnt.

(iii) Interest is a facilitator.

An individual with high scientific aptitude having strong interest in mechanical activities is more likely to be successful mechanical engineer.

(i) Intelligence is a global and aggregate capacity of an individual to think rationally, act purposefully and to deal effectively with her/his environment.

(ii) Intelligence is a general mental ability.

(iii) It is product of heredity and environment.

(iv) It does not require training for the growth.

### 12. How is creativity related to intelligence? (Delhi Board 2010)

Or

#### How creativity and creativity tests are related but different from each other?

Ans. Creativity and intelligence are positively correlated because high ability is component of creativity, A highly intelligent person may not be creative but all the creative persons are definitely high in intelligence. \_

(i) Creativity is the ability to produce ideas, objects, or problem solutions that are novel, appropriate and useful.

(ii) Intelligence is subset of creativity.

(iii) Terman found that persons with high IQ were not necessarily creative. The same time, creative ideas could come from persons who did not even one of those identified as gifted, followed up through out their adult life, had become well known for creativity in some field.

(iv) Researchers have found that both high and low level of creativity can be found in highly intelligent children and also children of average intelligence. The same person can be creative as well as intelligent but it is not necessary that intelligent once must be creative.

#### Creative tests are different from intelligence tests:

(i) Creative tests measure **creative thinking ability** whereas intelligence tests measure general mental ability.

(ii) **Creative tests** measure **convergent and divergent thinking** whereas intelligence test measure **convergent thinking only**.

(iii) Creative tests measure **imagination and spontaneous expression** to produce new ideas, to see new relationship, to guess causes and consequences and ability to put things in a new context. Intelligence tests measure potential.

(iv) In creative tests questions are **open-ended** that have no specified answers whereas intelligence tests **mostly use close-ended questions**.

