

CUET PG 2025 Public Health Question Paper with Solutions

Time Allowed :1 Hour 30 Mins	Maximum Marks :300	Total Questions :75
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General Instructions

Read the following instructions very carefully and strictly follow them:

1. The examination duration is 90 minutes. Manage your time effectively to attempt all questions within this period.
2. The total marks for this examination are 300. Aim to maximize your score by strategically answering each question.
3. There are 75 mandatory questions to be attempted in the Atmospheric Science paper. Ensure that all questions are answered.
4. Questions may appear in a shuffled order. Do not assume a fixed sequence and focus on each question as you proceed.
5. The marking of answers will be displayed as you answer. Use this feature to monitor your performance and adjust your strategy as needed.
6. You may mark questions for review and edit your answers later. Make sure to allocate time for reviewing marked questions before final submission.
7. Be aware of the detailed section and sub-section guidelines provided in the exam. Understanding these will aid in effectively navigating the exam.

1. What is the role of reverse transcriptase in recombinant DNA technology?

- (A) It leaves RNA at specific sequences
- (B) It synthesizes DNA from an RNA template
- (C) It repairs damaged DNA
- (D) It unwinds DNA during replication

Correct Answer: (B) It synthesizes DNA from an RNA template

Solution:

Step 1: Understanding the Concept:

Recombinant DNA technology involves the manipulation of genetic material to create new combinations of DNA. This process often requires converting RNA into DNA, especially when working with eukaryotic genes.

Step 2: Detailed Explanation:

The central dogma of molecular biology describes the flow of genetic information as DNA →

RNA → Protein. Transcription is the process of creating an RNA copy from a DNA template. Reverse transcriptase is an enzyme that performs "reverse transcription," which is the opposite of this process. It synthesizes a complementary DNA (cDNA) strand using an RNA molecule as a template.

This is particularly useful in genetic engineering for several reasons:

- **Cloning Eukaryotic Genes:** Eukaryotic genes contain non-coding regions called introns, which are removed from the messenger RNA (mRNA) molecule during processing. Bacteria cannot remove these introns. By using reverse transcriptase on mature mRNA, a cDNA copy is made that contains only the coding sequences (exons). This cDNA can then be inserted into a plasmid and expressed in bacteria.
- **Creating cDNA Libraries:** A collection of all the mRNA molecules in a cell can be converted into cDNA to create a cDNA library, which represents all the genes that were being expressed in that cell at that time.

Let's analyze the other options:

(A) It does not leave RNA at specific sequences; its function is synthesis.

(C) DNA repair is carried out by enzymes like DNA polymerase and ligase, not reverse transcriptase.

(D) Unwinding DNA is the role of DNA helicase.

Step 3: Final Answer:

Therefore, the primary role of reverse transcriptase in recombinant DNA technology is to synthesize DNA from an RNA template.

💡 Quick Tip

Remember the name: **Reverse Transcriptase**. It literally tells you its function - it reverses the process of transcription. Normal transcription is DNA to RNA, so reverse transcription is RNA to DNA.

2. A point mutation that changes a codon but not alter the resulting amino acid is classified as -

- (A) Missense mutation
- (B) Nonsense mutation
- (C) Silent mutation
- (D) Frameshift mutation

Correct Answer: (C) Silent mutation

Solution:

Step 1: Understanding the Concept:

A point mutation is a change in a single nucleotide base pair in the DNA sequence. The genetic code is "degenerate," meaning that most amino acids are coded for by more than one codon (a sequence of three nucleotides). This redundancy allows for some mutations to occur without changing the final amino acid sequence of the protein.

Step 2: Detailed Explanation:

Let's define the types of mutations listed:

- **Silent Mutation:** A change in the nucleotide sequence of a codon that does not change the amino acid that is specified. For example, both CCU and CCC codons code for the amino acid Proline. A mutation changing the last U to a C would be a silent mutation.
- **Missense Mutation:** A point mutation in which a single nucleotide change results in a codon that codes for a different amino acid. This may or may not have a significant effect on the protein's function.
- **Nonsense Mutation:** A point mutation resulting in a premature stop codon (UAA, UAG, or UGA). This leads to the production of a truncated, and usually nonfunctional, protein.
- **Frameshift Mutation:** This occurs when nucleotides are inserted or deleted from the DNA sequence in a number that is not a multiple of three. This shifts the "reading frame" of the codons, altering every amino acid downstream from the mutation and often leading to a premature stop codon. It is not a simple substitution mutation.

The question describes a scenario where the codon changes, but the amino acid does not. This perfectly fits the definition of a silent mutation.

Step 3: Final Answer:

A point mutation that changes a codon but does not alter the resulting amino acid is classified as a silent mutation.

Quick Tip

Associate the mutation names with their effects: **Silent** (no sound, no effect on protein), **Missense** (makes a "mistake" in the amino acid), **Nonsense** (makes "no sense" by stopping translation prematurely).

3. Which enzyme is primarily responsible for relieving supercoiling during DNA replication?

- (A) DNA helicase
- (B) DNA ligase
- (C) DNA polymerase
- (D) Topoisomerase

Correct Answer: (D) Topoisomerase

Solution:

Step 1: Understanding the Concept:

During DNA replication, the two strands of the double helix must be separated. This separation is done by an enzyme called DNA helicase. As helicase unwinds the DNA at the replication fork, it causes the DNA ahead of the fork to become overwound, creating torsional stress known as supercoiling. If this stress is not relieved, it would eventually stop the replication process.

Step 2: Detailed Explanation:

Let's examine the roles of the enzymes listed:

- **DNA helicase:** This enzyme is responsible for unwinding the DNA double helix, breaking the hydrogen bonds between the base pairs to separate the two strands. It creates the supercoiling problem but does not solve it.
- **DNA ligase:** This enzyme acts as a "molecular glue." It joins DNA fragments together by forming phosphodiester bonds, for example, joining Okazaki fragments on the lagging strand. It does not deal with supercoiling.
- **DNA polymerase:** This is the main enzyme of replication. It synthesizes new DNA strands by adding nucleotides that are complementary to the template strand. It does not relieve supercoiling.
- **Topoisomerase:** This class of enzymes is specifically responsible for relieving the strain caused by supercoiling. They work by cutting one or both DNA strands, allowing the DNA to rotate and unwind, and then rejoining the strands. This action releases the torsional stress ahead of the replication fork.

Step 3: Final Answer:

Therefore, topoisomerase is the enzyme that relieves supercoiling during DNA replication.

💡 Quick Tip

Think of unwinding a twisted rope. As you pull the two strands apart in the middle (like helicase), the ends get tighter and more twisted (supercoiled). You would need to cut the rope, let it untwist, and then tie it back together. That's exactly what topoisomerase does to DNA.

4. What is the primary purpose of using T4 DNA ligase in recombinant DNA technology?

- (A) To cut DNA at specific sequences
- (B) To join DNA fragments with complementary sticky ends
- (C) To synthesize DNA from RNA
- (D) To unwind DNA for replication

Correct Answer: (B) To join DNA fragments with complementary sticky ends

Solution:

Step 1: Understanding the Concept:

Recombinant DNA technology involves cutting a gene of interest and a vector (like a plasmid) with restriction enzymes, and then pasting the gene into the vector. T4 DNA ligase is a key enzyme in this "pasting" step.

Step 2: Detailed Explanation:

The process of creating recombinant DNA typically involves these steps:

1. **Cutting:** A restriction enzyme is used to cut both the DNA containing the gene of interest and the plasmid vector. This often creates "sticky ends," which are short, single-stranded overhangs that are complementary to each other.
2. **Annealing:** The gene of interest and the cut plasmid are mixed. The complementary sticky ends anneal (pair up) through hydrogen bonds.
3. **Ligation:** While the sticky ends are held together by weak hydrogen bonds, the sugar-phosphate backbone of the DNA has breaks (nicks). **T4 DNA ligase** is the enzyme that catalyzes the formation of strong covalent phosphodiester bonds at these nicks, permanently joining the DNA fragments together. It essentially acts as a "molecular glue."

Let's look at the other options:

- (A) Cutting DNA at specific sequences is the job of **restriction enzymes**.
- (C) Synthesizing DNA from RNA is the job of **reverse transcriptase**.
- (D) Unwinding DNA for replication is the job of **DNA helicase**.

Step 3: Final Answer:

The primary purpose of T4 DNA ligase is to join DNA fragments by creating phosphodiester bonds, effectively pasting them together.

💡 Quick Tip

The word "ligase" comes from the Latin verb "ligare," which means "to bind or tie." So, DNA ligase literally ties DNA strands together. T4 refers to the bacteriophage (a virus that infects bacteria) from which this particularly efficient ligase is derived.

5. What is the role of ATP in bioluminescence reactions?

- (A) To phosphorylate luciferase.
- (B) To act as an energy source for luciferin oxidation.
- (C) To stabilize the light emission.
- (D) To generate NADH for the reaction.

Correct Answer: (B) To act as an energy source for luciferin oxidation.

Solution:

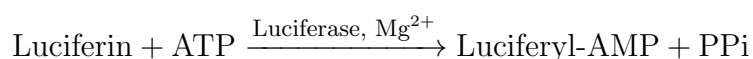
Step 1: Understanding the Concept:

Bioluminescence, such as the light produced by fireflies, is a chemical reaction that produces light. The key components are an enzyme called **luciferase** and a substrate called **luciferin**. The reaction requires energy to proceed, and this energy is provided by ATP (Adenosine Triphosphate).

Step 2: Detailed Explanation:

The firefly bioluminescence reaction occurs in two main steps:

1. **Activation of Luciferin:** Luciferin reacts with ATP in the presence of magnesium ions (Mg^{2+}). This reaction forms an activated intermediate called luciferyl adenylate and releases pyrophosphate (PPi).



In this step, ATP is not just phosphorylating a molecule; it is adenylating it, transferring an AMP group to luciferin. This is an energy-requiring step that "primes" the luciferin for the next stage.

2. **Oxidation and Light Emission:** The activated luciferyl adenylate reacts with molecular oxygen (O_2). This oxidation reaction is highly energetic and leads to the formation of an electronically excited state of oxyluciferin. When this excited molecule returns to its ground state, it releases the excess energy in the form of a photon of light.



Thus, ATP's primary role is to provide the chemical energy needed to activate luciferin, which

then allows the energy-releasing (light-emitting) oxidation to occur. It directly fuels the reaction.

Step 3: Final Answer:

ATP acts as the energy source that activates luciferin, enabling its subsequent oxidation and the emission of light.

💡 Quick Tip

ATP is the universal "energy currency" of the cell. Whenever you see a biological process that requires a significant energy input, such as creating light from chemical components, ATP is almost always the molecule providing that energy.

6. Match the LIST-I with LIST-II

LIST-I (Disease of infection)	LIST-II (Causative Agents)
A. Plague	I. Bacillus anthracis
B. Anthrax	II. Treponema Pallidum
C. Syphilis	III. Plasmodium spp.
D. Malaria	IV. Yersinia pestis

Choose the correct answer from the options given below:

- (A) A-II, B-I, C-III, D-IV
- (B) A-I, B-III, C-IV, D-II
- (C) A-IV, B-I, C-II, D-III
- (D) A-IV, B-II, C-III, D-I

Correct Answer: (C) A-IV, B-I, C-II, D-III

Solution:

Step 1: Understanding the Concept:

This question tests your knowledge of common infectious diseases and the specific microorganisms (pathogens) that cause them. It requires matching each disease with its correct causative agent.

Step 2: Detailed Explanation:

Let's match each disease in LIST-I with its corresponding agent in LIST-II.

- **A. Plague:** Plague, including the infamous bubonic plague, is a bacterial infection caused by *Yersinia pestis*. So, **A matches with IV**.

- **B. Anthrax:** Anthrax is a serious infectious disease caused by the spore-forming bacterium *Bacillus anthracis*. So, **B matches with I.**
- **C. Syphilis:** Syphilis is a sexually transmitted infection caused by the spirochete bacterium *Treponema pallidum*. So, **C matches with II.**
- **D. Malaria:** Malaria is a life-threatening disease caused by protozoan parasites of the genus *Plasmodium*, which are transmitted to people through the bites of infected female *Anopheles* mosquitoes. So, **D matches with III.**

Step 3: Final Answer:

Based on the matching, the correct combination is: A-IV, B-I, C-II, D-III. This corresponds to option (C).

💡 Quick Tip

For this type of question, creating flashcards or tables connecting diseases, causative agents, type of pathogen (bacterium, virus, fungus, protozoan), and mode of transmission is a very effective study method.

7. A single amino acid substitution in a protein causes sickle-cell disease. Identify the correct statements regarding it.

- A. It is an inherited blood disorder.
- B. Hydrophobic interactions between hemoglobin proteins lead to their aggregation into a fiber.
- C. Glutamic acid is replaced by valine in beta-globin chain of haemoglobin.
- D. The red blood cells in the patients are disc shaped carry oxygen.
- E. Capacity to carry oxygen is greatly reduced.

Choose the correct answer from the options given below:

- (A) A, B and C only
- (B) A, B and E only
- (C) B, C and D only
- (D) C, D and E only

Correct Answer: (A) A, B and C only

Solution:

Step 1: Understanding the Concept:

Sickle-cell disease is a classic example of a genetic disorder caused by a single point mutation. Understanding the molecular basis of the disease and its physiological consequences is key to

answering this question.

Step 2: Detailed Explanation:

Let's evaluate each statement:

- **A. It is an inherited blood disorder.**

This is **correct**. Sickle-cell disease is an autosomal recessive genetic disorder, meaning an individual must inherit two copies of the faulty gene (one from each parent) to have the disease.

- **B. Hydrophobic interactions between hemoglobin proteins lead to their aggregation into a fiber.**

This is **correct**. The mutation causes valine (a hydrophobic amino acid) to replace glutamic acid (a hydrophilic amino acid). Under low oxygen conditions, this hydrophobic patch on the hemoglobin surface causes the molecules to stick together (polymerize) into long, rigid fibers.

- **C. Glutamic acid is replaced by valine in beta-globin chain of haemoglobin.**

This is **correct**. This is the precise mutation: a single nucleotide substitution (A to T) in the DNA results in the substitution of the sixth amino acid in the beta-globin chain from glutamic acid (Glu) to valine (Val).

- **D. The red blood cells in the patients are disc shaped carry oxygen.**

This is **incorrect**. Normal red blood cells are biconcave disc-shaped. In sickle-cell disease, the polymerization of hemoglobin distorts the red blood cells into a rigid, crescent or "sickle" shape, especially under low oxygen stress.

- **E. Capacity to carry oxygen is greatly reduced.**

This statement is misleading. A single sickle hemoglobin (HbS) molecule's ability to bind oxygen is not significantly reduced. The primary problem is that the sickling of cells leads to their premature destruction (hemolysis), causing anemia, which reduces the total number of red blood cells and thus the overall oxygen-carrying capacity of the blood. The sickled cells also block blood vessels. While the ultimate physiological effect is reduced oxygen delivery, statements A, B, and C describe the direct cause and nature of the disease more accurately and are fundamentally correct, whereas E is a consequence and can be debated in its phrasing. Given the options, the set (A, B, C) is the most accurate and fundamental group of correct statements.

Step 3: Final Answer:

Statements A, B, and C are all factually correct descriptions of the disease. Statement D is incorrect. Therefore, the best option is (A).

 Quick Tip

In multiple-statement questions, first go through each statement and mark it as True or False. Then, use the process of elimination on the given options. This is often faster and more reliable than trying to find the correct combination directly.

8. Arrange the following scientific events in chronological sequence (oldest to latest)

A. Florence Nightingale organized hospitals with minimized cross infections.

B. Joseph Lister developed aseptic techniques.

C. Fanny Hesse advocated use of agar as a solidifying material for microbiological media.

D. Elie Metchnikoff discovered phagocytosis.

Choose the correct answer from the options given below:

(A) A, B, C, D

(B) A, C, B, D

(C) B, A, D, C

(D) C, B, D, A

Correct Answer: (A) A, B, C, D

Solution:

Step 1: Understanding the Concept:

This question tests knowledge of the historical timeline of key discoveries and developments in the fields of nursing, surgery, and microbiology. Placing these events in their correct order is required.

Step 2: Detailed Explanation:

Let's establish the time frame for each event:

- **A. Florence Nightingale organized hospitals with minimized cross infections.**
Florence Nightingale's major contributions to sanitation and hygiene in hospitals occurred during and after the Crimean War, which took place from **1853 to 1856**. Her work laid the foundation for modern nursing and hospital infection control.
- **B. Joseph Lister developed aseptic techniques.**
Joseph Lister, building on Pasteur's work, is considered the father of antiseptic surgery. He published his seminal work on using carbolic acid (phenol) to sterilize instruments and clean wounds in **1867**.
- **C. Fanny Hesse advocated use of agar as a solidifying material for microbiological media.**

Fanny Hesse, the wife of Walther Hesse who worked in Robert Koch's laboratory, suggested the use of agar as a solidifying agent to replace gelatin in **1881**. This was a revolutionary step that allowed for the reliable isolation of pure bacterial cultures.

- **D. Elie Metchnikoff discovered phagocytosis.**

The Russian zoologist Elie Metchnikoff observed cells in starfish larvae engulfing foreign particles and termed this process phagocytosis in **1882**. This discovery was a cornerstone of cellular immunology.

The chronological order (oldest to latest) is therefore: Nightingale (1850s) → Lister (1867) → Hesse (1881) → Metchnikoff (1882).

Step 3: Final Answer:

The correct sequence is A, B, C, D.

 Quick Tip

When studying the history of science, try to create a timeline and associate each key figure with their major contribution and an approximate decade. This helps to build a mental map of how scientific ideas developed over time.

9. Arrange the causative agent as per the ascending order of their incubation period for the disease development, as mentioned in bracket:

A. Clostridium perfringens (food poisoning)

B. Salmonella typhi (Typhoid)

C. Bubonic (Plague)

D. HIV (AIDS)

Choose the correct answer from the options given below:

(A) A, B, C, D

(B) A, C, B, D

(C) B, C, A, D

(D) C, B, D, A

Correct Answer: (B) A, C, B, D

Solution:

Step 1: Understanding the Concept:

The incubation period is the time elapsed between exposure to a pathogenic organism and when signs and symptoms of the disease are first apparent. This question asks to arrange the given diseases in ascending order (shortest to longest) of their typical incubation periods.

Step 2: Detailed Explanation:

Let's determine the typical incubation period for each disease:

- **A. *Clostridium perfringens* (food poisoning):** This is a common cause of food poisoning. The toxins produced by the bacteria cause symptoms very rapidly, typically within **6 to 24 hours**.
- **C. Bubonic (Plague):** Plague, caused by *Yersinia pestis*, has a relatively short incubation period after a bite from an infected flea, usually ranging from **1 to 7 days**.
- **B. *Salmonella typhi* (Typhoid):** Typhoid fever is a systemic infection. The incubation period is significantly longer than for plague or simple food poisoning, typically ranging from **6 to 30 days**.
- **D. HIV (AIDS):** The incubation period for HIV is complex. The initial acute infection may appear in 2-4 weeks. However, the progression from HIV infection to the development of AIDS (the symptomatic stage) has a very long latent period, often ranging from **2 to 15 years**, or even longer, without treatment.

Arranging these in ascending order (shortest to longest):

1. **A** (6-24 hours)
2. **C** (1-7 days)
3. **B** (6-30 days)
4. **D** (years)

The correct sequence is A, C, B, D.

Step 3: Final Answer:

The correct order of diseases by ascending incubation period is *Clostridium perfringens* food poisoning, Bubonic plague, Typhoid, and then HIV/AIDS. This corresponds to option (B).

💡 Quick Tip

Remember general rules of thumb for incubation periods: Food poisoning infections that act via pre-formed toxins or rapid growth in the gut are very fast (hours). Acute systemic bacterial/viral infections are often in the range of days to a few weeks. Diseases with long latency periods, like HIV or tuberculosis, can take months or years to become symptomatic.

10. The typical sequence for bacterial growth curve is:

- A. Exponential/ Log phase
- B. Lag Phase

C. Stationary Phase

D. Death/Decline Phase

Choose the correct answer from the options given below:

- (A) B, A, C, D
- (B) A, B, C, D
- (C) B, A, D, C
- (D) C, B, D, A

Correct Answer: (A) B, A, C, D

Solution:

Step 1: Understanding the Concept:

When bacteria are introduced into a new environment with nutrients (a batch culture), they exhibit a predictable pattern of growth over time. This pattern, when plotted as the logarithm of the number of live cells versus time, is known as the bacterial growth curve. It consists of four distinct phases.

Step 2: Detailed Explanation:

The four phases of the bacterial growth curve occur in the following sequence:

1. **B. Lag Phase:** This is the initial phase where bacteria are adapting to the new environment. They are metabolically active, synthesizing enzymes and other molecules needed for growth, but there is no significant increase in cell number. The length of this phase depends on the condition of the bacteria and the nature of the new medium.
2. **A. Exponential/Log Phase:** Once adapted, the bacteria begin to divide at a constant, maximum rate. The number of cells increases exponentially (doubling at regular intervals). This is the phase of healthiest growth.
3. **C. Stationary Phase:** Growth slows down and eventually stops as essential nutrients are depleted and toxic waste products accumulate. The rate of cell division equals the rate of cell death, so the population size remains constant (reaches a plateau).
4. **D. Death/Decline Phase:** As conditions worsen further, the death rate exceeds the division rate. The number of viable cells in the population decreases exponentially.

Therefore, the correct sequence is Lag Phase → Exponential Phase → Stationary Phase → Death Phase.

Step 3: Final Answer:

The correct sequence is B, A, C, D.

💡 Quick Tip

Use the mnemonic "Lions Eat Small Dogs" or "Let's Go Study Drugs" to remember the order of the phases: **L**ag, **E**xponential (**G**rowth), **S**tationary, **D**eath.

11. Contact between two people with different types of culture leading to diffusion of culture both ways is known as:

- (A) Socialization
- (B) Social stress
- (C) Acculturation
- (D) Social defence

Correct Answer: (C) Acculturation

Solution:

Step 1: Understanding the Concept:

This question asks for the sociological term that describes the process of cultural change resulting from the meeting of different cultures. The key part of the definition is that the change or "diffusion" happens in both directions.

Step 2: Detailed Explanation:

Let's define the terms provided:

- **(A) Socialization:** This is the lifelong process through which an individual learns the values, norms, skills, and social roles of their own culture or society. It's about how one becomes a member of their society, not primarily about the interaction between different societies.
- **(B) Social stress:** This is a state of tension or strain within a society or experienced by individuals due to social factors. It is not a term for cultural exchange.
- **(C) Acculturation:** This is the process of social, psychological, and cultural change that stems from the balancing of two cultures while adapting to the prevailing culture of the society. It involves changes in the original cultural patterns of either or both groups when they have continuous first-hand contact. The "diffusion of culture both ways" is a hallmark of acculturation.
- **(D) Social defence:** This term is not standard in this context; it might refer to societal mechanisms to protect against threats, which is not relevant to cultural exchange.

The term that specifically describes the mutual influence and change when two cultures come into contact is acculturation. It is distinct from assimilation, where a minority group is expected to completely adopt the culture of the dominant group.

Step 3: Final Answer:

The correct term is Acculturation.

 Quick Tip

Think of the prefix "ac-" as in "addition". Acculturation is the **addition** and blending of cultural traits when different groups meet. It's a two-way street, unlike assimilation, which is often a one-way absorption.

12. Hidden hunger is a form of undernutrition due to deficiency of

- (A) Vitamins and Minerals
- (B) Carbohydrates
- (C) Proteins
- (D) Fats

Correct Answer: (A) Vitamins and Minerals

Solution:

Step 1: Understanding the Concept:

Undernutrition can be broadly categorized. One type is a lack of sufficient calories (energy), primarily from macronutrients (carbohydrates, fats, proteins), which leads to obvious signs of hunger and wasting. Another type is a deficiency in essential micronutrients, which can occur even when a person is consuming enough calories. This latter form is known as "hidden hunger."

Step 2: Detailed Explanation:

- **Hidden Hunger:** This term refers to micronutrient deficiencies. Micronutrients are vitamins and minerals (e.g., iron, vitamin A, iodine, zinc) that the body requires in small quantities for proper growth, development, and physiological function. A person can eat a diet that is high in calories but poor in these essential nutrients. Because they do not feel the physical sensation of hunger, the deficiency is "hidden" but can have severe consequences, including impaired brain development, weakened immune systems, and increased risk of illness.
- **Macronutrients (Carbohydrates, Proteins, Fats):** These are required in large amounts and are the primary source of energy (calories) for the body. A deficiency in these leads to

what is typically thought of as hunger, starvation, and conditions like kwashiorkor (protein deficiency) or marasmus (energy deficiency).

Therefore, hidden hunger is specifically a deficiency of vitamins and minerals.

Step 3: Final Answer:

The correct answer is Vitamins and Minerals.

💡 Quick Tip

The key to this question is the word "hidden." A diet of plain rice or corn might provide enough calories to stop someone from feeling hungry, but it lacks the essential vitamins and minerals needed for health. The hunger for these micronutrients is hidden from the person's perception.

13. Anti Larval measures to control vector borne diseases include which of the following?

- A. Environmental Control**
- B. Biological Control**
- C. Residual Sprays**
- D. Genetic Control**

Choose the correct answer from the options given below:

- (A) A and B only
- (B) C and D only
- (C) A, B, C and D
- (D) B, C and D only

Correct Answer: (A) A and B only

Solution:

Step 1: Understanding the Concept:

Vector control strategies are often divided into those that target the adult stage of the vector (e.g., mosquitoes) and those that target the immature, aquatic larval stage. "Anti-larval measures" are specifically those aimed at eliminating or controlling vectors before they become adults.

Step 2: Detailed Explanation:

Let's analyze each of the listed measures in the context of larval control:

- **A. Environmental Control:** This is a primary anti-larval measure. It involves modifying the environment to prevent larvae from developing. This is also known as "source

reduction” and includes actions like draining stagnant water from containers, clearing gutters, and managing irrigation to eliminate breeding sites. This directly targets the larval habitat.

- **B. Biological Control:** This is another classic anti-larval measure. It involves introducing natural predators of larvae into their habitats. A well-known example is the use of larvivorous fish (like *Gambusia*) in ponds and water tanks to eat mosquito larvae.
- **C. Residual Sprays:** This is an **anti-adult measure**, not an anti-larval one. Indoor Residual Spraying (IRS) involves applying a long-lasting insecticide to the walls and ceilings of homes. Adult mosquitoes are killed when they rest on these treated surfaces. This has no effect on the larvae in water bodies.
- **D. Genetic Control:** Methods like the Sterile Insect Technique (SIT) involve releasing sterilized male insects that mate with wild females, resulting in no offspring. While this ultimately reduces the number of larvae in the next generation, it is generally categorized as a sophisticated population control method rather than a direct anti-larval measure that acts on existing larvae. More importantly, option C is definitively incorrect.

Step 3: Final Answer:

Environmental Control (A) and Biological Control (B) are direct and established anti-larval measures. Residual Sprays (C) are an anti-adult measure and therefore incorrect. Because option C is incorrect, any answer combination including it (B, C, and D) must be wrong. This leaves (A) A and B only, as the most accurate choice among the options provided.

💡 Quick Tip

When answering questions about vector control, always distinguish between methods targeting larvae (larviciding, source reduction, biological control) and methods targeting adults (adulticiding, space spraying, residual sprays, bed nets). Larval measures are proactive, while adult measures are reactive.

14. Classify the following foods in ascending order (lowest to highest) according to their Glycaemic Index

- A. Whole grains
- B. Baked potato
- C. Brown rice
- D. Blackberry

Choose the correct answer from the options given below:

- (A) C, B, A, D
- (B) A, C, B, D

- (C) D, A, C, B
(D) C, B, D, A

Correct Answer: (C) D, A, C, B

Solution:

Step 1: Understanding the Concept:

The Glycaemic Index (GI) is a relative ranking of carbohydrate in foods according to how they affect blood glucose levels. Foods with a low GI value (55 or less) are more slowly digested, absorbed and metabolised and cause a lower and slower rise in blood glucose and, therefore insulin levels. Foods with a high GI value (70 or more) are rapidly digested and cause a substantial, rapid rise in blood glucose.

Step 2: Detailed Explanation:

We need to arrange the given foods in ascending order of their GI, from lowest to highest. Let's look at the typical GI values for each food:

- **D. Blackberry:** Berries, like most fruits, are rich in fiber and have a very low GI. The GI of blackberries is approximately **25**.
- **A. Whole grains:** This is a broad category, but whole grains like oats or whole wheat bread generally have a low to medium GI due to their fiber content. A typical value is around **50-55**.
- **C. Brown rice:** Brown rice has more fiber than white rice, giving it a medium GI. Its GI is typically around **68**.
- **B. Baked potato:** Potatoes are very starchy, and baking makes the starch highly digestible. A baked potato has a very high GI, often ranging from **85 to over 100**.

Arranging these in ascending order of GI:

Blackberry (25) < Whole grains (~55) < Brown rice (68) < Baked potato (>85)

The correct sequence is D, A, C, B.

Step 3: Final Answer:

The correct ascending order of Glycaemic Index is Blackberry, Whole grains, Brown rice, and Baked potato. This corresponds to the sequence D, A, C, B.

💡 Quick Tip

As a general rule for GI: foods high in fiber and fat tend to have a lower GI, while processed carbohydrates and starchy root vegetables (like potatoes) tend to have a higher GI. Processing and cooking methods can also significantly alter the GI.

15. Match the LIST-I with LIST-II

LIST-I (Disease)	LIST-II (Cause)
A. Lathyrism	I. Pyrrolizidine alkaloids (Jhunjhunia seeds contaminating Gondhli)
B. Endemic ascites	II. Viral disease
C. Salmonellosis	III. Bacterial disease
D. Hepatitis A and E	IV. Beta oxalyl amino alanine (Khesri dal)

Choose the correct answer from the options given below:

- (A) A-IV, B-I, C-III, D-II
- (B) A-I, B-III, C-II, D-IV
- (C) A-I, B-II, C-IV, D-III
- (D) A-III, B-IV, C-I, D-II

Correct Answer: (A) A-IV, B-I, C-III, D-II

Solution:

Step 1: Understanding the Concept:

This question requires matching specific diseases with their known causes, which include toxins from plants, bacteria, and viruses.

Step 2: Detailed Explanation:

Let's match each disease in LIST-I with its correct cause in LIST-II.

- **A. Lathyrism:** This is a neurodegenerative disorder that causes paralysis of the lower limbs. It is caused by consuming Khesri dal (*Lathyrus sativus*), which contains the neurotoxin **Beta oxalyl amino alanine (BOAA)**. Therefore, **A matches with IV**.
- **B. Endemic ascites:** This condition, characterized by fluid accumulation in the abdomen, can be caused by liver damage. A specific form is hepatic veno-occlusive disease, which can result from consuming food grains contaminated with seeds containing **Pyrrolizidine alkaloids**. Jhunjhunia seeds (*Crotalaria*) are a known source of these alkaloids. Therefore, **B matches with I**.
- **C. Salmonellosis:** This is a common form of food poisoning caused by infection with bacteria from the *Salmonella* genus. It is a **Bacterial disease**. Therefore, **C matches**

with III.

- **D. Hepatitis A and E:** Both Hepatitis A and Hepatitis E are liver infections caused by the Hepatitis A virus (HAV) and Hepatitis E virus (HEV), respectively. They are **Viral diseases**. Therefore, **D matches with II**.

Step 3: Final Answer:

The correct pairings are A-IV, B-I, C-III, and D-II. This combination corresponds to option (A).

 Quick Tip

Food-borne illnesses can have diverse causes. It's helpful to categorize them: Lathyrism and Endemic Ascites are caused by natural toxins in plants (food contaminants), Salmonellosis is a bacterial infection, and Hepatitis A/E are viral infections often spread via contaminated food or water.

16. Match the LIST-I with LIST-II

LIST-I (Topic)	LIST-II (Explanation)
A. Crowd	I. When a group of people come together temporarily, motivated by a common interest without leadership
B. Mob	II. Community of a few families living together
C. Band	III. When a group of people come together temporarily, led by a leader who forces members into action
D. Herd	IV. When a group of people come together temporarily led by a leader where members of the group have to follow orders of the leader without question

Choose the correct answer from the options given below:

- (A) A-I, B-II, C-III, D-IV
- (B) A-I, B-III, C-II, D-IV
- (C) A-III, B-II, C-IV, D-I
- (D) A-III, B-IV, C-II, D-I

Correct Answer: (B) A-I, B-III, C-II, D-IV

Solution:

Step 1: Understanding the Concept:

This question tests the definitions of different types of social groups as understood in sociology and anthropology. Each term describes a group with specific characteristics regarding size, duration, leadership, and purpose.

Step 2: Detailed Explanation:

Let's match each term in LIST-I with its correct sociological definition in LIST-II.

- **A. Crowd:** A crowd is a temporary, unstructured gathering of people who are in the same place at the same time. They share a common focus but do not necessarily interact. The key features are its temporary nature and lack of formal leadership. Explanation I fits this perfectly. Thus, **A matches with I.**
- **B. Mob:** A mob is a specific type of crowd that is highly emotional and typically focuses on a violent or destructive goal. It is often incited to action by a leader. Explanation III, which describes a group led by a leader who "forces members into action," accurately describes a mob. Thus, **B matches with III.**
- **C. Band:** In anthropology, a band is the smallest and simplest form of political organization. It consists of a small group of related families living together, typically among foragers. Explanation II, "Community of a few families living together," is the correct definition of a band. Thus, **C matches with II.**
- **D. Herd:** The term "herd" can be used to describe a group of people who are easily led and act collectively without individualized thought, blindly following a leader. Explanation IV, where members "have to follow orders of the leader without question," captures this essence of passive following. Thus, **D matches with IV.**

Step 3: Final Answer:

The correct pairings are A-I, B-III, C-II, and D-IV. This combination corresponds to option (B).

💡 Quick Tip

To distinguish these terms, focus on key characteristics: Crowd = temporary, no leader. Mob = emotional crowd, with a leader inciting action. Band = small, family-based community. Herd = passive group, unquestioning followers.

17. Which of the following are examples of food fortification?

- A. Iodization of salt**
- B. Vitamin D in milk**
- C. Vanilla essence in Icecream**
- D. Saccharin in tooth paste**

Choose the correct answer from the options given below:

- (A) A, B and D only
- (B) A, B and C only
- (C) A, C and D only
- (D) A and B only

Correct Answer: (D) A and B only

Solution:

Step 1: Understanding the Concept:

Food fortification is the process of deliberately adding essential micronutrients (vitamins and minerals) to food products to improve their nutritional quality and address public health concerns related to nutrient deficiencies, without changing the basic characteristics of the food.

Step 2: Detailed Explanation:

Let's evaluate each option to see if it fits the definition of food fortification.

- **A. Iodization of salt:** This is a classic example of food fortification. Iodine, an essential mineral, is added to table salt to prevent iodine deficiency disorders (IDD) such as goiter and cretinism.
- **B. Vitamin D in milk:** This is another common example. Vitamin D is added to milk to enhance calcium absorption and prevent rickets in children and osteomalacia in adults.
- **C. Vanilla essence in Icecream:** Vanilla essence is a food additive used for flavoring. It does not add significant nutritional value and is not added to address a nutrient deficiency. Therefore, this is not fortification.
- **D. Saccharin in tooth paste:** Saccharin is an artificial sweetener added to improve the taste of toothpaste. Firstly, toothpaste is not a food. Secondly, saccharin is a non-nutritive sweetener, not an essential micronutrient. Therefore, this is not food fortification.

Step 3: Final Answer:

Only A (Iodization of salt) and B (Vitamin D in milk) are true examples of food fortification. Therefore, the correct option includes only A and B.

 Quick Tip

The key purpose of fortification is to improve public health by adding **essential nutrients**. Differentiate this from adding substances for taste (flavorings), sweetness (sweeteners), or texture (stabilizers), which are considered food additives, not fortificants.

18. Arrange the following food items in descending order (highest to lowest) according to presence of amount of Vitamin C in them.

A. Lime

B. Potato

C. Amla or gooseberry

D. Guava

Choose the correct answer from the options given below:

(A) A, C, B, D

(B) A, D, B, C

(C) B, A, D, C

(D) C, D, A, B

Correct Answer: (D) C, D, A, B

Solution:

Step 1: Understanding the Concept:

This question requires knowledge of the relative amounts of Vitamin C (ascorbic acid) in different common food items. The task is to arrange them from the highest concentration to the lowest.

Step 2: Detailed Explanation:

Let's look at the approximate Vitamin C content per 100 grams for each food item:

- **C. Amla or gooseberry:** Amla is one of the richest natural sources of Vitamin C. Its content can be exceptionally high, typically ranging from **400 to 600 mg** per 100g.
- **D. Guava:** Guava is another excellent source of Vitamin C, far exceeding citrus fruits. It contains about **228 mg** per 100g.
- **A. Lime:** Limes, like other citrus fruits, are well-known sources of Vitamin C, but contain less than amla or guava. They have about **29 mg** per 100g.
- **B. Potato:** While not famous for it, potatoes are a significant source of Vitamin C in many diets because they are consumed in large quantities. They contain about **20 mg**

per 100g.

Now, we arrange these foods in descending order (highest to lowest) of their Vitamin C content:
Amla (~600 mg) > Guava (228 mg) > Lime (29 mg) > Potato (20 mg)

The correct sequence is C, D, A, B.

Step 3: Final Answer:

The correct descending order of Vitamin C content is Amla, Guava, Lime, Potato. This corresponds to the sequence C, D, A, B.

💡 Quick Tip

Many people mistakenly believe citrus fruits like oranges and limes are the best sources of Vitamin C. Remember that other foods like amla, guava, bell peppers, and kiwi are actually much richer in this vitamin.

19. The legislations for social security measures for industrial workers in India includes all except

- (A) Workmen's Compensation Act, 1923
- (B) Central Maternity Benefit Act, 1961
- (C) Employees State Insurance Act, 1948
- (D) Water Prevention and Control of Pollution Act, 1974

Correct Answer: (D) Water Prevention and Control of Pollution Act, 1974

Solution:

Step 1: Understanding the Concept:

Social security legislations are laws designed to provide a safety net for workers and their dependents against various contingencies like injury, sickness, maternity, unemployment, and old age. The question asks to identify the law from the given list that does NOT fall under this category.

Step 2: Detailed Explanation:

Let's analyze the purpose of each Act:

- **1. Workmen's Compensation Act, 1923 (now the Employee's Compensation Act):** This act provides for the payment of compensation by employers to their employees for injury by accident arising out of and in the course of employment. This is a core social security measure.

- **2. Central Maternity Benefit Act, 1961:** This act regulates the employment of women in certain establishments for certain periods before and after child-birth and provides for maternity benefit and certain other benefits. This is a clear social security measure.
- **3. Employees State Insurance Act, 1948 (ESI Act):** This is a comprehensive social security legislation providing medical care and a range of cash benefits for sickness, maternity, disablement, and death due to employment injury to insured persons and their families. This is a cornerstone of social security in India.
- **4. Water Prevention and Control of Pollution Act, 1974:** This is an environmental law. Its main objective is to provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water. While it impacts industrial practices, its primary purpose is environmental protection, not providing social security benefits to individual workers.

Step 3: Final Answer:

The first three acts are directly related to providing social security to workers. The Water (Prevention and Control of Pollution) Act, 1974, is an environmental legislation. Therefore, it is the exception in the list.

Quick Tip

When analyzing laws, focus on their primary objective. Social security laws focus on the welfare and financial protection of individuals (workers). Environmental laws focus on the protection of natural resources (like water, air, forests).

20. Scale for measuring socio-economic status in urban areas ONLY widely used in India is:

- (A) Pareek and Kulshrestha Scale
- (B) Kuppuswamy Scale
- (C) B G Prasad Scale
- (D) Hollingshed Scale

Correct Answer: (B) Kuppuswamy Scale

Solution:

Step 1: Understanding the Concept:

Socio-economic status (SES) is a key determinant of health. In India, several scales have been developed to measure SES in communities for research and public health purposes. These scales

are often specific to either urban or rural settings.

Step 2: Detailed Explanation:

Let's examine the scales listed:

- **1. Pareek and Kulshrestha Scale:** This scale was developed specifically for measuring the socio-economic status of families in **rural** India. It considers factors like caste, occupation, education, social participation, land holding, housing, and farm power.
- **2. Kuppuswamy Scale:** The Kuppuswamy scale is the most widely used and accepted scale for classifying socio-economic status in **urban** communities in India. It was developed in 1976 and is periodically updated. It is based on three variables: the education and occupation of the head of the family, and the total monthly family income.
- **3. B G Prasad Scale:** This is another very popular scale, but it is primarily used in **rural** areas. It is based solely on the per capita monthly income of the family and is updated regularly based on the Consumer Price Index.
- **4. Hollingshed Scale:** The Hollingshed Index of Social Position was developed in the United States. While it's a significant tool in sociology, it is not widely used in India for community studies.

Step 3: Final Answer:

The scale specifically designed for and widely used in urban areas of India is the Kuppuswamy Scale.

💡 Quick Tip

For exams in the Indian context, remember these key associations: **Kuppuswamy = Urban**, and **B G Prasad / Pareek = Rural**. This simple mnemonic can help you answer questions about SES scales quickly.

21. Koplik's spots in oral mucosa along with rashes are seen in which disease?

- (A) Mumps
- (B) Chickenpox
- (C) Rubella
- (D) Measles

Correct Answer: (D) Measles

Solution:

Step 1: Understanding the Concept:

Certain diseases present with pathognomonic signs, which are specific clinical features that are diagnostic of a particular condition. Koplik's spots are a classic example of such a sign.

Step 2: Detailed Explanation:

- **Koplik's spots** are small, bluish-white spots on a bright red background, found on the inner lining of the cheek (buccal mucosa). They typically appear 1-2 days before the characteristic measles rash and are considered pathognomonic for **Measles** (also known as Rubeola).
- **Mumps** is characterized by painful swelling of the parotid (salivary) glands, giving a "chipmunk cheeks" appearance. It does not cause Koplik's spots.
- **Chickenpox** (Varicella) is characterized by an itchy rash that turns into fluid-filled blisters (vesicles) and then scabs. It does not cause Koplik's spots.
- **Rubella** (German Measles) causes a rash and swollen lymph nodes, but the characteristic oral spots are Forchheimer spots (petechiae on the soft palate), which are different from Koplik's spots and are not as specific.

Step 3: Final Answer:

Koplik's spots are a hallmark sign of Measles.

💡 Quick Tip

Associate "Koplik's spots" directly with "Measles." This is a frequently asked, high-yield fact in medicine and public health exams. The presence of these spots is a clinical clue to diagnose measles even before the full-body rash appears.

22. Which of the following statement is true about First-aid incase of snake bite.

- A. Immobilize in the same way as a fractured limb
 - B. Incise or manipulate the bitten site
 - C. Give beverages or stimulants
 - D. Do not apply any compression in the form of tight ligatures
- Choose the correct answer from the options given below:

- (A) A and D only
- (B) A and C only

- (C) A, C and D
- (D) B, C and D only

Correct Answer: (A) A and D only

Solution:

Step 1: Understanding the Concept:

The primary goal of first-aid for a snake bite is to slow the spread of venom and get the victim to a medical facility as quickly and safely as possible. It is crucial to know what to do and, just as importantly, what NOT to do.

Step 2: Detailed Explanation:

Let's evaluate each statement based on current medical guidelines for snake bite first-aid:

- **A. Immobilize in the same way as a fractured limb:** This is **TRUE**. Movement, especially of the bitten limb, increases blood and lymph flow, which can spread the venom more rapidly through the body. Keeping the limb still, for example with a splint, is a critical step.
- **B. Incise or manipulate the bitten site:** This is **FALSE**. Cutting the wound ("incise"), trying to suck out the venom, or applying any form of manipulation is extremely harmful. It does not remove a significant amount of venom and increases the risk of tissue damage, bleeding, and infection.
- **C. Give beverages or stimulants:** This is **FALSE**. Stimulants like caffeine or alcohol should be avoided as they can increase the heart rate and potentially accelerate the absorption and spread of the venom. The victim should be kept calm and at rest.
- **D. Do not apply any compression in the form of tight ligatures:** This is **TRUE**. Applying a tight band or tourniquet ("ligature") is dangerous. It can completely cut off blood flow to the limb, leading to severe tissue damage (gangrene) and potentially requiring amputation. While a 'pressure bandage' is recommended for some bites (like from elapids), it is applied with the pressure of a sprain bandage, not as a tight ligature.

Step 3: Final Answer:

The correct and true statements about snake bite first-aid are A and D. Therefore, the correct option is A and D only.

💡 Quick Tip

Remember the "Don'ts" of snake bite first-aid are more numerous than the "Do's". Don't cut, don't suck, don't use a tourniquet, don't give alcohol. The main "Do's" are: keep the victim calm and still, immobilize the limb, and get to a hospital immediately.

23. Isolation is important in control of which disease?

- (A) Diphtheria
- (B) Hepatitis A
- (C) Tuberculosis
- (D) HIV-AIDS

Correct Answer: (A) Diphtheria

Solution:

Step 1: Understanding the Concept:

Isolation is a public health measure that involves separating sick people with a contagious disease from people who are not sick. It is most critical for diseases that are highly infectious and spread easily from person to person, particularly through respiratory droplets or direct contact.

Step 2: Detailed Explanation:

Let's analyze the mode of transmission for each disease to determine the importance of isolation:

- **1. Diphtheria:** This is a bacterial infection caused by *Corynebacterium diphtheriae*. It spreads very easily and rapidly through respiratory droplets from coughing or sneezing. Due to its high infectivity and severity, strict isolation of patients is a cornerstone of its control to prevent outbreaks.
- **2. Hepatitis A:** This is a viral infection that spreads through the fecal-oral route, typically via contaminated food or water. Control measures focus on hygiene, sanitation, and food safety (enteric precautions), not respiratory isolation.
- **3. Tuberculosis (TB):** Pulmonary TB is spread through respiratory droplets. Isolation, particularly airborne infection isolation in healthcare settings, is important for patients with active, contagious forms of TB. However, Diphtheria is an acute illness where immediate, strict isolation is paramount to stop rapid spread in the community.
- **4. HIV-AIDS:** HIV is transmitted through specific body fluids (blood, semen, vaginal fluids, breast milk), primarily via sexual contact, sharing needles, or from mother to child. It does not spread through casual contact, air, or water. Therefore, isolation of patients

is medically unnecessary and ethically wrong.

Comparing Diphtheria and Tuberculosis, both require isolation. However, Diphtheria is a classic example of a disease requiring immediate and strict quarantine and isolation procedures to control acute outbreaks. Therefore, it is often considered the best answer in such a comparative context.

Step 3: Final Answer:

Among the given options, isolation is a critical and immediate control measure for Diphtheria.

💡 Quick Tip

To answer questions about control measures like isolation, quarantine, or vaccination, always focus on the mode of transmission of the disease. Respiratory droplet transmission (like Diphtheria, Measles, TB) often requires isolation, while blood-borne (HIV) or fecal-oral (Hepatitis A) diseases require different precautions.

24. Commonest type of cancer among males in India is:

- (A) Lung cancer
- (B) Oral Cavity cancer
- (C) Prostate cancer
- (D) Bladder cancer

Correct Answer: (B) Oral Cavity cancer

Solution:

Step 1: Understanding the Concept:

This question asks about cancer epidemiology, specifically the most common cancer affecting men in India. This is a factual question based on data from national cancer registries and global health organizations.

Step 2: Detailed Explanation:

The cancer profile in India is heavily influenced by lifestyle and environmental factors, especially the high prevalence of tobacco use in various forms (smoking and chewing).

- **1. Lung cancer:** This is a very common cancer in Indian men, strongly linked to smoking cigarettes and bidis. It is consistently one of the top two cancers.
- **2. Oral Cavity cancer:** Cancers of the lip and oral cavity are extremely common in India, particularly among men. This is largely due to the widespread use of smokeless

tobacco products like gutka, paan, and khaini. According to recent data from sources like the National Cancer Registry Programme (NCRP) of India and GLOBOCAN, cancer of the lip and oral cavity is the most frequent cancer diagnosed in Indian males.

- **3. Prostate cancer:** This is a common cancer in elderly men, but its incidence in India is lower than that of tobacco-related cancers like oral and lung cancer.
- **4. Bladder cancer:** While also linked to smoking, bladder cancer is less common in Indian men compared to oral and lung cancers.

Based on the latest epidemiological data, oral cavity cancer holds the top rank for incidence among men in India, followed closely by lung cancer.

Step 3: Final Answer:

The most common type of cancer among males in India is Oral Cavity cancer.

 Quick Tip

Remember the strong link between tobacco and cancer in the Indian context. Since both smoking (leading to lung cancer) and chewing tobacco (leading to oral cancer) are highly prevalent, these two will always be the top contenders for the most common cancers in men. Current data places oral cancer slightly ahead.

25. According to IMNCI (Integrated Management of Neonatal and Childhood Illness) classification, fast breathing is present in a child aged 12 months upto 5 years if respiration rate is more than or equal to:

- (A) 60
- (B) 50
- (C) 40
- (D) 30

Correct Answer: (C) 40

Solution:

Step 1: Understanding the Concept:

The Integrated Management of Neonatal and Childhood Illness (IMNCI) strategy, developed by WHO and UNICEF, provides simple, evidence-based guidelines for managing common childhood illnesses. A key component is identifying pneumonia by looking for two main signs: cough or difficult breathing, combined with fast breathing (tachypnea). The cutoff for what constitutes "fast breathing" is age-dependent.

Step 2: Detailed Explanation:

The IMNCI guidelines define fast breathing based on the following age-specific respiratory rate cutoffs (counting breaths in one full minute):

- **Age ; 2 months:** Fast breathing is defined as a respiratory rate of **60 breaths per minute or more**.
- **Age 2 months up to 12 months:** Fast breathing is defined as a respiratory rate of **50 breaths per minute or more**.
- **Age 12 months up to 5 years:** Fast breathing is defined as a respiratory rate of **40 breaths per minute or more**.

The question specifically asks for the cutoff for a child aged 12 months up to 5 years.

Step 3: Final Answer:

According to the IMNCI guidelines, for a child in the age group of 12 months to 5 years, a respiration rate of 40 or more breaths per minute is classified as fast breathing.

💡 Quick Tip

Remember the IMNCI respiratory rate cutoffs with the mnemonic "60-50-40" for the age groups "under 2 months", "2 to 12 months", and "12 months to 5 years", respectively. The breathing rate slows as a child gets older, so the cutoff number decreases with increasing age.

26. According to WHO BMI (Body-mass index) classification, Pre-obese value is

- (A) 25.00-29.99
- (B) 30.00-34.99
- (C) 20.00-24.99
- (D) 18.5-24.99

Correct Answer: (A) 25.00-29.99

Solution:

Step 1: Understanding the Concept:

The Body Mass Index (BMI) is a value derived from the mass (weight) and height of a person. It is used as a simple and common metric to categorize weight status as underweight, normal weight, overweight, and obese. The World Health Organization (WHO) provides a standard

international classification.

Step 2: Key Formula or Approach:

The formula for BMI is:

$$\text{BMI} = \frac{\text{weight in kilograms}}{(\text{height in meters})^2}$$

The WHO classification for adults is as follows:

- < 18.5 : Underweight
- 18.5 - 24.99: Normal weight
- 25.00 - 29.99: Pre-obese (also commonly called Overweight)
- ≥ 30.00 : Obese

Step 3: Detailed Explanation:

Based on the official WHO classification:

- The range 18.5-24.99 represents a normal, healthy weight.
- The range 25.00-29.99 indicates that a person is pre-obese or overweight. This is the range where the risk for developing non-communicable diseases begins to increase.
- The range 30.00-34.99 falls into Obesity Class I.
- The range 20.00-24.99 is within the normal weight category.

The question specifically asks for the "Pre-obese" value, which corresponds to the BMI range of 25.00-29.99.

Step 4: Final Answer:

The correct BMI range for the Pre-obese category according to WHO is 25.00-29.99.

💡 Quick Tip

Remember the key cutoff points for BMI: 18.5, 25, and 30. Below 18.5 is underweight. From 18.5 up to 25 is normal. From 25 up to 30 is pre-obese/overweight. 30 and above is obese. These are essential numbers in public health.

27. How many sputum samples are collected from a presumptive Pulmonary Tuberculosis case for microscopic observation?

- (A) 4
- (B) 3
- (C) 2
- (D) 1

Correct Answer: (C) 2

Solution:

Step 1: Understanding the Concept:

The diagnosis of Pulmonary Tuberculosis (TB) often relies on sputum smear microscopy, where a patient's sputum is examined under a microscope for the presence of acid-fast bacilli (*Mycobacterium tuberculosis*). The number of samples collected is based on guidelines from organizations like the World Health Organization (WHO) and national programs like India's National TB Elimination Program (NTEP), formerly RNTCP.

Step 2: Detailed Explanation:

Historically, the standard protocol for TB diagnosis involved collecting three sputum samples: one spot sample on the first day, one early morning sample collected by the patient at home, and a second spot sample when the patient returned with the morning sample.

However, research showed that examining two samples was nearly as effective as examining three. The third sample added very little diagnostic yield but increased the burden on patients and the laboratory.

Therefore, WHO and subsequently the NTEP in India revised the guidelines. The current recommendation is to collect **two sputum samples**:

1. **Sample 1 (Spot):** Collected on the spot when the patient first visits the health facility.
2. **Sample 2 (Morning):** An early morning sample collected by the patient at home the next day. This sample is generally of better quality as secretions accumulate overnight.

Step 3: Final Answer:

According to the current guidelines for TB diagnosis, two sputum samples are collected from a presumptive case for microscopic observation.

💡 Quick Tip

While the older protocol was three samples, the current standard for sputum microscopy is two. For exams, always try to recall the most up-to-date clinical guidelines. The change from three to two samples was a significant update in TB control programs worldwide.

28. Risk factors for Non communicable diseases are all of the following except

- (A) Tobacco and alcohol
- (B) Raised cholesterol
- (C) Contaminated water
- (D) Sedentary lifestyle

Correct Answer: (C) Contaminated water

Solution:

Step 1: Understanding the Concept:

Non-communicable diseases (NCDs), such as heart disease, stroke, cancer, diabetes, and chronic lung disease, are not passed from person to person. They are typically of long duration and are the result of a combination of genetic, physiological, environmental, and behavioral factors. The question asks to identify which of the given options is NOT a risk factor for NCDs.

Step 2: Detailed Explanation:

Let's analyze each option:

- **1. Tobacco and alcohol:** The use of tobacco and the harmful use of alcohol are two of the most significant behavioral risk factors for a wide range of NCDs, including various cancers, cardiovascular diseases, and liver disease.
- **2. Raised cholesterol:** High levels of cholesterol in the blood (hypercholesterolemia) is a major metabolic risk factor that leads to atherosclerosis, which is the underlying cause of heart attacks and strokes.
- **3. Contaminated water:** Contaminated water is a primary vehicle for the transmission of **communicable (infectious) diseases**, such as cholera, typhoid, dysentery, and Hepatitis A. It is not considered a direct risk factor for the major NCDs.
- **4. Sedentary lifestyle:** Physical inactivity is a leading behavioral risk factor for NCDs. It contributes to obesity, raised blood pressure, raised cholesterol, and an increased risk of heart disease, stroke, diabetes, and certain types of cancer.

Step 3: Final Answer:

Tobacco, alcohol, raised cholesterol, and a sedentary lifestyle are all major risk factors for non-communicable diseases. Contaminated water is a risk factor for communicable diseases. Therefore, it is the correct exception.

Quick Tip

Differentiate between risk factors for communicable vs. non-communicable diseases. Communicable diseases spread via pathogens (bacteria, viruses) often transmitted through vectors, air, or contaminated food/water. NCD risk factors are often related to long-term lifestyle choices (diet, exercise, smoking) and metabolic changes (obesity, high blood pressure).

29. According to National Immunisation Schedule, OPV(oral polio vaccine) contains how many types of Poliovirus?

- A. Type 1**
- B. Type 2**
- C. Type 3**
- D. Type 4**

Choose the correct answer from the options given below:

- (A) A, B and C only
- (B) A and C only
- (C) A and B only
- (D) B, C and D only

Correct Answer: (A) A, B and C only

Solution:

Step 1: Understanding the Concept:

Poliomyelitis is caused by three serotypes of poliovirus: Type 1, Type 2, and Type 3. The Oral Polio Vaccine (OPV) is designed to provide immunity against these types. The composition of the OPV used in immunization schedules has evolved over time as the global polio eradication initiative has progressed.

Step 2: Detailed Explanation:

- **Poliovirus Types:** There are three types of wild poliovirus - Type 1 (WPV1), Type 2 (WPV2), and Type 3 (WPV3). There is no Type 4. So, option D is incorrect.
- **Trivalent OPV (tOPV):** For many decades, the standard vaccine used was the trivalent OPV. As the name suggests, it contained live attenuated strains of all three poliovirus types: Type 1, Type 2, and Type 3.
- **The Global Switch:** Wild poliovirus type 2 was declared globally eradicated in 2015. However, the live attenuated Type 2 strain in tOPV could, on rare occasions, revert to a virulent form and cause vaccine-derived polio. To eliminate this risk, in April 2016, there

was a globally synchronized switch from tOPV to **bivalent OPV (bOPV)**. The bOPV contains only Type 1 and Type 3 poliovirus strains.

- **Interpretation of the Question:** The question asks what types of poliovirus OPV contains, in the context of the National Immunisation Schedule. Although the current schedule uses bOPV (Types 1 and 3), the OPV program as a whole has been built around targeting all three types. The trivalent form, containing types 1, 2, and 3, was the standard for a very long time. In the context of a general knowledge question about the components of OPV, it is most common to refer to the three original types it was designed to combat. Thus, the most comprehensive answer reflecting the full scope of the poliovirus targeted by OPV is Types 1, 2, and 3.

Step 3: Final Answer:

The Oral Polio Vaccine was developed to combat Poliovirus types 1, 2, and 3. The original and long-standing formulation (tOPV) contained all three. Therefore, the correct answer is A, B, and C only.

💡 Quick Tip

While the current OPV is bivalent (Types 1–3), be aware of the history. Questions may refer to the long-standing trivalent OPV (Types 1, 2,–3). The context is key. Unless specified as "current" or "bivalent," a general question about OPV often refers to the three types it targets.

30. Match the LIST-I with LIST-II

LIST-I (Vaccine)	LIST-II (Type of Vaccine)
A. BCG	I. Toxoid
B. Rabies	II. Killed whole organism
C. Tetanus	III. Live attenuated
D. Pneumococcus	IV. Polysaccharide

Choose the correct answer from the options given below:

- (A) A-I, B-III, C-II, D-IV
- (B) A-II, B-IV, C-I, D-III
- (C) A-IV, B-II, C-I, D-III

(D) A-III, B-II, C-I, D-IV

Correct Answer: (D) A-III, B-II, C-I, D-IV

Solution:

Step 1: Understanding the Concept:

Vaccines are biological preparations that provide active acquired immunity to a particular infectious disease. They are classified based on how they are made. This question requires matching specific vaccines to their type.

Step 2: Detailed Explanation:

Let's match each vaccine from LIST-I to its correct type in LIST-II.

- **A. BCG (Bacillus Calmette-Guérin):** This vaccine protects against tuberculosis. It is made from a weakened (attenuated) strain of *Mycobacterium bovis*. Therefore, it is a **Live attenuated** vaccine. **A matches with III.**
- **B. Rabies:** The rabies vaccine is prepared from rabies virus that has been inactivated or killed, so it can no longer cause disease but can still stimulate an immune response. Therefore, it is a **Killed whole organism** (or inactivated) vaccine. **B matches with II.**
- **C. Tetanus:** The tetanus vaccine does not contain the bacteria itself. Instead, it contains the inactivated tetanus toxin, known as a toxoid. The body learns to fight the toxin, which is what causes the disease. Therefore, it is a **Toxoid** vaccine. **C matches with I.**
- **D. Pneumococcus:** One of the common types of pneumococcal vaccine (PPSV23) is made from the polysaccharide (sugar) chains found on the capsule of the *Streptococcus pneumoniae* bacterium. Therefore, it is a **Polysaccharide** vaccine. (Another type is the conjugate vaccine, but polysaccharide is the option given). **D matches with IV.**

Step 3: Final Answer:

The correct set of matches is A-III, B-II, C-I, D-IV. This corresponds to option (D).

 Quick Tip

Memorize key examples for each vaccine type: **Live attenuated** (BCG, Measles, OPV), **Killed/Inactivated** (Rabies, IPV, Hepatitis A), **Toxoid** (Tetanus, Diphtheria), **Subunit/Polysaccharide/Conjugate** (Hepatitis B, Pneumococcus, Hib).

31. The goal of population approach to shift the community distribution of blood pressure towards lower levels involves reduction of salt intake to an average of not more than

- (A) 3 grams per day
- (B) 4 grams per day
- (C) 5 grams per day
- (D) 6 grams per day

Correct Answer: (C) 5 grams per day

Solution:

Step 1: Understanding the Concept:

A key public health strategy to control hypertension (high blood pressure) at the population level is to promote a reduction in dietary sodium intake. High sodium intake is a major driver of elevated blood pressure. The World Health Organization (WHO) provides global targets for nutrient intake to prevent non-communicable diseases.

Step 2: Detailed Explanation:

The WHO recommendation for adults is to reduce sodium intake to less than 2 grams per day. Salt is chemically sodium chloride (NaCl), and is about 40% sodium by weight.

To convert the sodium recommendation to a salt recommendation:

$$\text{Salt intake} = \frac{\text{Sodium intake}}{0.4}$$
$$\text{Salt intake} = \frac{2 \text{ grams}}{0.4} = 5 \text{ grams}$$

Therefore, the WHO recommends that adults consume **less than 5 grams of salt per day**. This is equivalent to about one teaspoon. The goal is to reduce average intake to this level or lower to have a significant impact on community blood pressure levels.

Step 3: Final Answer:

The recommended upper limit for average daily salt intake according to global public health guidelines is 5 grams per day.

💡 Quick Tip

Remember the "Rule of 5" for salt. The WHO recommends less than 5 grams of salt per day for adults. This is a very common public health fact that frequently appears in exams.

32. Laboratory diagnosis of HIV infection is done through which of following tests?

A. Absolute CD4 lymphocyte count

- B. WESTERN Blot
- C. HIV viral load test
- D. ELISA test

Choose the correct answer from the options given below:

- (A) D and B
- (B) A and C
- (C) A, C and D
- (D) C and D

Correct Answer: (A) D and B

Solution:

Step 1: Understanding the Concept:

The laboratory diagnosis of HIV infection involves detecting either the antibodies produced by the body against the virus or the virus itself (its antigens or genetic material). It is important to distinguish between tests used for diagnosis and tests used for monitoring the disease after diagnosis.

Step 2: Detailed Explanation:

Let's analyze the purpose of each test:

- **D. ELISA test (Enzyme-Linked Immunosorbent Assay):** This is the standard **screening test** for HIV. It is highly sensitive and detects antibodies to HIV in the blood. A positive ELISA result is considered presumptive and requires confirmation.
- **B. WESTERN Blot:** This is the classic **confirmatory test** used to verify a positive ELISA result. It is highly specific and detects antibodies to individual HIV proteins. A positive Western Blot confirms the diagnosis of HIV infection.
- **C. HIV viral load test (e.g., PCR):** This test measures the amount of HIV's genetic material (RNA) in the blood. While it can be used for diagnosis (especially for early detection before antibodies develop or in newborns), its primary use is to **monitor** the effectiveness of antiretroviral therapy (ART).
- **A. Absolute CD4 lymphocyte count:** This test measures the number of CD4 T-cells, which are the main cells targeted by HIV. This is NOT a diagnostic test for HIV. It is a crucial test for **monitoring** the health of the immune system and the stage of the disease in a person already diagnosed with HIV.

The standard diagnostic algorithm for many years has been screening with ELISA followed by confirmation with Western Blot. Therefore, both D and B are central to the diagnosis of HIV

infection.

Step 3: Final Answer:

The primary screening test (ELISA) and the classic confirmatory test (Western Blot) are the key components of HIV diagnosis. Therefore, the combination of D and B is the most appropriate answer.

💡 Quick Tip

Distinguish between diagnostic tests and monitoring tests. Diagnostic tests answer "Does this person have HIV?" (ELISA, Western Blot, PCR). Monitoring tests answer "How is the HIV-positive person's health?" (CD4 count, Viral load). The classic diagnostic pair is ELISA + Western Blot.

33. Neonatal Tetanus is well controlled by all, except-

- (A) Antibiotics
- (B) Clean delivery surface
- (C) Clean blade for cutting the cord and clean tie for the cord
- (D) Tetanus immunisation

Correct Answer: (A) Antibiotics

Solution:

Step 1: Understanding the Concept:

Neonatal Tetanus (NNT) is a severe, often fatal disease of newborns caused by contamination of the umbilical cord stump with spores of *Clostridium tetani*. Control and elimination strategies focus on **prevention** rather than treatment.

Step 2: Detailed Explanation:

The key strategies for preventing and controlling Neonatal Tetanus are:

- **4. Tetanus immunisation:** Immunizing pregnant women or women of childbearing age with the Tetanus Toxoid (TT) vaccine is the most important strategy. The mother develops antibodies and passes them to the fetus, providing passive immunity to the newborn for the first few weeks of life.
- **The "Three Cleans" of delivery:** These are hygienic practices during childbirth to prevent the introduction of tetanus spores.
 - **2. Clean delivery surface:** Ensuring the baby is born on a clean surface.

- **3. Clean blade for cutting the cord...:** Using a sterile instrument to cut the umbilical cord and a clean tie. This also includes clean hands of the attendant.
- **1. Antibiotics:** Antibiotics (like penicillin) are used in the **treatment** of a baby who has already developed neonatal tetanus. Their role is to kill the *C. tetani* bacteria to stop further production of the toxin. However, they are not a primary measure for controlling or preventing the disease at a population level. Prevention is the key to control.

Step 3: Final Answer:

Clean delivery practices and maternal immunization are the cornerstones of NNT control. Antibiotics are used for treatment, not as a primary control or prevention measure. Therefore, "Antibiotics" is the exception.

 Quick Tip

For questions about disease control, always distinguish between prevention/control measures and treatment measures. Control measures (vaccination, hygiene) are applied to a population to stop the disease from occurring. Treatment (antibiotics, antitoxin) is given to an individual who is already sick.

34. Which of the following is the true statement in the case of Leprosy:

- (A) The indeterminate type of Leprosy is bacteriologically positive.
- (B) Tuberculoid type of Leprosy is bacteriologically negative.
- (C) Lepromatous type of Leprosy is bacteriologically negative.
- (D) Pure neuritic type of Leprosy is bacteriologically positive.

Correct Answer: (B) Tuberculoid type of Leprosy is bacteriologically negative.

Solution:

Step 1: Understanding the Concept:

Leprosy, caused by *Mycobacterium leprae*, presents as a spectrum of disease depending on the host's immune response. A key diagnostic classification is based on the bacteriological index (BI), determined by a slit-skin smear examination for acid-fast bacilli. This divides leprosy into paucibacillary (PB, few bacteria, bacteriologically negative) and multibacillary (MB, many bacteria, bacteriologically positive).

Step 2: Detailed Explanation:

Let's analyze the bacteriological status of each type of leprosy mentioned:

- **Tuberculoid type (TT):** This is at one end of the spectrum where the patient has a strong cell-mediated immune response. The immune system effectively contains the bacteria, so there are very few bacilli in the lesions. Consequently, slit-skin smears are typically **bacteriologically negative**. This is a form of paucibacillary (PB) leprosy. So, statement 2 is **TRUE**.
- **Lepromatous type (LL):** This is at the opposite end of the spectrum, characterized by a poor cell-mediated immune response. The bacteria multiply unchecked, leading to a very high bacterial load throughout the body. Slit-skin smears are strongly **bacteriologically positive**. This is the classic form of multibacillary (MB) leprosy. So, statement 3 is **FALSE**.
- **Indeterminate type:** This is a very early form of leprosy with a single, ill-defined skin patch. The bacterial load is very low, and smears are usually **bacteriologically negative**. So, statement 1 is **FALSE**.
- **Pure neuritic type:** In this form, there is nerve involvement but no skin lesions. Since the diagnosis relies on skin smears, and there are no skin lesions to take a smear from, they are by definition **bacteriologically negative** on skin smears. It is classified as paucibacillary. So, statement 4 is **FALSE**.

Step 3: Final Answer:

The only true statement among the options is that the Tuberculoid type of Leprosy is bacteriologically negative.

💡 Quick Tip

Remember the inverse relationship in the leprosy spectrum: Strong Immunity (Tuberculoid) = Few Bacteria (Negative Smear, Paucibacillary). Weak Immunity (Lepromatous) = Many Bacteria (Positive Smear, Multibacillary).

35. Appropriate clinical management of Acute Diarrhoeal diseases in children is :

- (A) Give tea or coffee
- (B) Oral Rehydration therapy with reduced osmolarity Oral Rehydration Salt and Zinc supplementation
- (C) Antibiotics only
- (D) Stop breast feeding

Correct Answer: (B) Oral Rehydration therapy with reduced osmolarity Oral Rehydration Salt and Zinc supplementation

Solution:

Step 1: Understanding the Concept:

The management of acute diarrhea in children focuses on preventing and treating dehydration, replacing ongoing fluid and electrolyte losses, and providing adequate nutrition to promote recovery. The guidelines from WHO and UNICEF are the global standard for care.

Step 2: Detailed Explanation:

Let's evaluate the appropriateness of each management option:

- **1. Give tea or coffee:** This is **inappropriate**. Caffeinated beverages can act as diuretics, potentially increasing fluid loss. Many teas and coffees are also given with sugar, which can worsen osmotic diarrhea.
- **2. Oral Rehydration therapy with reduced osmolarity Oral Rehydration Salt and Zinc supplementation:** This is the **cornerstone of appropriate management**.
 - **Low-osmolarity ORS:** It is the recommended fluid for rehydration as it effectively replaces water and electrolytes lost during diarrhea and reduces stool volume and vomiting compared to the older standard ORS.
 - **Zinc supplementation:** Daily zinc supplementation for 10-14 days is recommended for all children with acute diarrhea. It has been proven to reduce the duration and severity of the episode and also prevent subsequent episodes of diarrhea in the following months.
- **3. Antibiotics only:** This is **inappropriate**. The vast majority of acute diarrheal episodes in children are caused by viruses (like Rotavirus) and are self-limiting. Antibiotics have no effect on viruses and their indiscriminate use can lead to antibiotic resistance. They are only indicated in specific cases, such as dysentery (bloody diarrhea) or suspected cholera.
- **4. Stop breast feeding:** This is **dangerous and incorrect advice**. Breastfeeding should be continued, and even offered more frequently, during a diarrheal episode. Breast milk provides ideal hydration, essential nutrients, and important immune factors that help the child fight the infection.

Step 3: Final Answer:

The most appropriate and evidence-based clinical management for acute diarrhea in children is the combined approach of using low-osmolarity ORS for rehydration and providing zinc supplementation.

 Quick Tip

For childhood diarrhea, remember the three key principles: 1. Rehydrate with ORS. 2. Give Zinc. 3. Continue feeding (including breastfeeding). Everything else is secondary or potentially harmful.

36. Screening programmes for detection of Diabetes Mellitus is :

- (A) Primordial Level of Prevention
- (B) Primary Level of Prevention
- (C) Secondary Level of Prevention
- (D) Tertiary Level of Prevention

Correct Answer: (C) Secondary Level of Prevention

Solution:

Step 1: Understanding the Concept:

The levels of prevention are a cornerstone of public health, classifying interventions based on their timing in the natural history of a disease.

- **Primordial Prevention:** Focuses on preventing the development of risk factors themselves. Example: Promoting healthy eating habits in a population from childhood to prevent obesity.
- **Primary Prevention:** Aims to prevent the disease from occurring in the first place in people who are currently healthy but at risk. Example: Immunization, health education on smoking cessation.
- **Secondary Prevention:** Aims to detect a disease at its earliest stages and intervene to slow or stop its progression. It targets individuals who may have the disease but are not yet showing symptoms. Example: Screening tests.
- **Tertiary Prevention:** Focuses on people who already have the disease and aims to reduce complications, disability, and improve quality of life. Example: Rehabilitation for stroke patients, regular foot examinations for diabetics.

Step 2: Detailed Explanation:

A screening program for Diabetes Mellitus involves testing an asymptomatic population to identify individuals with early, undiagnosed diabetes or pre-diabetes. The goal is early detection and prompt treatment to prevent the disease from progressing and causing complications. This action perfectly aligns with the definition of secondary prevention.

Step 3: Final Answer:

Screening is a classic example of secondary prevention.

 Quick Tip

Remember the keyword for each level: Primordial = No Risk Factors, Primary = No Disease, Secondary = No Symptoms (Early Detection), Tertiary = No Complications. Screening is always secondary.

37. Match List-I with List-II

LIST-I (Committee)	LIST-II (Recommendation)
A. Bhore	I. Primary Health Units with 75 bedded hospitals for 10-20000 population
B. Mudaliar	II. One basic health worker per 10000 population
C. Chadah	III. All India Health Service on the pattern of IAS
D. Kartar Singh	IV. One Primary Health Centre for the population of 50000

Choose the correct answer from the options given below:

- (A) A-III, B-I, C-II, D-IV
- (B) A-II, B-I, C-III, D-IV
- (C) A-I, B-III, C-II, D-IV
- (D) A-IV, B-II, C-III, D-I

Correct Answer: (C) A-I, B-III, C-II, D-IV

Solution:

Step 1: Understanding the Concept:

This question tests knowledge of the key recommendations of major health committees that have shaped India's public health system.

Step 2: Detailed Explanation:

Let's match each committee with its famous recommendation:

- **A. Bhore Committee (1946):** Officially the Health Survey and Development Committee, it laid the blueprint for India's health services. It introduced the concept of Primary

Health Centres (PHCs) or Units linked to hospitals to provide integrated curative and preventive care. While the exact numbers in option I are slightly different from the original short-term goal (PHC for 40k pop.), the core concept of PHUs linked with hospitals is the Bhore Committee's legacy. So, **A matches with I.**

- **B. Mudaliar Committee (1962):** Officially the Health Survey and Planning Committee, it reviewed the progress since the Bhore committee. One of its key recommendations was the creation of an **All India Health Service** on the pattern of the Indian Administrative Service (IAS) to improve the quality of health administration. So, **B matches with III.**
- **C. Chadah Committee (1963):** This committee was appointed to study the arrangements for the maintenance phase of the National Malaria Eradication Programme. It recommended that the vigilance workers for malaria should be converted into basic health workers to serve a population of 10,000, handling malaria work, family planning, and vital statistics. So, **C matches with II.**
- **D. Kartar Singh Committee (1973):** This committee on Multipurpose Workers (MPW) gave concrete recommendations for integrating health services at the peripheral level. It defined the population norms for health infrastructure, including the norm of **one Primary Health Centre (PHC) for a population of 50,000.** So, **D matches with IV.**

Step 3: Final Answer:

The correct matching is A-I, B-III, C-II, D-IV. This corresponds to option (C).

 Quick Tip

Create flashcards for Indian health committees. Associate a single, memorable keyword with each: Bhore = PHC Concept; Mudaliar = All India Health Service; Chadah = Basic Health Worker; Kartar Singh = Multipurpose Worker (MPW).

38. "Blinding" is most commonly done in :

- (A) Case Control study
- (B) Randomized Controlled Trials
- (C) Cohort study
- (D) Cross- sectional study

Correct Answer: (B) Randomized Controlled Trials

Solution:

Step 1: Understanding the Concept:

Blinding (or masking) is a procedure in experimental studies where one or more parties involved in the trial (such as the participants, investigators, or analysts) are kept unaware of the treatment assignment. It is a critical method to reduce bias.

- **Single-blind:** Participants do not know which treatment they are receiving.
- **Double-blind:** Neither the participants nor the investigators administering the treatment know the treatment assignments.
- **Triple-blind:** The participants, investigators, and data analysts are all unaware of the treatment assignments.

Step 2: Detailed Explanation:

Let's look at the study designs:

- **1. Case Control study & 3. Cohort study:** These are observational studies. While some blinding is possible (e.g., an outcome assessor can be blinded to the exposure status in a cohort study), it is not a fundamental or universally applied feature as the investigator does not control the intervention.
- **4. Cross-sectional study:** This is a snapshot in time and is observational. Blinding is generally not applicable.
- **2. Randomized Controlled Trials (RCTs):** These are experimental studies designed to test an intervention. Blinding is a hallmark and a fundamental methodological principle of high-quality RCTs. It is used to prevent performance bias (participants or investigators behaving differently based on treatment knowledge) and detection bias (outcome assessment being influenced by treatment knowledge).

Step 3: Final Answer:

Blinding is most integral to, and most commonly associated with, Randomized Controlled Trials.

💡 Quick Tip

When you see the term "Blinding" or "Randomization" in an exam, your first thought should be "Randomized Controlled Trial (RCT)". These are defining characteristics of this 'gold standard' study design.

39. Match category of Personnel (List-I) with suggested norms (List-II)

LIST-I (Category of Health Staff)	LIST-II (Population Norm)
A. ASHA	I. 1 per 1000 population
B. Pharmacist	II. 1 per 5,000 population in plain
C. Health Assistant (Female)	III. 1 per 30,000 population in plain
D. Health Worker (Male)	IV. 1 per 10,000 population

Choose the correct answer from the options given below:

- (A) A-IV, B-II, C-I, D-III
- (B) A-I, B-II, C-IV, D-III
- (C) A-II, B-III, C-IV, D-I
- (D) A-I, B-IV, C-III, D-II

Correct Answer: (D) A-I, B-IV, C-III, D-II

Solution:

Step 1: Understanding the Concept:

India's public health infrastructure, particularly under the National Health Mission (NHM), operates based on specific population norms for positioning different cadres of health staff to ensure service delivery.

Step 2: Detailed Explanation:

Let's match the health staff with their population norms based on the Indian Public Health Standards (IPHS).

- **A. ASHA (Accredited Social Health Activist):** She is a community-level health activist who serves as the first port of call for any health-related needs of the community. The norm is **1 ASHA per 1000 population**. So, **A matches with I**.
- **C. Health Assistant (Female):** Also known as the Lady Health Visitor (LHV), she is posted at the Primary Health Centre (PHC) and supervises the work of Female Health Workers (ANMs) at the Sub-Centres. One PHC in a plain area covers a population of 30,000. Therefore, the norm is **1 per 30,000 population in plain areas**. So, **C matches with III**.
- **D. Health Worker (Male):** He is posted at the Sub-Centre. A Sub-Centre in a plain area is established for a population of 5,000. Thus, the norm is **1 per 5,000 population**.

in plain areas. So, D matches with II.

- **B. Pharmacist:** A pharmacist is posted at the PHC (serving 30,000 population). None of the remaining options perfectly match this norm. However, by elimination, if we look at the provided options, option 4 suggests A-I, C-III, and D-II, which are all correct. This leaves B to be matched with IV (1 per 10,000 population). While this is not a standard norm for a pharmacist, it is the only remaining option in the most accurate combination provided.

Step 3: Final Answer:

Based on the correct matching of ASHA, Health Assistant (Female), and Health Worker (Male), the most plausible combination offered is A-I, B-IV, C-III, D-II.

💡 Quick Tip

Memorize the key population norms for India's health system: ASHA = 1000, Sub-Centre (ANM/HW-Male) = 5000 (plain) / 3000 (hilly), PHC = 30,000 (plain) / 20,000 (hilly), Community Health Centre (CHC) = 1,20,000 (plain) / 80,000 (hilly).

40. The study design for developing the new vaccine is :

- (A) Cross-sectional study
- (B) Cohort Study
- (C) Longitudinal study
- (D) Randomized Controlled trial

Correct Answer: (D) Randomized Controlled trial

Solution:

Step 1: Understanding the Concept:

The development and approval of a new vaccine is a rigorous scientific process that requires demonstrating its safety and efficacy. The study design chosen must be able to establish a cause-and-effect relationship between receiving the vaccine and being protected from the disease.

Step 2: Detailed Explanation:

Let's evaluate the suitability of each study design:

- **1. Cross-sectional study:** This observational study looks at data at a single point in time. It cannot determine causality and is unsuitable for testing a new intervention like a vaccine.

- **2. Cohort Study:** This is an observational study where a group of people (cohort) is followed over time to see who develops the disease. While powerful, it cannot prove causation as effectively as an experiment because the investigator does not control who gets the intervention (vaccine).
- **3. Longitudinal study:** This is a broad category for any study that follows subjects over time. Both cohort studies and RCTs are longitudinal. It is not the most specific or best answer.
- **4. Randomized Controlled trial (RCT):** This is an experimental study and is considered the "gold standard" for evaluating the efficacy of a new intervention. Participants are randomly assigned to receive either the new vaccine or a placebo. Randomization ensures that the groups are comparable, and any difference in disease outcome can be attributed to the vaccine. This design provides the strongest evidence for a cause-and-effect relationship. The phased clinical trials for vaccines (Phase I, II, III) are all forms of RCTs.

Step 3: Final Answer:

The definitive study design used to establish the efficacy and safety of a new vaccine is the Randomized Controlled Trial.

💡 Quick Tip

For any question asking about the best study design to test a new drug, therapy, or vaccine, the answer is almost always Randomized Controlled Trial (RCT). It is the gold standard for establishing causality for interventions.

41. Attributes of a mentally healthy person in Mental Dimensions of Health includes

- A. Faces problems and tries to solve them intelligently
- B. Coping with stress and anxiety
- C. Commitment to integrity, principles, ethics, belief and commitment to some higher beings
- D. Has good self control and balances rationally and emotionally

Choose the correct answer from the options given below:

- (A) A, B and D only
- (B) A, B and C only
- (C) B, C and D only
- (D) A, C and D only

Correct Answer: (A) A, B and D only

Solution:

Step 1: Understanding the Concept:

Health is a multidimensional concept, encompassing physical, mental, social, and spiritual well-being. This question asks to identify the attributes that specifically belong to the mental dimension of health.

Step 2: Detailed Explanation:

Let's analyze each attribute:

- **A. Faces problems and tries to solve them intelligently:** This describes resilience and problem-solving ability, which are core functions of mental health. This is a correct attribute.
- **B. Coping with stress and anxiety:** The ability to manage and cope with life's stressors in a healthy way is a fundamental aspect of mental wellness. This is a correct attribute.
- **C. Commitment to integrity, principles, ethics, belief and commitment to some higher beings:** This statement describes the **spiritual dimension** of health. It relates to a person's values, beliefs, and sense of purpose and connection to something larger than oneself. While spiritual health can positively influence mental health, it is considered a distinct dimension.
- **D. Has good self control and balances rationally and emotionally:** This refers to emotional regulation, a key component of mental health. It involves being aware of and managing one's emotions. This is a correct attribute.

Step 3: Final Answer:

Statements A, B, and D are direct attributes of the mental dimension of health. Statement C belongs to the spiritual dimension. Therefore, the correct combination is A, B, and D only.

Quick Tip

Be able to distinguish the dimensions of health: Mental (thinking, feeling, coping), Social (relationships, community), Physical (body function), and Spiritual (values, purpose, beliefs). Questions often test the ability to correctly categorize attributes.

42. Increase in Prevalence of a disease depends on :

- A. Incidence of disease
- B. Communicable period of disease
- C. Increased Duration of disease / illness

D. Increased in mortality due to the disease

Choose the correct answer from the options given below:

- (A) A and D only
- (B) A and C only
- (C) A and B only
- (D) C and D only

Correct Answer: (B) A and C only

Solution:

Step 1: Understanding the Concept:

In epidemiology, Prevalence and Incidence are two fundamental measures of disease frequency.

- **Incidence:** The rate of occurrence of **new cases** of a disease in a population over a specific period.
- **Prevalence:** The proportion of a population that has a disease at a **specific point in time** (point prevalence) or over a period (period prevalence). It includes both old and new cases.

The relationship between them for a stable disease is often expressed as: **Prevalence $\approx$ Incidence $\times$ Duration**.

Step 2: Detailed Explanation:

Based on the formula, let's analyze how each factor affects prevalence:

- **A. Incidence of disease:** If the rate of new cases (Incidence) increases, more people are added to the pool of existing cases. This will **increase** the prevalence.
- **B. Communicable period of disease:** This affects the spread or transmission of an infectious disease, which in turn can affect the incidence, but it's not a direct determinant of prevalence itself.
- **C. Increased Duration of disease / illness:** If people live longer with a disease (e.g., due to treatments that manage but don't cure), they remain a "prevalent case" for a longer time. This will **increase** the prevalence.
- **D. Increased in mortality due to the disease:** If a disease becomes more fatal, people die sooner, and they are removed from the pool of prevalent cases more quickly. This would **decrease** the prevalence.

Step 3: Final Answer:

An increase in prevalence is caused by an increase in incidence (more new cases being added) and an increase in the duration of the illness (cases remaining in the pool for longer). Therefore, A and C are the correct factors.

💡 Quick Tip

Think of prevalence as a bathtub. The water level is the prevalence. Incidence is the rate at which water flows in from the tap. Duration is related to how slowly the water drains out. To raise the water level, you either turn up the tap (increase incidence) or partially plug the drain (increase duration/decrease cure/death).

43. Arrange the given step by step approach in investigation of an Epidemic in ascending order.

A. Formulation of hypothesis

B. Verification of diagnosis

C. Data analysis

D. confirmation of the existence of an epidemic

Choose the correct answer from the options given below:

(A) A, D, C, B

(B) B, C, A, D

(C) B, D, C, A

(D) C, B, D, A

Correct Answer: (C) B, D, C, A

Solution:

Step 1: Understanding the Concept:

Investigating an epidemic or outbreak is a systematic process that epidemiologists follow to identify the source, control the spread, and prevent future occurrences. The steps follow a logical sequence.

Step 2: Detailed Explanation:

Let's arrange the given steps in the correct logical order of an outbreak investigation:

1. **B. Verification of diagnosis:** The first step upon receiving reports of a possible outbreak is to confirm that the patients have the correct diagnosis. You need to ensure you are dealing with a real disease and not a misdiagnosis or reporting error.
2. **D. Confirmation of the existence of an epidemic:** Once the diagnosis is verified for the initial cases, you must determine if the number of cases exceeds the normal expected

number for that area and time period. This confirms that you are dealing with an epidemic and not just a random cluster of cases.

3. **C. Data analysis:** After confirming the epidemic and identifying cases, you collect detailed information (time, place, person) and perform descriptive data analysis. This helps to characterize the epidemic and understand its pattern.
4. **A. Formulation of hypothesis:** Based on the descriptive analysis (the "who, where, when"), you can formulate a hypothesis about the likely cause, source, and mode of transmission of the epidemic. This hypothesis will then be tested with further analytical studies.

The correct ascending order is $B \rightarrow D \rightarrow C \rightarrow A$.

Step 3: Final Answer:

The logical sequence for the initial phase of an epidemic investigation is: Verify diagnosis, Confirm epidemic, Analyze data, and then Formulate a hypothesis. This corresponds to option (C).

Quick Tip

Think like a detective. First, confirm the crime (Verify diagnosis). Second, see if there's a crime wave (Confirm epidemic). Third, analyze the clues (Data analysis). Fourth, form a theory about the culprit (Formulate hypothesis).

44. Match indicators of health(List-I) with their Classification (List-II)

LIST-I (Indicators)	LIST-II (Classification)
A. Notification rates	I. Mortality Indicators
B. Population- bed ratio	II. Morbidity Indicators
C. Case- fatality rate	III. Health-care delivery Indicators
D. Rate of population increase	IV. Socio-economic Indicators

Choose the correct answer from the options given below:

- (A) A-III, B-II, C-I, D-IV
- (B) A-I, B-III, C-II, D-IV
- (C) A-II, B-III, C-I, D-IV
- (D) A-III, B-IV, C-I, D-II

Correct Answer: (C) A-II, B-III, C-I, D-IV

Solution:

Step 1: Understanding the Concept:

Health indicators are quantifiable characteristics of a population which researchers use as supporting evidence to describe the health of a population. They are categorized based on what aspect of health or its determinants they measure.

Step 2: Detailed Explanation:

Let's classify each indicator:

- **A. Notification rates:** This measures the frequency of reported cases of a communicable disease. It is a direct measure of illness or sickness in the population, which falls under **Morbidity Indicators**. So, **A matches with II**.
- **B. Population-bed ratio:** This ratio (number of hospital beds per 1000 population) measures the availability of health infrastructure and resources. It is classified as a **Health-care delivery Indicator**. So, **B matches with III**.
- **C. Case-fatality rate:** This rate is the proportion of individuals with a particular disease who die from it. It measures the severity of the disease and is a direct measure of death. It falls under **Mortality Indicators**. So, **C matches with I**.
- **D. Rate of population increase:** This is a demographic indicator that is closely linked to the overall development, education, and economic status of a country. It is considered a **Socio-economic Indicator**. So, **D matches with IV**.

Step 3: Final Answer:

The correct set of matches is A-II, B-III, C-I, D-IV. This corresponds to option (C).

💡 Quick Tip

Associate keywords with indicator types: Mortality = Death (e.g., death rate, fatality rate). Morbidity = Sickness/Disease (e.g., incidence, prevalence, notification rate). Health Care Delivery = Resources (e.g., doctor-population ratio, bed-population ratio).

45. According to vaccine vial monitors, vaccine is to be discarded and not to be used if:

- A. Inner square color is lighter than outer circle
- B. Inner circle color is lighter than outer square
- C. Inner square color is same as the outer circle

D. Inner square color is darker than outer circle

Choose the correct answer from the options given below:

- (A) C and D only
- (B) A and B only
- (C) A, C and D only
- (D) A and C only

Correct Answer: (A) C and D only

Solution:

Step 1: Understanding the Concept:

A Vaccine Vial Monitor (VVM) is a label containing a heat-sensitive material that is placed on a vaccine vial to register cumulative heat exposure over time. It consists of a dark outer circle and a light inner square. The inner square gradually darkens when exposed to heat.

Step 2: Detailed Explanation:

The rule for interpreting a VVM is simple and is known as the "inner square rule":

- **Condition for USE (Statements A and B):** If the inner square is lighter than the outer circle, the vaccine has not been exposed to excessive heat and **can be used**. Statement A describes this "OK" stage. Statement B is worded confusingly but implies the same "OK" stage.
- **Condition for DISCARD (Statements C and D):** The vaccine reaches its discard point when the inner square becomes the same color as the outer circle. From this point on, the vaccine should not be used.
 - **C. Inner square color is same as the outer circle:** This is the discard point. The vaccine **must be discarded**.
 - **D. Inner square color is darker than outer circle:** This indicates that the vaccine has passed the discard point and has been exposed to even more heat. The vaccine **must be discarded**.

Step 3: Final Answer:

The conditions under which a vaccine must be discarded based on the VVM are when the inner square is the same color as the outer circle, or when it is darker than the outer circle. Therefore, both C and D are correct.

 Quick Tip

Simple rule for VVM: "If the inner square is lighter, use the vial. If the inner square is the same or darker, discard the vial." This covers all scenarios.

46. Match the LIST-I with LIST-II

LIST-I (Concept)	LIST-II (Explanation)
A. Isolation	I. Interruption in transmission of disease
B. Quarantine	II. Limitation of freedom of movements of well person exposed to communicable disease for a period of longest incubation period of the disease to prevent transmission of infection to those not exposed to infection
C. Elimination	III. Termination of all transmission of infections by extermination of infectious agents.
D. Eradication	IV. Separation for the period of communicability of infected persons

Choose the correct answer from the options given below:

- (A) A-IV, B-II, C-I, D-III
- (B) A-II, B-IV, C-I, D-III
- (C) A-IV, B-II, C-III, D-I
- (D) A-II, B-IV, C-III, D-I

Correct Answer: (A) A-IV, B-II, C-I, D-III

Solution:

Step 1: Understanding the Concept:

This question requires defining four key public health terms related to the control and prevention of infectious diseases.

Step 2: Detailed Explanation:

Let's define each concept from List-I and match it with the correct explanation from List-II.

- **A. Isolation:** This refers to the separation of **sick or infected individuals** from healthy ones for the duration of their communicability period. This prevents the direct or indirect transmission of the infectious agent. Explanation IV, "Separation for the period of communicability of infected persons," perfectly matches this definition. So, **A matches with IV**.

- **B. Quarantine:** This is the restriction of movement of **apparently healthy persons** who have been exposed to a communicable disease. The restriction lasts for the duration of the disease's longest incubation period to see if they become ill. This prevents transmission from individuals who may be infected but are not yet symptomatic. Explanation II correctly describes this. So, **B matches with II.**
- **C. Elimination:** Disease elimination is the reduction of the incidence of a disease to zero in a **defined geographical area** as a result of deliberate efforts. It is an "interruption in transmission of disease" within that region. Continued intervention measures are required. Explanation I matches this. So, **C matches with I.**
- **D. Eradication:** This is a more absolute term. It means the permanent reduction to zero of the worldwide incidence of infection caused by a specific agent. It is the "Termination of all transmission of infections by extermination of infectious agents" globally. Explanation III matches this. So, **D matches with III.**

Step 3: Final Answer:

The correct set of matches is A-IV, B-II, C-I, and D-III. This corresponds to option (A).

💡 Quick Tip

Remember the key difference: **Isolation** is for the **sick**, while **Quarantine** is for the **exposed but healthy**. And **Elimination** is regional, while **Eradication** is global (e.g., Smallpox).

47. All are true about Screening test for a disease except :

- (A) Done on apparently healthy people
- (B) Not a basis for treatment
- (C) Based on one criteria or cut off point
- (D) Based on evaluation of number of symptoms, signs and laboratory findings

Correct Answer: (D) Based on evaluation of number of symptoms, signs and laboratory findings

Solution:

Step 1: Understanding the Concept:

A screening test is a simple test applied to a large, apparently healthy population to identify those who have a high probability of having a particular disease, even before they show any symptoms. It is different from a diagnostic test.

Step 2: Detailed Explanation:

Let's evaluate each statement:

- **1. Done on apparently healthy people:** This is **TRUE**. The very purpose of screening is to find hidden diseases in people who look and feel well.
- **2. Not a basis for treatment:** This is **TRUE**. A screening test only indicates a high probability of disease. Those who test positive must undergo a more definitive diagnostic test. Treatment is only started after a confirmed diagnosis, not based on the screening result alone.
- **3. Based on one criteria or cut off point:** This is **TRUE**. Screening tests are typically simple and based on a single measurement against a pre-defined cutoff. For example, a blood pressure reading above 140/90 mmHg, or a random blood sugar above a certain value.
- **4. Based on evaluation of number of symptoms, signs and laboratory findings:** This is **FALSE**. This detailed process describes a **diagnostic work-up**, which is done by a clinician on a patient who is already suspected of having a disease (either due to symptoms or a positive screening test). A screening test is, by design, much simpler than this.

Step 3: Final Answer:

The statement that is not true for a screening test is that it is based on an evaluation of multiple symptoms, signs, and findings. Therefore, this is the correct answer to the "except" question.

💡 Quick Tip

Screening vs. Diagnosis: Think of screening as a quick, wide net to catch fish (high probability cases), and diagnosis as pulling up the net and carefully examining each fish (confirming the disease). Screening is simple and for the healthy-looking; diagnosis is complex and for the sick/suspected.

48. How many vaccine vials are carried in Vaccine Carriers?

- (A) 6-8
- (B) 12-14
- (C) 16-20
- (D) 2-4

Correct Answer: (C) 16-20

Solution:

Step 1: Understanding the Concept:

The vaccine cold chain refers to the system of storing and transporting vaccines at recommended temperatures. Vaccine carriers are insulated, portable boxes used to carry small quantities of vaccines for outreach immunization sessions. They are lined with conditioned ice packs to maintain the temperature.

Step 2: Detailed Explanation:

Different types of cold chain equipment have different capacities.

- **Vaccine Carriers:** These are the standard boxes used by health workers for a day's immunization session. The standard small carrier is designed to hold approximately **16-20 vials**. This allows the health worker to carry a sufficient mix of different vaccines for the session.
- **Day Carriers:** Smaller versions exist that might hold 6-8 vials, but the most commonly used "vaccine carrier" fits the 16-20 vial capacity.
- **Cold Boxes:** These are larger passive containers used for transporting larger quantities of vaccines, for example, from a district store to a Primary Health Centre.

Given the standard options, the 16-20 vial capacity is the correct specification for a standard vaccine carrier.

Step 3: Final Answer:

A standard vaccine carrier used for immunization sessions is designed to carry 16-20 vaccine vials.

💡 Quick Tip

In the context of immunization programs, the "vaccine carrier" is the workhorse for daily sessions. Its capacity is designed to be sufficient for one day's work. Remember the number 16-20 as the standard capacity.

49. Active immunity is acquired by :

- (A) Administration of Immunoglobulin
- (B) Transferring of antibodies across placenta
- (C) Following subclinical infection like Polio and Diphtheria
- (D) Administration of antisera or anti-toxins

Correct Answer: (C) Following subclinical infection like Polio and Diphtheria

Solution:

Step 1: Understanding the Concept:

Immunity can be classified as active or passive.

- **Active Immunity:** The body's own immune system is stimulated to produce antibodies and cellular memory. This provides long-lasting, often lifelong, protection. It is acquired naturally (by infection) or artificially (by vaccination).
- **Passive Immunity:** An individual is given ready-made antibodies produced by another person or animal. This provides immediate but temporary protection, as the body does not produce its own memory cells. It is acquired naturally (mother to fetus) or artificially (injection of immunoglobulins).

Step 2: Detailed Explanation:

Let's analyze each option:

- **1. Administration of Immunoglobulin:** This involves injecting ready-made antibodies. This is an example of **artificially acquired passive immunity**.
- **2. Transferring of antibodies across placenta:** The mother's IgG antibodies cross the placenta to the fetus, providing protection in the first few months of life. This is an example of **naturally acquired passive immunity**.
- **3. Following subclinical infection like Polio and Diphtheria:** A subclinical infection means the person is infected with the pathogen but shows no symptoms. The immune system is still stimulated to produce its own antibodies and memory cells. This is an example of **naturally acquired active immunity**.
- **4. Administration of antisera or anti-toxins:** These contain antibodies (often from animal sources) against a specific toxin or pathogen. This is another example of **artificially acquired passive immunity**.

Step 3: Final Answer:

The only option that describes the acquisition of active immunity is through an immune response following a natural (subclinical) infection.

💡 Quick Tip

Ask yourself: "Is the body doing the work to make antibodies?" If yes, it's **active** (e.g., after infection or vaccination). If no (receiving ready-made antibodies), it's **passive** (e.g., from mother or an injection).

50. Specificity of a Screening Test is:

- (A) Ability of the test to identify correctly those who do not have the disease
- (B) Ability of the test to identify correctly those who have the disease
- (C) The probability that a patient with a positive test has in fact, disease in question
- (D) The probability that a patient with a negative test does not have disease in question

Correct Answer: (A) Ability of the test to identify correctly those who do not have the disease

Solution:

Step 1: Understanding the Concept:

The validity of a screening test is measured by its sensitivity and specificity. These are intrinsic properties of the test that measure how well it performs against a "gold standard" diagnostic test.

Step 2: Detailed Explanation:

Let's define the key terms:

- **Sensitivity:** The ability of the test to correctly identify those who **have** the disease. It is the proportion of true positives among all diseased individuals. A sensitive test has few false negatives. This corresponds to option (B).
- **Specificity:** The ability of the test to correctly identify those who **do not have** the disease. It is the proportion of true negatives among all non-diseased individuals. A specific test has few false positives. This corresponds to option (A).
- **Positive Predictive Value (PPV):** The probability that a person with a positive test result actually has the disease. This corresponds to option (C).
- **Negative Predictive Value (NPV):** The probability that a person with a negative test result actually does not have the disease. This corresponds to option (D).

Step 3: Final Answer:

The correct definition for the specificity of a screening test is its ability to correctly identify

disease-free individuals.

 Quick Tip

Use a mnemonic: **S**ensitivity = rules **N**egative out (SNOUT) - a high sensitivity test, if negative, is good for ruling out a disease. **S**pecificity = rules **P**ositive in (SPECIN) - a high specificity test, if positive, is good for ruling in a disease. Specificity = True Negative Rate.

51. One ASHA worker is posted for _____ population.

- (A) 3000
- (B) 2000
- (C) 1000
- (D) 4000

Correct Answer: (C) 1000

Solution:

Step 1: Understanding the Concept:

The ASHA (Accredited Social Health Activist) is a key component of India's National Health Mission (NHM). She is a trained female community health activist selected from the village itself and accountable to it. Her role is to act as a bridge between the community and the public health system.

Step 2: Detailed Explanation:

The guidelines for the NHM specify the population norms for the placement of various health workers to ensure adequate coverage. For an ASHA, the established norm is to have one ASHA for every **1000 population**. In sparsely populated tribal or hilly areas, this norm can be relaxed to one ASHA per habitation.

Step 3: Final Answer:

The standard population norm for one ASHA worker is 1000.

 Quick Tip

The number 1000 is fundamental to the ASHA program. This is one of the most frequently asked population norms in public health exams in India.

52. Community Health Officer is posted at:

- (A) Primary Health Centre
- (B) Health and Wellness Centre / Ayushman Aarogya Mandir
- (C) Community Health Centre
- (D) District Hospital

Correct Answer: (B) Health and Wellness Centre / Ayushman Aarogya Mandir

Solution:

Step 1: Understanding the Concept:

The Ayushman Bharat program, launched in 2018, is India's flagship initiative for universal health coverage. One of its two main components is the establishment of Health and Wellness Centres (HWCs) by upgrading existing Sub-Centres and Primary Health Centres. A new cadre of mid-level health provider was created to lead the team at these HWCs.

Step 2: Detailed Explanation:

- **Health and Wellness Centres (HWCs):** These centers are designed to provide comprehensive primary health care, including preventive, promotive, and curative services, closer to the community. In late 2023, HWCs were rebranded as **Ayushman Aarogya Mandir**.
- **Community Health Officer (CHO):** The CHO is this new mid-level health provider, typically a B.Sc. Nurse or an Ayurveda practitioner who has completed a certificate course in Community Health. Their specific place of posting is at the Sub Centre-level Health and Wellness Centre (SC-HWC), where they lead a team including the ANM and Male Health Worker.

Therefore, the correct location for a CHO's posting is the Health and Wellness Centre / Ayushman Aarogya Mandir.

Step 3: Final Answer:

A Community Health Officer is posted at the Health and Wellness Centre, which has been recently renamed Ayushman Aarogya Mandir.

💡 Quick Tip

Associate the new terms under Ayushman Bharat: **HWC** (or Ayushman Aarogya Mandir) is the place, and **CHO** is the person. The CHO is the leader of the primary health care team at the most peripheral HWC.

53. According to National Immunisation Schedule, arrange in sequence the vaccines to be given to a child from birth till 5 years of age

- A. Inactivated Polio Vaccine**
- B. Oral Polio vaccine-0 dose**
- C. DPT booster-1**
- D. Measles 1st dose**

Choose the correct answer from the options given below:

- (A) A, B, C, D
- (B) B, C, A, D
- (C) B, C, D, A
- (D) B, A, D, C

Correct Answer: (D) B, A, D, C

Solution:

Step 1: Understanding the Concept:

The National Immunisation Schedule (NIS) of India provides a timeline for administering vaccines to infants, children, and pregnant women to protect them against vaccine-preventable diseases. The question requires ordering a specific set of vaccines according to this schedule.

Step 2: Detailed Explanation:

Let's determine the administration time for each vaccine listed:

- **B. Oral Polio vaccine-0 dose (OPV-0):** This is a birth dose, given as early as possible within the first 15 days of life. This is the **first** vaccine in the sequence.
- **A. Inactivated Polio Vaccine (IPV):** Under the NIS, two fractional doses of IPV are given intradermally at **6 weeks and 14 weeks** of age, along with the pentavalent and OPV doses. This comes **second** in the list.
- **D. Measles 1st dose:** The first dose of the Measles-containing vaccine (now given as MR vaccine for Measles-Rubella) is administered at **9 completed months to 12 months** of age. This comes **third**.
- **C. DPT booster-1:** The first booster dose of DPT (Diphtheria, Pertussis, Tetanus) is given at **16-24 months** of age. This is the **last** vaccine in the sequence.

The chronological sequence of administration is: B (at birth) → A (at 6/14 weeks) → D (at 9 months) → C (at 16-24 months).

Step 3: Final Answer:

The correct sequence is B, A, D, C.

 Quick Tip

To master the immunization schedule, create a timeline: Birth (BCG, OPV-0, Hep B), 6-10-14 weeks (Penta, OPV, IPV, Rota), 9 months (MR, PCV), 16-24 months (DPT/MR boosters), 5-6 years (DPT booster). Placing vaccines on this timeline makes sequencing questions easy.

54. Exclusive breast-feeding for an infant is recommended till _____ months of age.

- (A) 3
- (B) 5
- (C) 6
- (D) 9

Correct Answer: (C) 6

Solution:

Step 1: Understanding the Concept:

Exclusive breastfeeding (EBF) is a major public health recommendation for infant nutrition. It means that the infant receives only breast milk from his/her mother or a wet nurse, or expressed breast milk, and no other liquids or solids, not even water, with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines.

Step 2: Detailed Explanation:

Global and national health authorities, including the World Health Organization (WHO), UNICEF, and the Indian government, have a clear and consistent recommendation based on extensive scientific evidence. The recommendation is for infants to be **exclusively breastfed for the first 6 months of life**. After 6 months, appropriate complementary foods should be introduced while breastfeeding is continued for up to two years or beyond.

Step 3: Final Answer:

Exclusive breastfeeding is recommended for the first 6 months of an infant's life.

 Quick Tip

The number "6" is central to infant feeding guidelines. Remember: **exclusive** breastfeeding for 6 months, and then **start complementary foods** at 6 months while continuing to breastfeed.

55. The concept of "Social physician" was recommended by:

- (A) Chadah Committee
- (B) Mukherji Committee
- (C) Mudaliar Committee
- (D) Bhore Committee

Correct Answer: (D) Bhore Committee

Solution:

Step 1: Understanding the Concept:

This question refers to a key recommendation from one of the foundational health committees in India. The term "Social Physician" encapsulates a philosophy of medical practice focused on community health and preventive medicine, not just individual curative care.

Step 2: Detailed Explanation:

- The **Bhore Committee (1946)**, officially the Health Survey and Development Committee, was a visionary committee that laid the groundwork for India's post-independence health system.
- One of its most important recommendations was the need for a new type of doctor, whom they termed a "**social physician**."
- This physician would not just treat sick individuals but would be trained in preventive and social medicine, and would be the leader of a health team responsible for the comprehensive health of a specific community. This concept emphasized health promotion and disease prevention, a revolutionary idea at the time.

The other committees had different primary focuses: the Mudaliar committee reviewed progress, the Chadah committee focused on malaria workers, and the Mukherji committee dealt with family planning.

Step 3: Final Answer:

The concept of the "Social Physician" was a key recommendation of the Bhore Committee.

 Quick Tip

Associate the Bhore Committee with foundational, visionary ideas for India's health system: the PHC concept, integration of preventive and curative services, and the "Social Physician." It is considered the 'Magna Carta' of health in India.

56. National Health Programme for control of Tuberculosis currently in use by Government of India is:

- (A) National Tuberculosis Elimination Programme
- (B) National Tuberculosis Eradication Programme
- (C) National Tuberculosis Control Programme
- (D) Revised National Tuberculosis Control Programme

Correct Answer: (A) National Tuberculosis Elimination Programme

Solution:

Step 1: Understanding the Concept:

The Government of India has been running a dedicated national program to combat Tuberculosis (TB) for decades. The name and goals of this program have evolved over time to reflect changing strategies and ambitions.

Step 2: Detailed Explanation:

The evolution of the program is as follows:

- **National Tuberculosis Control Programme (NTP):** This was the initial program launched in 1962.
- **Revised National Tuberculosis Control Programme (RNTCP):** The program was revamped and re-launched as RNTCP in 1997 with the adoption of the DOTS (Directly Observed Treatment, Short-course) strategy. This was the active program for over two decades.
- **National Tuberculosis Elimination Programme (NTEP):** In 2020, to reflect the country's ambitious goal of eliminating TB as a public health problem by 2025 (five years ahead of the global Sustainable Development Goal target), the RNTCP was renamed the National Tuberculosis Elimination Programme (NTEP). This is the **currently active** program.
- **Eradication vs. Elimination:** "Eradication" implies the permanent global elimination of the pathogen, which is not the current goal for TB. The goal is "elimination," which means reducing the incidence to a very low level.

Step 3: Final Answer:

The current name of the national program for TB in India is the National Tuberculosis Elimination Programme (NTEP).

💡 Quick Tip

Pay attention to the keyword in the current program name: "Elimination." The Indian government has shifted its focus from mere "control" to the more ambitious goal of "elimination" by 2025.

57. The Terminal Contraceptive method is :

- (A) Female sterilization
- (B) Intra uterine device
- (C) Combined Oral Contraceptive Pill
- (D) Diaphragm

Correct Answer: (A) Female sterilization

Solution:

Step 1: Understanding the Concept:

Contraceptive methods are broadly classified into two categories based on their purpose and permanence:

- **Spacing Methods:** These are temporary and reversible methods used by couples who wish to postpone or space pregnancies.
- **Terminal Methods:** These are permanent methods for couples who have completed their family and do not wish to have more children.

Step 2: Detailed Explanation:

Let's classify the given options:

- **1. Female sterilization (Tubal ligation):** This is a surgical procedure that permanently prevents pregnancy. It is a **terminal method**. Male sterilization (vasectomy) is the other terminal method.
- **2. Intra uterine device (IUD):** This is a device inserted into the uterus that can be removed later, allowing fertility to return. It is a **spacing method**.
- **3. Combined Oral Contraceptive Pill:** These pills are taken daily and are reversible; fertility returns after stopping them. This is a **spacing method**.

- **4. Diaphragm:** This is a barrier method used during intercourse and is completely reversible. It is a **spacing method**.

Step 3: Final Answer:

Among the given options, only female sterilization is a permanent or terminal method of contraception.

💡 Quick Tip

The word "Terminal" implies an endpoint. In contraception, this means the end of fertility. The only common terminal methods are male and female sterilization. All other methods (pills, IUDs, condoms, etc.) are considered spacing methods.

58. Sex Ratio is:

- (A) Number of males per 1000 females in a given population
- (B) Number of females per 1000 males in a given population
- (C) Number of males per 1000 live births
- (D) Number of females per 1000 live births

Correct Answer: (B) Number of females per 1000 males in a given population

Solution:

Step 1: Understanding the Concept:

Sex ratio is a fundamental demographic indicator that describes the balance between males and females in a population. The definition can vary between countries, but in the context of India and most international standards, it is defined in a specific way.

Step 2: Detailed Explanation:

- The Census of India defines the **Sex Ratio** as the **number of females per 1000 males** in a given population at a specific point in time. This is the standard definition used for all official demographic data in India.
- Option 1 (males per 1000 females) is the reverse of the Indian definition.
- Options 3 and 4 refer to the **Sex Ratio at Birth**, which is a different indicator that measures the number of males or females born per 1000 live births. The standard way to express this is also the number of female live births per 1000 male live births.

Step 3: Final Answer:

The correct definition of sex ratio, as used in India, is the number of females per 1000 males in a given population.

💡 Quick Tip

For the Indian context, always remember: Sex Ratio = Females / Males. A ratio above 1000 is favorable to women, while a ratio below 1000 (as is the case in most of India) indicates a deficit of females.

59. Pearl Index is defined as:

- (A) Number of failures per 100 woman-years of exposure.
- (B) Number of births per 100 woman-years of exposure.
- (C) Number of abortions per 100 woman-years of exposure.
- (D) Number of deaths per 100 woman-years of exposure.

Correct Answer: (A) Number of failures per 100 woman-years of exposure.

Solution:**Step 1: Understanding the Concept:**

The Pearl Index is a statistical method used to measure the effectiveness of a contraceptive method. A lower Pearl Index indicates a more effective method of birth control.

Step 2: Key Formula or Approach:

The Pearl Index is calculated based on the number of unintended pregnancies that occur during a specific period of exposure to the risk of pregnancy while using a contraceptive method. The unit of exposure is "woman-years". One woman-year is equivalent to one woman using the method for one year, or 12 women using it for one month, and so on.

The definition is: The number of contraceptive **failures** (i.e., accidental pregnancies) that occur per 100 woman-years of use.

$$\text{Pearl Index} = \frac{\text{Number of accidental pregnancies} \times 1200}{\text{Total months of exposure}}$$

The multiplication by 1200 converts the rate to pregnancies per 100 woman-years.

Step 3: Detailed Explanation:

- Option 1 correctly defines the index. "Failures" is the standard term for unintended pregnancies in this context.

- Options 2 and 3 are incorrect because the index measures all accidental pregnancies, regardless of whether they result in a live birth or an abortion.
- Option 4 is completely unrelated.

Step 4: Final Answer:

The Pearl Index is defined as the number of failures (unintended pregnancies) per 100 woman-years of exposure.

💡 Quick Tip

Associate "Pearl Index" with "Contraceptive Failure." It is the most common measure of how often a birth control method fails. The lower the index, the better the method.

60. Strength of association between risk factor and outcome is measured by:

- A. Odds Ratio
- B. Attributable Risk
- C. Population Attributable risk
- D. Relative Risk

Choose the correct answer from the options given below:

- (A) A and B only
- (B) A and C only
- (C) B and D only
- (D) A and D only

Correct Answer: (D) A and D only

Solution:

Step 1: Understanding the Concept:

In epidemiology, we use different measures to describe the relationship between an exposure (risk factor) and an outcome (disease). These measures can be broadly divided into measures of association (which quantify the strength of the relationship) and measures of potential impact (which quantify how much disease could be prevented by removing the risk factor).

Step 2: Detailed Explanation:

Let's classify each measure:

- **A. Odds Ratio (OR) and D. Relative Risk (RR):** These are the two primary measures of the **strength of association**. They are ratios that compare the risk or odds of an outcome in the exposed group to the risk or odds in the unexposed group. A value of

1 means no association, while a value greater than 1 indicates a positive association. The further the value is from 1, the stronger the association.

- **B. Attributable Risk (AR) and C. Population Attributable Risk (PAR):** These are measures of **impact**.

- **Attributable Risk** (or Risk Difference) is the absolute difference in risk between the exposed and unexposed groups. It tells us the excess risk of the disease in the exposed group that is attributable to the exposure.
- **Population Attributable Risk** tells us the proportion of the disease in the total population that is attributable to the exposure.

These are not measures of the strength of association but rather of public health importance or potential for prevention.

Step 3: Final Answer:

The measures that quantify the strength of the association are the Odds Ratio and the Relative Risk. Therefore, A and D are the correct answers.

💡 Quick Tip

Remember the difference: **Strength** measures answer "How many times more likely?" (RR, OR). **Impact** measures answer "How much of the disease is due to the exposure?" (AR, PAR). Strength is about causal inference, while impact is about public health significance.

61. According to Bio-Medical waste management rules, 2016 Match List-I with List-II

LIST-I (Color of Bin)	LIST-II (Corresponding type of waste to be collected)
A. Yellow	I. Soiled Dressings and plaster cast
B. Blue	II. Broken glassware like vials and ampules
C. Red	III. Intravenous tubes and catheters
D. White	IV. Syringes with fixed needles

Choose the correct answer from the options given below:

- (A) A-I, B-II, C-III, D-IV
- (B) A-I, B-III, C-II, D-IV

(C) A-II, B-I, C-III, D-IV

(D) A-III, B-IV, C-I, D-II

Correct Answer: (A) A-I, B-II, C-III, D-IV

Solution:

Step 1: Understanding the Concept:

The Bio-Medical Waste Management Rules, 2016, mandate a strict color-coding system for the segregation of different types of healthcare waste at the source. This is crucial for safe handling, treatment, and disposal.

Step 2: Detailed Explanation:

Let's match the color of the bin with the type of waste designated for it:

- **A. Yellow Bin:** This is for human anatomical waste, animal waste, soiled waste (items contaminated with blood and body fluids like dressings, cotton swabs, plaster casts), expired or discarded medicines, and chemical waste. Thus, **A matches with I.**
- **B. Blue Bin:** This is for contaminated glassware, including broken or discarded items like vials and ampules, and metallic body implants. Thus, **B matches with II.**
- **C. Red Bin:** This is for contaminated recyclable waste, which mainly includes plastics. Examples are tubing, bottles, intravenous tubes, catheters, and syringes (without the needle). Thus, **C matches with III.**
- **D. White (Translucent) Bin:** This is a puncture-proof container specifically for "sharps" waste. This includes needles, scalpels, blades, and syringes with their fixed needles. Thus, **D matches with IV.**

Step 3: Final Answer:

The correct matching is A-I, B-II, C-III, and D-IV. This corresponds to option (A).

💡 Quick Tip

A simple way to remember: **Yellow** = Soiled/Anatomical/Chemicals. **Red** = Recyclable Plastics. **Blue** = Glass. **White** = Sharps.

62. The color "Red" under Triage system carried out at the site of disaster indicates :

- (A) Medium priority treatment or transfer
- (B) Dead or Moribound patients
- (C) Highest priority treatment or transfer
- (D) Ambulatory patients

Correct Answer: (C) Highest priority treatment or transfer

Solution:

Step 1: Understanding the Concept:

Triage is the process of sorting casualties in a mass casualty incident (like a disaster) based on the severity of their injuries and their need for medical treatment. The goal is to do the "greatest good for the greatest number." A color-coding system is universally used for rapid classification.

Step 2: Detailed Explanation:

The standard color codes in most triage systems (like START - Simple Triage and Rapid Treatment) are:

- **Red (Priority 1 / Immediate):** This category is for victims with severe, life-threatening injuries who have a high chance of survival if they receive immediate medical care. They are the **highest priority** for treatment and transport.
- **Yellow (Priority 2 / Delayed):** This is for victims with serious injuries that are not immediately life-threatening. Their treatment can be delayed. This corresponds to **medium priority**.
- **Green (Priority 3 / Minor):** This is for victims with minor injuries, often called the "walking wounded." They are **ambulatory patients** and are the lowest priority.
- **Black (Priority 0 / Deceased):** This is for victims who are either **dead or have injuries so catastrophic that they are not expected to survive (moribund)**. No treatment is provided to this group.

Step 3: Final Answer:

The color "Red" in a triage system signifies that the patient has life-threatening injuries and requires immediate medical attention, making them the highest priority.

💡 Quick Tip

Think of the triage colors like a traffic light: **Red** = Stop and treat now! (Highest priority). **Yellow** = Wait/Caution (Delayed priority). **Green** = Go (Minor injuries, can walk). **Black** = The end (Deceased).

63. According to WHO child growth standards Growth Chart of weight for age, Z score curves for normal zone of weight is:

- (A) 0 to +2
- (B) -2 to +2
- (C) 0 to +1
- (D) Above +2

Correct Answer: (B) -2 to +2

Solution:

Step 1: Understanding the Concept:

The WHO Child Growth Standards use Z-scores to assess a child's growth. A Z-score, or standard deviation (SD) score, indicates how far and in what direction a child's measurement (e.g., weight-for-age) deviates from the median of the healthy reference population.

Step 2: Detailed Explanation:

The interpretation of the Z-score curves on the WHO growth charts is standardized as follows:

- The median of the reference population is represented by the Z-score of 0.
- The range between the +2 and -2 Z-score lines is considered the **normal range of weight** for a given age. A child whose weight falls within this zone is considered to have a normal weight.
- A Z-score below -2 indicates underweight (moderately or severely).
- A Z-score above +2 may indicate a potential risk of being overweight.

Step 3: Final Answer:

The normal zone of weight on the WHO growth charts is defined by the area between the -2 and +2 Z-score curves.

💡 Quick Tip

Remember the key number for WHO growth charts is '2'. The normal range for all indicators (Weight-for-age, Height-for-age, Weight-for-height) is generally considered to be between +2 and -2 Standard Deviations (Z-scores).

64. Arrange the following causes of neo-natal deaths in India in decreasing order of frequency (commonest cause to least common cause):

- A. Birth asphyxia
- B. Pneumonia
- C. Diarrhoea
- D. Preterm birth

Choose the correct answer from the options given below:

- (A) C, B, A, D
- (B) A, C, B, D
- (C) D, A, B, C
- (D) B, C, D, A

Correct Answer: (C) D, A, B, C

Solution:

Step 1: Understanding the Concept:

The neonatal period (the first 28 days of life) is the most vulnerable time for a child's survival. Understanding the major causes of neonatal deaths is crucial for planning public health interventions. The question asks to arrange the leading causes in India from most common to least common.

Step 2: Detailed Explanation:

Based on data from sources like the Sample Registration System (SRS) in India and global estimates (e.g., from UNICEF/WHO), the major causes of neonatal mortality in India are:

1. **D. Preterm birth complications:** This is the single largest cause of neonatal deaths. Premature babies have immature organs and are highly susceptible to complications like respiratory distress syndrome. (Accounts for ~35% of deaths).
2. **A. Birth asphyxia and birth trauma:** Intrapartum-related events, where the baby does not breathe properly at birth, are the second leading cause. (Accounts for ~20% of deaths).
3. **B. Pneumonia / Sepsis:** Infections, particularly pneumonia and sepsis, are the third major cause of neonatal deaths. (Accounts for ~16% of deaths).
4. **C. Diarrhoea:** While a major killer of children in the post-neonatal period (1-59 months), diarrhoea is a much less common cause of death within the first 28 days of life compared to the other three conditions. (Accounts for a very small percentage of neonatal deaths).

Therefore, the decreasing order of frequency is Preterm birth (D), Birth asphyxia (A), Pneumonia (B), and Diarrhoea (C).

Step 3: Final Answer:

The correct sequence from most common to least common cause is D, A, B, C.

💡 Quick Tip

For neonatal deaths in India, remember the top three causes: 1. Prematurity, 2. Birth Asphyxia, 3. Infections (Sepsis/Pneumonia). Diarrhoea becomes a bigger problem after the first month of life.

65. Coefficient of correlation (represented by the symbol "r") is calculated:

- (A) To find out whether there is a significant association or not between the two variables.
- (B) To find out whether there is a significant relationship or not between the two variables.
- (C) To find out whether there is a significant variability or not between the two variables.
- (D) To find out whether there is a significant matching or not between the two variables.

Correct Answer: (B) To find out whether there is a significant relationship or not between the two variables.

Solution:**Step 1: Understanding the Concept:**

The coefficient of correlation, denoted by 'r' (specifically, the Pearson correlation coefficient), is a statistical measure that quantifies the degree to which two continuous variables are linearly related to each other.

Step 2: Detailed Explanation:

- The purpose of calculating 'r' is to determine both the **strength** and the **direction** of a linear **relationship** between two variables.
 - The value of 'r' ranges from -1 to +1.
 - A value close to +1 indicates a strong positive linear relationship.
 - A value close to -1 indicates a strong negative linear relationship.
 - A value close to 0 indicates a weak or no linear relationship.
- Let's analyze the options:
 - (A) "Association" is a broader term. Correlation measures a very specific type of association (linear). While not entirely wrong, "relationship" is more precise. Furthermore, calculating 'r' tells you the strength of the relationship; a separate statistical test (like a t-test) is needed to determine if this relationship is "significant." However, in common parlance, calculating 'r' is the first step in this process.

- (B) This is the best description. The core purpose is to quantify the **relationship** between the variables.
- (C) "Variability" within a single variable is measured by variance or standard deviation, not the correlation coefficient.
- (D) "Matching" is not a standard statistical term in this context.

Between options A and B, "relationship" is a more direct and accurate description of what the correlation coefficient measures than the broader term "association." The calculation of 'r' is the fundamental step in assessing this relationship.

Step 3: Final Answer:

The coefficient of correlation is calculated to find out the strength and direction of the linear relationship between two variables.

💡 Quick Tip

Remember that correlation measures the **linear relationship** between two variables. It is crucial to understand that **correlation does not imply causation**. Two variables can be strongly correlated without one causing the other.

66. Purification of water at household level through Chlorine tablets is done by :

- (A) A single tablet of 0.5 g is sufficient to disinfect 20 litres of water
- (B) Two tablets of 0.5 g is sufficient to disinfect 20 litres of water
- (C) A single tablet of 0.5 g is sufficient to disinfect 1 litre of water
- (D) Two tablets of 0.5 g is sufficient to disinfect 1 litre of water

Correct Answer: (A) A single tablet of 0.5 g is sufficient to disinfect 20 litres of water

Solution:

Step 1: Understanding the Concept:

Chlorination is a common method for disinfecting water at the household and community levels. Chlorine tablets provide a standardized dose of chlorine for this purpose. The standard dosage is designed to treat a common volume of water stored in households, such as a bucket or a small container.

Step 2: Detailed Explanation:

The standard chlorine tablet available for household water purification contains 0.5 grams (500 mg) of chlorine. This dosage is specifically formulated to be effective for a standard volume of relatively clear water.

The accepted norm is that **one 0.5 g tablet is sufficient to disinfect 20 litres of water**. This volume (20 litres) corresponds to a typical household bucket ("balti"). After adding the

tablet, the water should be stirred and left for at least 30 minutes (the contact period) before it is considered safe to drink. This ensures the chlorine has enough time to kill the harmful microorganisms.

Let's analyze the other options:

- Option 2 suggests two tablets, which would be an overdose for 20 litres.
- Options 3 and 4 suggest treating only 1 litre, which is incorrect and would lead to a massive over-chlorination of the water, making it unpalatable and potentially harmful.

Step 3: Final Answer:

The standard guideline for household water purification is that a single 0.5 g chlorine tablet is used to disinfect 20 litres of water.

💡 Quick Tip

Remember the common household measure: 1 Chlorine Tablet (0.5g) = 1 Bucket of Water (20 litres). This is a practical and easy-to-remember fact for public health.

67. Measure of Central Tendency useful in markedly skewed distribution is :

- (A) Mean
- (B) Median
- (C) Geometric mean
- (D) Mode

Correct Answer: (B) Median

Solution:

Step 1: Understanding the Concept:

Measures of central tendency (mean, median, mode) describe the center or typical value of a dataset. The choice of which measure to use depends on the distribution of the data. A skewed distribution is one that is not symmetrical and has a long tail on one side.

Step 2: Detailed Explanation:

- **Mean:** This is the arithmetic average of all values. In a skewed distribution, the mean is strongly influenced by extreme values (outliers) in the long tail. For example, in a dataset of incomes, a few billionaires would pull the mean income to a very high value that doesn't represent the typical person. Therefore, the mean is a poor measure of central tendency

for skewed data.

- **Median:** This is the middle value when the data is arranged in order. It is the 50th percentile. The median is resistant to outliers because its position is not affected by how extreme the values at the ends are. It represents the "typical" value much better in a skewed distribution.
- **Geometric Mean:** This is used for data that are log-normally distributed or when dealing with rates of change. It is less common than the median for general skewed data.
- **Mode:** This is the most frequently occurring value. It can be useful, but in some datasets, there may be no mode or multiple modes, and it may not represent the center of the data well.

For a markedly skewed distribution, the median is the most robust and appropriate measure of central tendency because it is not affected by the extreme values that cause the skewness.

Step 3: Final Answer:

The median is the most useful measure of central tendency for a markedly skewed distribution.

💡 Quick Tip

For skewed data, always prefer the **Median** over the Mean. Think of income data: if you have 10 people earning \$50k and one person earning \$5 million, the mean income will be very high, but the median income will still be \$50k, which is a better representation of the group.

68. Match List-I with List-II

LIST-I (Vector)	LIST-II (Disease)
A. Anopheles	I. Malaria
B. Aedes	II. Japanese Encephalitis
C. Culex	III. Chikungunya fever
D. Mansonides	IV. Brugian Filariasis

Choose the correct answer from the options given below:

- (A) A-I, B-II, C-III, D-IV
- (B) A-I, B-III, C-II, D-IV
- (C) A-I, B-II, C-IV, D-III
- (D) A-I, B-IV, C-III, D-II

Correct Answer: (B) A-I, B-III, C-II, D-IV

Solution:

Step 1: Understanding the Concept:

This question tests the knowledge of important mosquito vectors and the specific diseases they transmit. Different genera of mosquitoes have different breeding habits and are responsible for spreading different pathogens.

Step 2: Detailed Explanation:

Let's match each vector from List-I with the disease it transmits from List-II.

- **A. Anopheles:** Female *Anopheles* mosquitoes are the sole vectors of human **Malaria**. This is a classic and well-known vector-disease pair. So, **A matches with I**.
- **B. Aedes:** Mosquitoes of the *Aedes* genus, particularly *Aedes aegypti* and *Aedes albopictus*, are vectors for several viral diseases, including Dengue, Yellow Fever, Zika, and **Chikungunya fever**. So, **B matches with III**.
- **C. Culex:** Mosquitoes of the *Culex* genus, particularly *Culex tritaeniorhynchus*, are the principal vectors of **Japanese Encephalitis**. Some *Culex* species also transmit West Nile Fever and Bancroftian filariasis. So, **C matches with II**.
- **D. Mansonides:** Mosquitoes of the *Mansonia* genus are the primary vectors of **Brugian Filariasis**, which is caused by the nematode worm *Brugia malayi*. So, **D matches with IV**.

Step 3: Final Answer:

The correct set of matches is A-I, B-III, C-II, and D-IV. This corresponds to option (B).

💡 Quick Tip

Create a quick mental chart for mosquito vectors: **Anopheles** → Malaria. **Aedes** → Dengue/Chikungunya (the "urban" mosquitoes). **Culex** → Japanese Encephalitis/Filariasis (the "dirty water" mosquitoes). **Mansonides** → Brugian Filariasis (associated with aquatic plants).

69. Measures of variations or dispersion of a data is :

- A. Interquartile Range**
- B. Mode**
- C. Standard Deviation**
- D. Weighted Mean**

Choose the correct answer from the options given below:

- (A) A and D only
- (B) A and C only
- (C) B and C only
- (D) A and B only

Correct Answer: (B) A and C only

Solution:

Step 1: Understanding the Concept:

In statistics, we use two main types of descriptive measures:

1. **Measures of Central Tendency:** These describe the center of a dataset (e.g., mean, median, mode).
2. **Measures of Dispersion (or Variation):** These describe the spread or variability of the data points around the center (e.g., range, standard deviation).

The question asks to identify the measures of dispersion from the given list.

Step 2: Detailed Explanation:

Let's classify each option:

- **A. Interquartile Range (IQR):** The IQR is the range between the first quartile (25th percentile) and the third quartile (75th percentile). It measures the spread of the middle 50% of the data. It is a **measure of dispersion**.
- **B. Mode:** The mode is the most frequently occurring value in a dataset. It is a **measure of central tendency**.
- **C. Standard Deviation:** The standard deviation is a measure of the average amount of variation or dispersion of a set of values from their mean. A low standard deviation indicates that the values tend to be close to the mean, while a high standard deviation indicates that the values are spread out over a wider range. It is a key **measure of dispersion**.

- **D. Weighted Mean:** This is a type of average where some data points contribute more "weight" than others. It is a **measure of central tendency**.

Step 3: Final Answer:

The Interquartile Range (A) and the Standard Deviation (C) are measures of dispersion. The Mode (B) and Weighted Mean (D) are measures of central tendency. Therefore, the correct answer includes A and C only.

💡 Quick Tip

To differentiate, ask yourself: Does this statistic describe the "center" or the "spread" of the data? Mean, Median, Mode = Center. Range, IQR, Variance, Standard Deviation = Spread.

70. Arrange the various methods of mosquito control according to life history of mosquitoes from egg to adult stages

- A. Source reduction through engineering methods like filling, levelling
- B. Screening of buildings with bronze gauge
- C. Biological control through fish
- D. Residual sprays with Malathion

Choose the correct answer from the options given below:

- (A) A, B, D, C
- (B) A, D, B, C
- (C) B, A, D, C
- (D) A, C, D, B

Correct Answer: (D) A, C, D, B

Solution:

Step 1: Understanding the Concept:

Mosquito control strategies are categorized based on which stage of the mosquito life cycle (Egg → Larva → Pupa → Adult) they target. The first three stages are aquatic (water-based), while the adult stage is terrestrial/aerial. The question asks to arrange the control methods in an order that follows this life cycle progression.

Step 2: Detailed Explanation:

Let's analyze each control method and the life stage it targets:

- **A. Source reduction through engineering methods like filling, levelling:** This method eliminates or reduces potential water bodies where mosquitoes can lay their **eggs** and where **larvae** and pupae can develop. This is the earliest point of intervention in the

life cycle.

- **C. Biological control through fish:** This involves introducing larvivorous fish (like *Gambusia*) into water bodies to eat mosquito **larvae**. This targets the larval stage, which comes after the eggs have been laid and hatched.
- **D. Residual sprays with Malathion:** This is an anti-adult measure. Insecticide is sprayed on walls and surfaces where **adult** mosquitoes rest. This targets the mosquitoes after they have emerged from the pupal stage and become flying adults.
- **B. Screening of buildings with bronze gauge:** This is a personal protection measure that acts as a physical barrier to prevent **adult** mosquitoes from entering homes and biting people. It targets the adult stage's activity.

Arranging these in sequence from egg to adult stage:

1. **A** (Source reduction) - Targets egg-laying sites and larval habitats.
2. **C** (Biological control) - Targets existing larvae in water.
3. **D** (Residual sprays) - Targets resting adult mosquitoes.
4. **B** (Screening) - Targets biting adult mosquitoes.

The correct logical sequence is $A \rightarrow C \rightarrow D \rightarrow B$.

Step 3: Final Answer:

The correct arrangement of control methods following the mosquito life cycle is A, C, D, B.

💡 Quick Tip

Mosquito control is divided into anti-larval and anti-adult measures. Always place anti-larval measures (like source reduction and biological control) before anti-adult measures (like sprays and screening) when sequencing according to the life cycle.

71. Waste water from kitchens and bathrooms NOT containing excreta is called:

- (A) Sewage
- (B) Refuse

- (C) Sludge
- (D) Sullage

Correct Answer: (D) Sullage

Solution:

Step 1: Understanding the Concept:

This question requires knowledge of the terminology used in environmental health and sanitation to classify different types of waste.

Step 2: Detailed Explanation:

Let's define the terms:

- **1. Sewage:** This is liquid waste from a community that **contains human excreta** (feces and urine). It is also known as blackwater.
- **2. Refuse:** This refers to solid waste materials, also known as garbage or trash.
- **3. Sludge:** This is the semi-solid material that settles out from sewage during the wastewater treatment process.
- **4. Sullage:** This is wastewater generated from domestic activities such as washing, bathing, and kitchen work. The key characteristic of sullage is that it **does not contain human excreta**. It is also commonly known as greywater.

Step 3: Final Answer:

The term for wastewater from kitchens and bathrooms that does not contain excreta is sullage.

 Quick Tip

Remember the key distinction: **Sewage** = Water + Excreta (Blackwater). **Sullage** = Water without Excreta (Greywater).

72. Best sampling method where every unit in the population has an equal chance of being included in the sample is :

- (A) Convenience Sampling
- (B) Quota Sampling
- (C) Simple Random Sampling

(D) Judgemental Sampling

Correct Answer: (C) Simple Random Sampling

Solution:

Step 1: Understanding the Concept:

Sampling methods are techniques used to select a subset of individuals or units from a larger population to make inferences about the whole population. They are broadly divided into probability sampling and non-probability sampling. The core principle of probability sampling is that every unit in the population has a known, non-zero chance of being selected.

Step 2: Detailed Explanation:

Let's analyze the sampling methods listed:

- **1. Convenience Sampling:** A non-probability method where the sample is taken from a group of people easy to contact or reach. Selection is not random, and the chance of inclusion is unknown.
- **2. Quota Sampling:** A non-probability method where the researcher creates a sample of individuals that represent a population according to certain traits or qualities (e.g., age, sex). The final selection within the quotas is non-random.
- **3. Simple Random Sampling (SRS):** This is the most basic form of **probability sampling**. By its definition, every member of the population has an equal and independent chance of being selected. This is achieved through methods like drawing lots (a lottery) or using a random number generator.
- **4. Judgemental Sampling (or Purposive Sampling):** A non-probability method where the researcher uses their own judgment to select participants based on their perceived suitability for the study.

Step 3: Final Answer:

The definition provided in the question—"every unit in the population has an equal chance of being included"—is the precise definition of Simple Random Sampling.

 Quick Tip

The key to probability sampling is "randomness." If you see "random" in the name (Simple Random, Stratified Random, Systematic Random), it's a probability method. Methods based on ease, quotas, or judgment are non-probability and do not give everyone an equal chance.

73. Which of the Mosquitoes is easily distinguished by white stripes on the black body?

- (A) Culex
- (B) Anopheles
- (C) Mansonoides
- (D) Aedes

Correct Answer: (D) Aedes

Solution:

Step 1: Understanding the Concept:

Different genera of mosquitoes have distinct morphological features that help in their identification. These features are crucial for entomologists and public health workers to identify the vectors prevalent in an area.

Step 2: Detailed Explanation:

Let's look at the key distinguishing features of the major mosquito genera:

- **1. Culex:** These mosquitoes are typically brownish in color and have a blunt-tipped abdomen. They hold their body parallel to the resting surface.
- **2. Anopheles:** These mosquitoes are known for their resting posture, where their body is held at an angle (about 45 degrees) to the surface. They often have patterns of dark and light scales on their wings.
- **3. Mansonoides:** These are large mosquitoes, and their identification often relies on specific features of their larvae and pupae which are adapted to attach to aquatic plants.
- **4. Aedes:** Mosquitoes of the *Aedes* genus, particularly *Aedes aegypti* and *Aedes albopictus*, are famously known for their striking appearance. They have a **black body with prominent white or silvery stripes** on their legs and thorax. *Aedes albopictus* is often called the "Asian tiger mosquito" because of these stripes.

Step 3: Final Answer:

The mosquito easily distinguished by white stripes on a black body is the Aedes mosquito.

💡 Quick Tip

Remember the visual cue: **White Stripes = Aedes**. This distinctive "tiger-like" appearance is the most memorable feature of this important disease vector.

74. The proportion of frequencies lying on either side of the mean in a normal distribution curve within a range of $+1$ to -1 standard deviation is approximately :

- (A) 95%
- (B) 68%
- (C) 50%
- (D) 75%

Correct Answer: (B) 68%

Solution:

Step 1: Understanding the Concept:

The normal distribution is a symmetric, bell-shaped probability distribution. A key property of this distribution is that a predictable percentage of the data falls within a certain number of standard deviations (SD) from the mean.

Step 2: Detailed Explanation:

The empirical rule (or the 68-95-99.7 rule) for a normal distribution states:

- Approximately **68%** of the data falls within the range of the mean ± 1 standard deviation (i.e., between -1 SD and $+1$ SD).
- Approximately **95%** of the data falls within the range of the mean ± 2 standard deviations.
- Approximately **99.7%** of the data falls within the range of the mean ± 3 standard deviations.

The question asks for the proportion of frequencies within the range of $+1$ to -1 standard deviation.

Step 3: Final Answer:

According to the properties of the normal distribution curve, approximately 68% of the frequencies lie within one standard deviation on either side of the mean.

💡 Quick Tip

Memorize the empirical rule: **68-95-99.7** for **1-2-3** standard deviations. This is one of the most fundamental and frequently tested concepts in basic statistics.

75. In India birth weight of less than _____ kg is considered low birth weight

- (A) 2.5
- (B) 2.0
- (C) 1.5
- (D) 3.0

Correct Answer: (A) 2.5

Solution:

Step 1: Understanding the Concept:

Low Birth Weight (LBW) is a critical public health indicator, as it is a major determinant of infant mortality and morbidity. The World Health Organization (WHO) has established a standard international definition, which is followed by India and most other countries.

Step 2: Detailed Explanation:

The definition for Low Birth Weight is as follows:

- **Low Birth Weight (LBW):** A birth weight of **less than 2500 grams (2.5 kg)**, irrespective of the gestational age.

Further classifications exist based on this cutoff:

- **Very Low Birth Weight (VLBW):** Less than 1500 grams (1.5 kg). This corresponds to option 3.
- **Extremely Low Birth Weight (ELBW):** Less than 1000 grams (1.0 kg).

The question asks for the general definition of "low birth weight."

Step 3: Final Answer:

In India, following the WHO definition, a birth weight of less than 2.5 kg is considered low birth weight.

💡 Quick Tip

The cutoff for Low Birth Weight (LBW) is a fundamental number in maternal and child health. Remember **2.5 kg** as the magic number. Anything less than this is LBW.