Answers

1. **Answer: b**

Explanation:

Idiom 'Hit the Hay' Meaning Explained

The question asks for the meaning of the idiom '**Hit the hay**'. Idioms are phrases where the words together have a meaning that is different from the dictionary definitions of the individual words.

Understanding the Idiom 'Hit the Hay'

The phrase '**Hit the hay**' is an informal and common English idiom. It is used to express the action of going to bed or going to sleep. The origin likely relates to farmers or people sleeping on mattresses stuffed with hay.

Analysis of Options

Let's look at each option provided:

- **Option 1: Feed the cattle**

  This option suggests feeding farm animals. It has no connection to the meaning of the idiom '**Hit the hay**'.

- **Option 2: Go to sleep**

  This option means to retire for the night and sleep. This perfectly matches the meaning of the idiom '**Hit the hay**'.

- **Option 3: Burn the hay**

  This option describes a literal action of setting hay on fire. It is destructive and unrelated to the idiomatic meaning of going to bed.

- **Option 4: Lose the sheep**

  This option refers to misplacing sheep, which is an agricultural activity and has no relation to the idiom '**Hit the hay**'.

Conclusion

Based on the analysis, the most suitable substitute for the idiom '**Hit the hay**' is '**Go to sleep**'.

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2. **Answer: a**

Explanation:

Idiom Meaning: To pull one's punches

The English idiom "To pull one's punches" describes the action of deliberately not doing something with full force or intensity. It originates from the sport of boxing, where a boxer might physically "pull" their punch to avoid hitting their opponent too hard, perhaps out of sportsmanship or a desire not to cause excessive injury. Figuratively, it means to moderate one's criticism, actions, or efforts, holding back from being as severe or forceful as one possibly could be.

Analyzing the Options for "To pull one's punches"

To correctly understand the meaning of this idiom, let's look at each option provided:

- **Option 1: be less forceful**
  This option directly matches the figurative meaning of the idiom. If someone "pulls their punches," they are consciously choosing to be less severe, less critical, or less aggressive in their actions or words. For instance, a reviewer might "pull their punches" if they feel the subject of their review deserves some leniency. This is the correct interpretation.

- Option 2: pull someone's punches
  This phrase involves influencing another person to reduce the force of *their* actions. The original idiom, "to pull *one's* punches," refers to self-restraint, not controlling others.
- Option 3: throw the punches
  This phrase means to fight, attack, or act vigorously. It is essentially the opposite of "pulling punches," as it implies using full force rather than holding back.
- Option 4: having strong power
  While the ability to "pull punches" implies that the person *has* the power to hit hard, the idiom itself doesn't mean simply possessing power. It specifically refers to the *choice* not to use that power fully.

Conclusion on Idiom Meaning

Based on the analysis, the idiom "To pull one's punches" means to moderate one's actions or words, essentially choosing to **be less forceful** rather than applying full strength or severity.

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3. **Answer: d**

Explanation:

Understanding the Antonym for 'Temporal'

The question asks us to find the most suitable **antonym** for the word '**Temporal**'. An antonym is a word that means the opposite of another word. To find the correct antonym, we first need to understand the meaning of 'Temporal'.

'Temporal' primarily relates to things that are temporary, lasting only for a limited period of time, or concerning worldly affairs rather than spiritual ones. It often contrasts with 'eternal' or 'spiritual'.

Analyzing the Options for Temporal Antonym

Let's examine the meaning of each provided option to see how it relates to 'Temporal':

- **Worldly**: This term describes things related to the material world, practical life, and ordinary human affairs, as opposed to spiritual or supernatural matters. It shares a similar meaning with one aspect of 'Temporal' (relating to worldly affairs).
- **Secular**: This word means not religious or sacred; relating to worldly things. Like 'Worldly', it is closely related in meaning to the aspect of 'Temporal' that refers to non-spiritual matters.
- **Earthly**: This term refers to things belonging to or related to the earth or human life, in contrast to heaven or the spiritual realm. It also aligns closely with the meaning of 'Temporal' concerning the material world.
- **Religious**: This word pertains to or is concerned with religion, faith, and worship, often involving spiritual beliefs and practices. This contrasts directly with the aspect of 'Temporal' that refers to worldly, non-spiritual, or time-bound matters.

Identifying the Correct Antonym of Temporal

Considering the meanings:

- 'Worldly', 'Secular', and 'Earthly' all describe aspects related to the material world or non-spiritual life, which are similar to or overlap with the meaning of 'Temporal'.
- 'Temporal' signifies being related to time or the material world, often in opposition to the eternal or spiritual.
- Therefore, the word that represents the opposite concept, focusing on the spiritual or eternal aspect, is '**Religious**'. It stands in direct contrast to the worldly or time-bound nature implied by 'Temporal'.

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4. **Answer: a**

Explanation:

This question requires rearranging jumbled sentence parts (P, Q, R, S) to form a grammatically correct and meaningful sentence that completes the initial statement about **Le Corbusier's** birthplace.

Identifying the Key Information

The base sentence is: "**Le Corbusier** was born in a small town _____."

The jumbled parts provide details about this town/region:

- P: **in the mountainous Swiss Jura region** - Specifies the geographical location.
- Q: **since the 18th century the** - Provides a time frame and a linking phrase.
- R: **world's center of** - Describes the town/region's significance.
- S: **precision watchmaking.** - Identifies the specific industry or characteristic.

The goal is to arrange P, Q, R, and S into the blank space logically and grammatically.

Determining the Correct Sentence Order (PQRS)

The provided correct option suggests the order PQRS. Let's assemble the sentence using this order:

"Le Corbusier was born in a small town in the mountainous Swiss Jura region since the 18th century the world's center of precision watchmaking."

Step-by-Step Explanation of the PQRS Arrangement

Let's break down why the PQRS order logically completes the sentence:

1. **Start with the Base:** The sentence begins by stating that **Le Corbusier** was born in a small town.
2. **Add Part P:** Placing "**in the mountainous Swiss Jura region**" (P) immediately after "small town" identifies the specific geographical area where he was born. This sets the context.
3. **Add Part Q:** The phrase "**since the 18th century the**" (Q) follows P. Grammatically, this might seem slightly unusual, but it serves to introduce the historical context

and prepare the reader for the description that follows. It links the location (Jura region) to its historical status.

4. **Add Part R:** "**world's center of**" (R) comes next. Combined with Q, it starts describing the importance or role of the Jura region during the specified period.
5. **Add Part S:** Finally, "**precision watchmaking.**" (S) completes the description, specifying that the mountainous Swiss Jura region has historically been recognized as the **world's center of precision watchmaking** since the 18th century.

Therefore, the sequence PQRS effectively integrates the location details (P) with the historical significance of that location (QRS), creating a complete and informative sentence about **Le Corbusier's** birthplace and its associated context.

Conclusion

By arranging the parts in the order PQRS, the sentence effectively conveys that **Le Corbusier's** birthplace was a small town located within the **mountainous Swiss Jura region**, an area renowned as the **world's center of precision watchmaking** from the 18th century onwards. This arrangement logically builds the description from specific location to broader historical significance.

---

5. **Answer: c**

Explanation:

Identifying Grammatical Errors in Sentences

This solution provides a detailed explanation for identifying the grammatical error within the given sentence. We need to pinpoint the specific segment containing the mistake.

Sentence Analysis: Locating the Grammatical Fault

The sentence for analysis is: "The blast wave they generate is significantly longer in duration and sometimes more powerful than conventional explosives."

Let's break down the sentence into its segments as presented in the options:

- **Option 1:** "The blast wave they generate is significantly longer" - This segment seems grammatically sound. It sets up the subject ("The blast wave") and describes its characteristic ("significantly longer").
- **Option 2:** "in duration and sometimes more powerful" - This part continues the description of the blast wave, using appropriate comparative phrasing ("longer in duration", "more powerful").
- **Option 3:** "than conventional explosives." - This segment is identified as the location of the grammatical error according to the provided answer.
- **Option 4:** "No error" - This is incorrect because a grammatical error exists within the sentence.

Explanation of the Grammatical Error in the Sentence Segment

The grammatical error resides in the segment **"than conventional explosives."**

The Issue: Faulty Comparison Structure

The sentence compares the characteristics of a specific "blast wave" (which is singular) to "conventional explosives" (which is plural). The structure highlights a comparison of power:

The blast wave ... is ... more powerful than conventional explosives.

Grammatically, when making comparisons, the items being compared should be parallel in structure and type. In this sentence:

- The subject is singular: "The blast wave".
- The object of comparison is plural: "conventional explosives".

This structure directly compares the singular "blast wave" to the plural "conventional explosives". However, the intended comparison is likely between the wave generated

by the source ("they") and the waves generated by conventional explosives, not the explosives themselves.

A more grammatically correct comparison would be structured to compare like entities, such as:

- "...than **those** from conventional explosives." (Comparing the wave to waves from explosives)
- "...than the blast waves generated by conventional explosives."

By comparing "The blast wave" (singular) directly with "conventional explosives" (plural, representing the devices), the sentence presents an imprecise comparison, which constitutes a grammatical fault. This makes Option 3 the segment containing the error.

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6. **Answer: a**

Explanation:

Understanding the Xylem : Water :: Phloem Analogy

This question involves understanding plant biology, specifically the functions of vascular tissues, presented in the format of an analogy. An analogy requires identifying the relationship between the first pair of words (Xylem : Water) and applying that same relationship to find the missing word for the second pair (Phloem : _____).

Xylem Function Explained

Xylem is one of the two types of transport tissue in vascular plants, the other being phloem. The basic function of the xylem is the conduction of **water** from the roots to the rest of the plant and also to provide support.

Phloem Function Explained

Phloem is the other type of transport tissue. Its main function is to transport sugars (produced during photosynthesis) from the leaves, where they are made, to all other parts of the plant where they are needed for growth or storage. This transported sugar is commonly referred to as **food**. This transport process is known as translocation.

Analogy Breakdown

The relationship in the first pair, 'Xylem : Water', is based on transport:

- **Xylem** transports **Water**.

Following this pattern, we need to find what **Phloem** transports:

- **Phloem** transports _____.

Evaluating the Options

Let's examine the given options based on the function of the phloem:

- **1. Food:** Phloem transports sugars, which are the plant's food produced during photosynthesis. This fits the analogy perfectly.
- **2. Photosynthesis:** This is the process by which plants make food, not the substance transported by the phloem.
- **3. Carbon Dioxide:** This gas is used by plants during photosynthesis but is not the substance primarily transported by the phloem.
- **4. Gasses:** While gas exchange occurs in plants, the specific and primary transport function of phloem relates to organic nutrients (food).

Conclusion on the Analogy

The analogy compares the transport roles of the two main vascular tissues in plants. Just as xylem is responsible for transporting water, phloem is responsible for transporting food (sugars). Therefore, the pair that best expresses the relationship is Phloem : Food.

7. Answer: a

Explanation:

Finding the Opposite: Understanding the Antonym of Archaic

This solution explains the meaning of the word **Archaic** and identifies its most suitable **antonym** from the given choices.

Definition of the Word 'Archaic'

The word **Archaic** means something is very old-fashioned, belonging to an earlier period, or no longer in common use. It often refers to things that are characteristic of an earlier time and are now considered old or superseded.

For example, an **archaic** system of writing or an **archaic** law would be one that is from the past and not currently in widespread use.

Analysis of Options to Find the Antonym

We need to find the word that means the opposite of **Archaic** (old-fashioned, belonging to an earlier time). Let's look at each option provided:

- **Option 1: Modern**
  Modern relates to the present or recent times. It signifies what is current, up-to-date, and contemporary. This is the direct opposite of **Archaic**.
- **Option 2: Outdated**
  Outdated means no longer fashionable or useful; old-fashioned. This meaning is very similar to **Archaic**, making it a synonym, not an antonym.
- **Option 3: Obsolete**
  Obsolete means no longer produced or used; out of date. Like 'outdated', this term is also a synonym for **Archaic** as it describes something from the past that is no longer relevant or in use.

- Option 4: Frivolous
  Frivolous means lacking seriousness or importance; treating serious matters lightly. This word relates to attitude or importance, not to time periods or relevance, so it is not related to the meaning of **Archaic**.

Determining the Best Antonym

Comparing the meanings:

- **Archaic** = Old, old-fashioned, from an earlier time.
- **Modern** = New, current, from the present time.
- **Outdated** = Similar to Archaic (not current).
- **Obsolete** = Similar to Archaic (not current or used).
- **Frivolous** = Unrelated meaning (silly, unimportant).

The word **Modern** clearly represents the opposite meaning of **Archaic**. While 'outdated' and 'obsolete' describe things that are no longer current, 'modern' specifically refers to the present time, contrasting directly with the past-oriented nature of 'archaic'.

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8. **Answer: d**

Explanation:

Choosing the Right Verb for Court Petitions: Quashing Appointment Orders

This question requires selecting the most appropriate legal term to complete the sentence: "The petition before the Court prayed for _____ the appointment orders issued by the management." The sentence describes a formal request made to a court regarding official employment documents.

Understanding Legal Terminology for Court Actions

When a person or entity petitions a court, they are asking the court to take a specific action. In this case, the petition is directed at "appointment orders" issued by management. Such petitions often aim to challenge or invalidate these orders.

Analyzing the Options

Let's examine each alternative word to see which best fits the context:

- **Granting**: This word means to give or allow something. A petition might ask the court to grant a specific relief, but asking the court to "grant the appointment orders" doesn't make sense if the goal is to challenge them. It implies approval, not cancellation.
- **Removing**: While "removing" means taking something away, it is a general term. In a legal context concerning official orders, more precise language is usually preferred. It doesn't specifically imply making the orders legally invalid.
- **Dismissing**: This term typically refers to the rejection of a case, claim, or lawsuit by a court. A court might dismiss a petition, but one does not usually pray for the court to "dismiss" the orders themselves in this manner.
- **Quashing**: This is a specific legal term that means to reject or void a legal decision, order, or rule. When a court decides to quash an order, it means the order is officially declared invalid or nullified. This aligns perfectly with the likely intention of a petition challenging appointment orders – to have them cancelled or invalidated.

Conclusion: Selecting the Correct Legal Term

Based on the analysis, the word **quashing** is the most fitting term. A petition to a court often seeks to have official orders, like appointment orders, declared void or invalid, which is precisely what "quashing" means in a legal context. Therefore, the petition prayed for **quashing** the appointment orders.

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9. **Answer: d**

Explanation:

Exploring the Meaning of PLACATE

This question asks to identify the correct meaning of the word "PLACATE" from the given options. Understanding vocabulary, especially the nuances of words like **PLACATE**, is important for effective communication and comprehension.

Definition of PLACATE

The word **PLACATE** is a verb that means to make someone feel less angry or hostile. It involves appeasing or soothing someone, often by making concessions or speaking in a calming manner, to reduce their agitation or anger.

Analysis of Options

Let's examine each option to determine which best defines **PLACATE**:

- **Option 1: To worship**
  Worshipping involves showing deep respect, adoration, or devotion, typically towards a divine figure or a revered entity. This is fundamentally different from trying to calm down an angry person. Hence, "to worship" is not synonymous with **PLACATE**.
- **Option 2: To laugh**
  Laughing is an outward expression of amusement or happiness. It does not involve managing or reducing someone's anger or distress. Therefore, "to laugh" is unrelated to the meaning of **PLACATE**.
- **Option 3: To force**
  Forcing means to compel someone to do something against their will, using power or coercion. This action can often escalate conflict or resentment, which is the opposite of what it means to **PLACATE** someone.
- **Option 4: To pacify**
  The word "pacify" means to calm the anger, agitation, or excitement of someone. This definition closely matches the meaning of **PLACATE**, as both describe the act of soothing and reducing anger or distress in another person.

Understanding PLACATE with an Example

For instance, imagine a situation where a customer is angry about a faulty product. The company representative might try to **placate** the customer by offering a refund or a replacement. In this context, the representative is attempting to **pacify** the customer by addressing their grievance and calming their anger.

Conclusion on the Meaning

Comparing the definition of **PLACATE** with the provided options, the most suitable synonym is "To pacify". This option accurately reflects the act of calming someone down and reducing their anger or displeasure.

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10. **Answer: d**

Explanation:

Understanding the Phrase: 'An Amusing and Interesting Story'

The question asks us to find a single word that best describes a phrase: "An amusing and interesting story". This means we are looking for a term that signifies a short, engaging narrative, often with a humorous or captivating element, typically based on a real event or person.

Analyzing the Options Provided

Let's examine each option to see how well it fits the description:

- **Poesy**: This word relates to poetry or the art of writing poems. It does not refer to a short, amusing story. Therefore, it is not a suitable substitute for the given phrase.
- **Legend**: A legend is a traditional story sometimes popularly regarded as historical but not authenticated. While legends are stories, they are often grander in scale and may not necessarily be amusing or short, nor are they typically personal accounts. They often carry cultural or historical significance.

- **Ballsy**: This is an adjective used to describe someone or something as bold, daring, or courageous. It does not refer to a type of story at all.
- **Anecdote**: An anecdote is defined as a short, amusing, or interesting story about a real incident or person. This definition aligns perfectly with the description "An amusing and interesting story". Anecdotes are often shared in conversation to illustrate a point or provide entertainment.

Selecting the Most Appropriate Word

Comparing the options, the word 'Anecdote' is the most accurate synonym for "An amusing and interesting story". It specifically captures the essence of a brief, engaging narrative that is often humorous or captivating, based on real-life occurrences or people.

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11. **Answer: a**

Explanation:

Analyzing Jumbled Sentence Parts for Almaty

This question involves rearranging four jumbled sentence fragments (P, Q, R, S) to create a coherent description of Almaty, Kazakhstan. The sentence structure starts with a descriptive phrase about Almaty's location and ends with information about its population growth.

Breakdown of Sentence Fragments:

- **P:** Introduces the founding date: "The modern city was founded in 1854"
- **Q:** Provides information on the city's past role as the capital: "Formerly the capital of Kazakhstan, it lost its capital status in 1995 to Aqmola (now Astana)."
- **R:** Explains the circumstances of the founding: "when the Russians established a military fortification"
- **S:** Details the location of the founding: "on the site of the ancient city of Almaty, destroyed by the Mongols in the 13th century."

Determining the Correct Arrangement (QPRS)

We need to find the sequence that logically connects these parts to form a meaningful narrative about Almaty.

1. **Linking P, R, and S:** Fragments P, R, and S naturally fit together to describe the city's foundation. P sets the time (1854), R explains the context (Russian fortification), and S specifies the location (site of the ancient city). Combining them yields: "The modern city was founded in 1854 when the Russians established a military fortification on the site of the ancient city of Almaty, destroyed by the Mongols in the 13th century." This forms a coherent unit (**PRS**).
2. **Placing Fragment Q:** Fragment Q discusses the city's former status as the capital, a fact linked to 1995.
3. **Evaluating the QPRS Sequence:** The question asks for the order that correctly completes the sentence. Let's examine the sequence **QPRS**.

Constructing the Full Sentence

Combining the initial phrase, the QPRS sequence, and the concluding phrase results in the following sentence:

"Almaty, formerly Alma-Ata, southeastern Kazakhstan. Formerly the capital of Kazakhstan, it lost its capital status in 1995 to Aqmola (now Astana). The modern city was founded in 1854 when the Russians established a military fortification on the site of the ancient city of Almaty, destroyed by the Mongols in the 13th century. With the coming of the railroad in 1930, its population grew rapidly."

Justification for the QPRS Order

This arrangement (**QPRS**) places the information regarding Almaty's former capital status (Q) prior to the details about its founding (PRS). While this places the date 1995 before 1854, potentially disrupting strict chronological order, it might prioritize thematic flow. The sequence presents background information on the city's political importance (Q), followed by its historical founding (PRS), and concludes with its development (population growth). The unit formed by P, R, and S is grammatically sound and logically describes the founding process.

12. **Answer: c**

Explanation:

Understanding 'Using More Words Than Needed'

The question asks for the best word to describe the act of 'using or expressing something in more words than are needed'. This phrase refers to language that is unnecessarily lengthy, often to the point of being tedious or unclear because of the excess words.

Analyzing Substitute Words for the Phrase

Let's examine each alternative provided to find the best substitute for the given phrase:

- **Verbatim**: This word means repeating something exactly as it was originally spoken or written, word for word. It focuses on accuracy and direct repetition, not on the quantity of words used. For example, writing down someone's speech verbatim means writing it down using the exact same words.
- **Verbal**: This adjective relates to words, especially spoken ones, as opposed to written ones. It can also mean communicated by speaking rather than writing. For instance, a verbal agreement is one made by talking, not in writing. This term doesn't imply using too many words.
- **Verbose**: This word specifically means using or expressed in more words than are needed. A verbose speaker or writer tends to use excessive language, making their communication longer than necessary. This directly matches the definition given in the question. For example, a verbose explanation might take ten minutes to say what could have been said clearly in one.
- **Reprimand**: This is a noun or verb meaning a formal expression of disapproval or to express disapproval formally. It is about criticism or punishment, and has no connection to the number of words used in communication. For example, a manager might reprimand an employee for being late.

Identifying the Best Substitute

Comparing the meanings, the word **Verbose** is the most accurate and direct substitute for the phrase 'Using or expressing something in more words than are needed'. It specifically captures the essence of using excessive words.

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13. **Answer: d**

Explanation:

The correct answer is **PQSR.**

⭐ Key Points

- The given question is an example **of sentence rearrangement.**
- The first sentence should begin with Segment P as it tells the information about what was made. i.e. **the geography of the west map**
- **For further clarification, lets break the sentence,**
  - *'Maps + that William Clark made + showing the geography of the west.'*
- Although, **option 1** seems correct but the **'segment Q'** would come after **'P'** as **'made'** qualify the 'maps' then we will introduce it when it was made.
- **Segment P** is connected **with Q.**
- **Option 3** becomes redundant as it is starting with **segment S 'these'** which indicates previous happening without introducing the maps.
- Out of the given options, only **option 4** contains **Segment P** as the starting segment, thereby, making it the correct answer.
- **Therefore,** as per the points mentioned above, we find that the correct answer is Option 4.

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14. **Answer: a**

Explanation:

Identifying the Grammatical Error in "a little money"

The sentence contains a subtle error related to the use of determiners with "little". Let's break down the distinction between "a little" and "the little" to understand the correction.

- **"A little"**: This phrase signifies a small, but indefinite, quantity. It often implies that there might be more, or it simply states the existence of a small amount. For example, "She speaks **a little** French." means she speaks some French, but not fluently.
- **"The little"**: This phrase refers to a small quantity that is available, but emphasizes that it is the *entire* amount available or possessed. It highlights limitation and possession. For example, "Use **the little** time you have wisely." means use all the time you possess, even though it's not much.

Analyzing the Correct Usage in the Sentence

The original sentence is: "In this hard time, utilise a little money you have in a proper manner now."

The specific part requiring attention, based on the options, is the phrase "utilise a little money you have". The phrase "money you have" clearly indicates the specific funds that belong to or are in the possession of the person. Because it refers to the total amount available to the person, even if small, the correct determiner is "the little".

Therefore, the phrase should be corrected to "utilise **the little** money you have". This phrasing accurately conveys that all the available money, despite being a small amount, should be used effectively.

Evaluating Sentence Components

Let's look at the key components:

- **"In this hard time"**: While "times" (plural) is often used for periods of difficulty (e.g., "these hard times"), the singular "time" can refer to the current period of hardship. The primary error lies elsewhere.

- **"utilise"**: This verb means to make use of something effectively. It is grammatically correct here.
- **"in a proper manner"**: This phrase is acceptable, although "properly" is a more concise alternative.
- **"now"**: This adverb emphasizes the urgency.

The most significant grammatical improvement needed is changing "a little money" to "the little money" to correctly reflect the context of using all the available, limited resources.

Guidance on Resource Management

This sentence emphasizes the importance of careful financial management, especially during difficult periods ("hard time"). The grammatical correction highlights how specific wording affects meaning: using "**the little**" underscores that every bit of the available resource should be utilized properly when funds are scarce.

Original Phrase	Corrected Phrase	Reason
utilise a little money you have	utilise the little money you have	"The little" is used because it refers to the specific, limited amount of money the person possesses, meaning all of it. "A little" would imply an indefinite small amount, not necessarily all that is available.

---

15. **Answer: b**

Explanation:

Understanding the Idiom 'Kick the bucket'

Idioms are phrases where the words together have a different meaning than the dictionary definitions of the individual words. They are a common part of the English

language. The question asks us to identify the most appropriate meaning for the idiom **'Kick the bucket'**.

Meaning of 'Kick the bucket'

The idiom **'Kick the bucket'** is a colloquial and informal way to say that someone has passed away or died. It's a very common idiom used in casual conversation.

Analyzing the Options for 'Kick the bucket'

Let's look at the given options to see which one matches the meaning of the idiom **'Kick the bucket'**:

- **Option 1: Be angry** - This describes an emotional state of anger or frustration. It is not related to the meaning of **'Kick the bucket'**.
- **Option 2: Die** - This means to cease living. This matches the commonly understood meaning of the idiom **'Kick the bucket'**.
- **Option 3: Be rude** - This refers to behaving in an impolite or offensive way. This meaning is unrelated to **'Kick the bucket'**.
- **Option 4: Arrive** - This means to reach a destination. This is completely different from the meaning of the idiom **'Kick the bucket'**.

Conclusion on 'Kick the bucket'

Based on the analysis, the most fitting and accurate meaning for the idiom **'Kick the bucket'** is to die. This idiom is often used humorously or informally when referring to death.

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16. **Answer: d**

Explanation:

Understanding Rights Acquisition Through Duty Performance

This question focuses on the relationship between fulfilling one's responsibilities (duties) and the subsequent acquisition or accumulation of entitlements (rights). We need to find the verb that best describes how rights are gained automatically as a consequence of performing duties.

Analyzing Word Choices for Rights Acquisition

Let's examine the meaning of each option to see which word best completes the sentence: "Rights _____ automatically to him who duly performs his duties."

The Meaning of 'Accrue' in Context

The word **accrue** means to accumulate or receive something (like benefits or rights) over time as a result of doing something. In the context of the sentence, performing duties diligently leads to the automatic accumulation or gaining of rights. It implies that rights naturally build up or come into existence because the duties have been properly executed.

Example: If someone works diligently, they might *accrue* vacation days. Similarly, in this sentence, the performance of duties causes rights to *accrue* to the person.

Why Other Options Are Less Suitable

- **Belong**: The word *belong* indicates possession or being in the right place. While rights ultimately belong to someone, this word doesn't capture the process of automatically gaining them through performing duties. The sentence implies a cause-and-effect relationship where performing duties *causes* the rights to come into being for the person, which 'belong' doesn't convey as strongly.
- **Transfer**: *Transfer* means to move something from one person or place to another, often involving a formal handover. Rights can be transferred, but the sentence suggests a more inherent and automatic outcome of performing duties, not necessarily a transfer from an external source. The rights arise from the action itself.
- **Issue**: The word *issue* typically means to give out or publish something officially, like issuing a permit or a statement. Rights might be *issued* by an authority,

but the sentence implies a natural consequence rather than a formal decree or distribution triggered by duty performance.

Therefore, **accrue** is the most appropriate word because it accurately describes the process of rights being gained or accumulating automatically as a direct consequence of diligently performing one's duties.

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17. **Answer: a**

Explanation:

Devolve Synonym Explanation

The question asks to identify the most appropriate synonym for the word "**Devolve**". A synonym is a word that has a similar meaning to another word.

Understanding the Word Devolve

The word "**Devolve**" primarily means to transfer or pass on responsibilities, duties, power, or property to another person or group, often someone or something lower in rank or authority. For example, a government might devolve power to regional assemblies.

Analyzing the Options for Devolve

Let's examine the meaning of each option provided:

- **Delegate:** This means entrusting a task or responsibility to another person, usually one who is subordinate or younger. This aligns closely with the meaning of transferring responsibility.
- **Centralize:** This means concentrating power or control in a single authority or location. This is the opposite of devolving power.
- **Retain:** This means to keep possession of something or continue to have something. This meaning is unrelated to devolving.

- **Incline:** This means to slope or lean in a particular direction, or to have a tendency or disposition towards something. This meaning is also unrelated to devolving.

Identifying the Best Synonym

Comparing the meanings, "**Delegate**" is the most fitting synonym for "**Devolve**" because both words involve the act of passing on or transferring power, duties, or responsibilities.

Devolve ⟷ Transferring Responsibility

Delegate ⟷ Entrusting Responsibility

The other options, "Centralize", "Retain", and "Incline", do not share this meaning.

Conclusion on Devolve Synonym

Based on the analysis, the most appropriate synonym for "**Devolve**" among the given choices is "**Delegate**".

---

18. **Answer: d**

Explanation:

Choosing the Correct Substitute Word

The task is to find a single word that serves as the best substitute for the phrase: **'A person with bad habits or faults which cannot be changed or corrected'**. We need to carefully examine the meaning of each option provided to see which one fits this description most accurately.

Defining the Core Meaning

The phrase emphasizes traits that are difficult or impossible to alter or improve. We are looking for a word that captures the essence of being **unchangeable** in terms of negative behaviors or character flaws.

Analyzing the Provided Options

Let's explore the meaning of each word presented:

- **Infallible**: This word describes someone or something that is incapable of making errors or being wrong. It relates to perfection and unerring accuracy, not to persistent bad habits. For example, one might hope a system is *infallible*, meaning it works perfectly without fail.
- **Incurable**: This term is typically used for diseases or conditions that cannot be cured or healed. While it implies something is beyond fixing, it's usually applied in a medical or physical context, not typically for behavioral or character issues. An example would be an *incurable* disease.
- **Insertable**: This simply means that something can be inserted or placed into something else. It has no connection to the meaning of having unchangeable faults or habits.
- **Incorrigible**: This word means a person or their behavior is difficult or impossible to correct, improve, or reform. It directly applies to someone whose **bad habits or faults** are firmly established and **cannot be changed or corrected**. For instance, an *incorrigible* child might consistently ignore rules despite repeated attempts to discipline them.

Matching the Substitute Word

By comparing the definitions:

- 'Infallible' relates to being error-free.
- 'Incurable' relates to being beyond healing.
- 'Insertable' relates to being capable of insertion.
- 'Incorrigible' relates to being beyond correction or reform, especially regarding behavior or habits.

The word **Incorrigible** most precisely matches the description of a person whose bad habits or faults are resistant to change or correction.

19. **Answer: b**

Explanation:

The correct answer is **'crime'** .

⭐ Key Points

- Let us look into the **meaning** of the given options -
  - **injuries -** an instance of being injured.
  - **crime -** an action or omission which constitutes an offence and is punishable by law.
  - **blunder -** a stupid or careless mistake.
  - **excesses -** an amount of something that is more than necessary, permitted, or desirable.
- The given blank should use a word that would explain that the police had not done anything wrong against the people in their custody as found in a departmental inquiry.
- **Commit** means **to do something illegal or wrong.**
- We usually use **'crime'** with the word **'commit'.**
- From the above meanings, it is clear that **' crime'** is the best-fit word for the given blank.
- Hence, **option 2** is the correct answer.

Complete sentence - *In the departmental inquiry, it was denied that the police had committed any **crime**on people under their custody.*

20. **Answer: b**

Explanation:

Understanding the Meaning of 'Placid'

The question asks us to find the word that is closest in meaning to the word '**Placid**'. This means we are looking for a synonym.

Defining 'Placid'

'**Placid**' describes someone or something that is calm, peaceful, and not easily upset or agitated. It often refers to a tranquil state or disposition.

Analyzing the Options

Let's look at the meaning of each option provided:

- **Clear:** This word means easy to perceive, understand, or interpret. It can also mean free from doubt or transparency. This meaning does not align with '**Placid**'.
- **Calm:** This word means not showing or feeling nervousness, anger, or other strong emotions; serene or peaceful. This is very similar to the meaning of '**Placid**'.
- **Enjoyable:** This word means giving delight or pleasure; pleasant. While a placid situation might be enjoyable, 'enjoyable' itself doesn't capture the core meaning of being calm and untroubled.
- **Noise:** This word refers to a loud or unpleasant sound. It is the opposite of peacefulness and tranquility, making it completely unrelated to '**Placid**'.

Choosing the Nearest Meaning

Comparing the definitions, the word '**Calm**' shares the core meaning of peacefulness and lack of agitation with the word '**Placid**'. Therefore, '**Calm**' is the word almost nearest in meaning to '**Placid**'.

---

21. **Answer: a**

Explanation:

The correct answer is **'were'**

⭐ Key Points

- **In the given sentence,** *'Landslides ___(X)____ reported in several parts of the state, of which the one at Koottickal in Kottayam has claimed more than seven lives.'* is telling about the landslide which has occured in past hours/or days.
- More over, Landslides is a plural noun and the sentence is in past tense thus, we use **'were'.**
- **We use the sentence form(was/were + V $_3$).**
- The **'simple past tense'** describes actions or events happened or occurred in past.
- **Example:**
  - *My parents were deeply grieved and perplexed.*
  - *When the kids were settled in their room, she turned on Arun.*
- Thus, the correct answer is **Option 1.**
- **The correct sentence is:** *Landslides were reported in several parts of the state, of which the one at Koottickal in Kottayam has claimed more than seven lives.*

---

22. **Answer: c**

Explanation:

Understanding the Passage Context for Blank (Y)

The question asks us to find the most appropriate word for the blank space marked as `____(Y)____` in the given passage. The specific sentence containing this blank is: "These disasters were caused `____(Y)____` to higher economic activities like rock quarrying, construction of new buildings and roads, and destruction of natural forest in the highly economic zones." We need to understand the relationship between the disasters and the mentioned economic activities.

Analyzing the Grammatical Role of Blank (Y)

The structure "caused ____ to" suggests that the word needed should explain the reason or the cause behind the disasters. We need a phrase that links the effect (disasters) to its cause (economic activities). Let's examine the options provided:

- **Option 1: used** - The phrase "caused used to higher economic activities" is grammatically incorrect and doesn't convey the intended meaning of causation.
- **Option 2: need** - "caused need to higher economic activities" is also grammatically incorrect and nonsensical in this context.
- **Option 3: due** - The phrase "caused due to higher economic activities" correctly establishes a cause-and-effect relationship. "Due to" is a common prepositional phrase indicating the reason for something.
- **Option 4: in a view** - "caused in a view to higher economic activities" is grammatically incorrect and does not fit the context. The phrase "in view of" or "with a view to" has different meanings, neither of which fits here.

Selecting the Most Appropriate Word for Blank (Y)

Based on the grammatical structure and the meaning required to link the disasters (effect) to the economic activities (cause), the phrase "**due to**" is the most suitable. It clearly indicates that the higher economic activities are the reason for the landslides.

Therefore, the completed sentence reads: "These disasters were caused **due** to higher economic activities..."

Conclusion on the Correct Option

The word that correctly fills the blank `____(Y)____`, establishing the causal link between the disasters and economic activities, is "**due**".

---

23. **Answer: b**

Explanation:

Passage Analysis for Blank (Z)

The question asks us to complete a passage about the causes of landslides. We need to select the most appropriate word to fill in the blank marked as _____(Z)_____. The specific sentence fragment is: "...construction _____(Z)_____ new buildings and roads...". This phrase is part of a list of economic activities identified as causes for the disasters. The task is to find a word that correctly connects the activity 'construction' with the objects of that activity, 'new buildings and roads'.

Evaluating Options for Construction Blank

Let's examine the given options to determine the best fit for the blank _____(Z)_____:

- **Option 1: `for`**: Using 'for' would result in "construction for new buildings and roads". While sometimes prepositions like 'for' can indicate purpose, in this context, it's less direct than linking the construction activity to the things being constructed.
- **Option 2: `of`**: Using 'of' creates the phrase "construction of new buildings and roads". This is a standard and grammatically correct English structure. The preposition 'of' is commonly used to show what is being made, built, or created. It clearly links the act of construction to the items being constructed.
- **Option 3: `can`**: "construction can new buildings..." is grammatically incorrect. 'Can' is a modal verb and requires a base form of a verb following it, which is missing here.
- **Option 4: `may`**: Similar to 'can', "construction may new buildings..." is also grammatically incorrect. 'May' is another modal verb that doesn't fit the structure required here.
- **Option 5: (Empty Option)**: This option is incomplete and cannot be considered.

Grammar Explanation for 'Construction Of'

The phrase "construction of" is a fundamental grammatical pattern used to specify the subject or object of an action. In this case, 'construction' is the action, and 'new

buildings and roads' are the objects being constructed. The preposition 'of' is used to indicate this relationship, similar to phrases like 'writing of a letter' or 'building of a bridge'.

The sentence lists several economic activities contributing to the landslides. These include 'rock quarrying', 'construction of new buildings and roads', and 'destruction of natural forest'. The structure 'construction of new buildings and roads' correctly identifies one of these economic activities.

Therefore, the most appropriate word to fill in the blank _____(Z)_____ is 'of', making the phrase "construction of new buildings and roads". This accurately describes the economic activity mentioned in the passage regarding landslides.

---

24. **Answer: b**

Explanation:

Analyzing the Blank (X) in the Hydrogen Wall Passage

The question asks us to fill in the blank marked as ____(X)_____ in the given passage about the hydrogen wall. The passage states: "The hydrogen wall has been described by scientists as the place ____(X)____ bubbles of solar wind cease to exist." We need to choose the most suitable word from the given options to complete this sentence logically.

Understanding the Context for (X)

The key phrase here is "the place ____(X)____ bubbles of solar wind cease to exist." We are looking for a word that connects "the place" with the action happening there. This connection should indicate a location.

Evaluating Options for Blank (X)

- **Option 1: when** - This word is used to refer to time. The sentence is describing a *place*, not a specific *time*, so 'when' is not appropriate.

- **Option 2: where** - This word is used to refer to a *place* or location. The sentence describes "the place" where an event occurs (solar wind bubbles ceasing to exist). This fits the context perfectly.
- **Option 3: what** - This word is typically used in questions or to refer to a thing or idea. It doesn't fit the grammatical structure or meaning required here.
- **Option 4: why** - This word is used to ask for a reason or cause. The sentence is describing a location, not asking for a reason, making 'why' unsuitable.

Selecting the Correct Word for (X)

Based on the analysis, the word 'where' is the most appropriate choice because it correctly connects the description of 'the place' with the event that happens at that location – the cessation of solar wind bubbles. The completed sentence reads: "The hydrogen wall has been described by scientists as the place **where** bubbles of solar wind cease to exist." This clearly indicates the location of this phenomenon.

---

25. **Answer: c**

Explanation:

Analyzing the Hydrogen Wall Passage and Fill in the Blanks

This question requires understanding the context provided in the passage about the **hydrogen wall** and its interaction with **solar winds**. We need to find the most suitable word to fill in the blank marked as **(Y)**. The specific sentence we are focusing on is: "The mass of interstellar matter here is very small ____(Y)_____ strong enough to not let the solar winds pass through."

Understanding the Sentence Context for Blank (Y)

Let's break down the sentence to understand the relationship between the two clauses connected by blank (Y):

- Clause 1: "The mass of interstellar matter here is very small" - This describes the quantity or density of the matter.
- Clause 2: "[the mass is] strong enough to not let the solar winds pass through" - This describes a functional property of the matter, its ability to resist or block the solar winds.

The sentence presents a situation where the mass is described as 'very small', yet it possesses a significant characteristic ('strong enough to not let the solar winds pass'). This juxtaposition suggests a contrast or an unexpected combination of qualities.

Evaluating Options for Blank (Y)

We need to choose a conjunction that best fits this contrasting relationship:

- **Option 1: since** - 'Since' indicates a reason or cause. Using 'since' here would imply that the mass is very small *because* it is strong enough, which doesn't make logical sense.
- **Option 2: because** - Similar to 'since', 'because' introduces a reason. Saying the mass is very small *because* it is strong enough is illogical in this context.
- **Option 3: but** - 'But' is a coordinating conjunction used to introduce a contrast. "The mass is very small *but* strong enough..." This correctly shows that despite being small in quantity, the matter possesses the necessary strength to affect the solar winds. This fits the likely intended meaning.
- **Option 4: in addition to** - This phrase is used to add another point. While the mass has two qualities (smallness and strength), 'in addition to' doesn't capture the contrast implied between being 'very small' and being 'strong enough' to block solar winds effectively. It merely lists attributes rather than highlighting a contrast.

Determining the Most Appropriate Conjunction

The passage describes the hydrogen wall's properties. The sentence concerning blank (Y) highlights a specific characteristic: the interstellar matter's mass is small, yet it's sufficiently strong to impede the solar winds. The word 'but' effectively connects these two ideas, emphasizing that the strength exists *in spite of* the

small mass. This contrast is crucial for understanding how the hydrogen wall functions as described.

Therefore, the most suitable word to fill in blank (Y) is **but**, as it correctly establishes the contrast between the small mass and the significant strength of the interstellar matter in the hydrogen wall.

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26. **Answer: c**

Explanation:

Hydrogen Wall Interaction Analysis

This question requires us to fill in the blank marked _____(Z)_____ in a passage describing the 'hydrogen wall' and its interaction with the 'solar wind'. The goal is to find the most suitable word from the given options to complete the sentence accurately based on the context provided.

Analyzing the 'Burst' Context

The relevant sentence is: "At the same time, it is not so strong to burst _____(Z)_____ the solar wind build-up." The passage explains that the hydrogen wall acts as a boundary that contains the solar wind. Specifically, it notes that the wall is "pressing the solar winds inward". This implies a balancing act where the wall withstands the pressure from the solar wind.

The phrase "not so strong to burst _____(Z)_____ the solar wind build-up" refers to a limitation in the wall's strength. We need to understand what action is being described in relation to the 'solar wind build-up'.

Evaluating Prepositions for 'Burst _____ Build-up'

Let's examine the options provided for the blank _____(Z)_____:

- **into**: Using 'into' would result in "burst into the solar wind build-up". This suggests the wall breaks inward into the build-up, which doesn't align with the described function of containing pressure.
- **upon**: The phrase "burst upon the solar wind build-up" is contextually inappropriate. It doesn't logically describe the interaction between the wall's strength and the solar wind pressure.
- **through**: The phrase "burst through the solar wind build-up" means to break apart or overcome the resistance of the build-up. The sentence states the wall is "not so strong" for this action. This implies that the solar wind build-up exerts enough pressure that the wall cannot break through it. This aligns perfectly with the description of the wall "pressing the solar winds inward", indicating containment. The wall is unable to overcome the pressure.
- **by**: "Burst by the solar wind build-up" is grammatically incorrect and does not fit the scientific context of forces and containment.

Selecting the Appropriate Word

Considering the context that the hydrogen wall acts as a barrier pressing the solar winds inward, the most logical completion is that the wall is not strong enough to break through the pressure exerted by the solar wind build-up. Therefore, 'through' is the correct preposition.

The completed sentence reads: "At the same time, it is not so strong to burst **through** the solar wind build-up."

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27. **Answer: d**

Explanation:

Analyzing Western Ghats Climate Change Statements

This solution provides a detailed explanation of the given statements based on the provided passage about forest degradation, carbon sequestration, and climate patterns in the Western Ghats region, specifically focusing on parts of Karnataka

and Kerala. We will examine each statement to determine its validity according to the text.

Statement Verification Against Passage

The passage discusses the impact of forest degradation and carbon sequestration on climate patterns. Let's verify each statement:

- **Statement a) The central Western Ghats area (Karnataka) shows a very meager change in temperature.**

  The passage explicitly states: "The central Western Ghats area (Karnataka) shows a very meager change in temperature (0.05 **degrees Celsius** increase)...". This directly confirms that the change in temperature in this specific region is described as very meager.

- **Statement b) The analyses demonstrate that land use has played a major role in moderating micro-climatic conditions in the Western Ghats.**

  According to the passage: "These analyses demonstrate that land use has played a major role in moderating micro-climatic conditions in the Western Ghats over a temporal scale." This sentence directly supports the statement, highlighting the significant influence of land use on local climate conditions.

- **Statement c) Kerala and part of Karnataka have witnessed large-scale climate changes.**

  The passage mentions: "The analysis indicated that the regions in the southern parts of Western Ghats (WG) in Kerala and part of Karnataka have witnessed large-scale climate changes." This confirms that the specified areas have experienced significant climate changes, validating the statement.

Conclusion on Statement Validity

Based on the direct evidence presented in the passage, all three statements (a, b, and c) are accurate representations of the information provided. Therefore, the most appropriate choice is that all statements are correct.

Key takeaways from the passage include:

- Forest degradation and improper carbon sequestration contribute to flooding.
- Deforestation leads to significant anthropogenic carbon emissions and impacts regional climate patterns.
- Land use is a crucial factor in moderating micro-climates in the Western Ghats.
- Climate changes, including temperature and rainfall pattern shifts, are observed in specific regions of the Western Ghats.

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28. **Answer: a**

Explanation:

This solution explains the impact of reduced rainfall based on the provided passage about forest degradation and climate patterns in the Western Ghats.

Rainfall Reduction Impact on Region

The question asks about the consequences of a **reduction in rainfall** within the specified **region**, as discussed in the text. Understanding these effects is crucial for comprehending the broader environmental changes occurring in the Western Ghats.

Analyzing the Question on Rainfall Effects

The core of the question focuses on identifying a direct effect linked to decreased rainfall. We need to carefully examine the passage to find where it explicitly states what happens when rainfall decreases in the area.

Passage Insights on Climate and Carbon

The provided passage highlights several key points regarding the environment in the Western Ghats:

- Large-scale forest degradation and improper carbon sequestration are linked to recent flooding.
- Researchers from IISc found that deforestation contributes significantly to **carbon emissions** and affects regional climate patterns.
- The loss of forest cover has altered local rainfall patterns.
- A study focused on the Western Ghats investigated landscape changes, climate trends, and **carbon sequestration** potential.
- The passage explicitly states: "The reduction in rainfall and an increase in temperature can affect **carbon stock** in the region."

Evaluating Option Relevance

Let's analyze how each option relates to the information presented in the passage concerning the effect of reduced rainfall:

- **Carbon Stocking**: The passage directly mentions that "The reduction in rainfall... can affect carbon stock in the region." This option aligns perfectly with the text's statement about the impact on carbon stock.
- **Increase in Temperature**: While the passage mentions both reduced rainfall and increased temperature occurring together and affecting carbon stock, it does not state that reduced rainfall *causes* an increase in temperature. They are presented as concurrent factors impacting carbon stock.
- **Carbon Emission**: The passage links deforestation and degradation to carbon emissions. It does not suggest that reduced rainfall leads to increased carbon emissions.
- **Loss of forest**: The passage indicates that deforestation leads to changes in rainfall patterns. It does not state that a reduction in rainfall causes further loss of forest.

Based on the direct statement in the passage, the reduction in rainfall primarily affects the **carbon stock** of the region.

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29. **Answer: b**

Explanation:

Defining Carbon Sequestration

This solution aims to clarify the meaning of "Carbon Sequestration" based on the provided passage. Understanding specific environmental terms like **Carbon Sequestration** is essential for grasping the context of the text.

Locating the Definition in the Passage

The passage explicitly defines **Carbon Sequestration** in the following sentence: "*Carbon sequestration is a natural/artificial process by which carbon dioxide is removed from the atmosphere and held in solid or liquid form.*" This sentence serves as the key reference for determining the correct meaning.

Analyzing the Options for Carbon Sequestration Meaning

We will now evaluate each multiple-choice option against the definition provided in the passage:

- **Option 1:** A process in which carbon dioxide is kept in only solid form. This option is partially correct because it mentions holding carbon dioxide. However, it is inaccurate because it limits the storage to *only* solid form, excluding liquid form, and critically misses the essential step of removing carbon dioxide from the atmosphere.
- **Option 2:** A process of removing carbon dioxide from the atmosphere and holding it in solid or liquid form. This option perfectly matches the definition given in the passage. It correctly identifies the core components: the removal of **carbon dioxide** from the **atmosphere** and its subsequent retention in either **solid** or **liquid form**.
- **Option 3:** A process of adding carbon-di-oxide to the atmosphere by taking it out from solid or liquid form. This option describes the opposite of carbon sequestration. Carbon sequestration is about removing CO2 from the atmosphere, whereas this option suggests adding CO2 to the atmosphere.
- **Option 4:** A process of removing moisture from carbon dioxide and keeping it in only liquid form. This option is completely unrelated to the definition of **Carbon**

Sequestration presented in the passage. The passage describes atmospheric carbon management, not a process focused on removing moisture from carbon dioxide.

Conclusion on Carbon Sequestration

Therefore, according to the provided passage, **Carbon Sequestration** is accurately defined as the natural or artificial process involving the removal of **carbon dioxide** from the **atmosphere** and its subsequent storage in either a **solid** or **liquid form**.

---

30. **Answer: a**

Explanation:

Age Calculation: Man and Son Ratio

This explanation breaks down how to find the son's age given the average age of a man and his son and the ratio of their ages.

Understanding the Given Information

- The average age of a man and his son is 40 years.
- The ratio of the man's age to his son's age is 11:5.

Calculating the Total Age Sum

The average age is calculated by dividing the sum of ages by the number of people. In this case, there are two people (man and son).

Let the man's age be M and the son's age be S. The formula for the average age is:

$$\text{Average Age} = \frac{M + S}{2}$$

We are given that the average age is 40 years. So:

$$40 = \frac{M + S}{2}$$

To find the sum of their ages $(M + S)$, we multiply the average age by 2:

$$M + S = 40 \times 2$$

$$M + S = 80 \text{ years}$$

Therefore, the combined age of the man and his son is 80 years.

Applying the Age Ratio

The ratio of the man's age to the son's age is given as 11:5. This means that for some common multiplier, let's call it 'x', their ages can be represented as:

- Man's Age (M) = $11x$
- Son's Age (S) = $5x$

Now we can use the sum of their ages we calculated earlier $(M + S = 80)$ and substitute these expressions:

$$11x + 5x = 80$$

Determining the Son's Age

First, we combine the terms with 'x':

$$16x = 80$$

Next, we solve for 'x' by dividing both sides by 16:

$$x = \frac{80}{16}$$

$$x = 5$$

Now that we have the value of 'x', we can find the son's age. The son's age is represented by $5x$.

$$\text{Son's Age} = 5x$$

$$\text{Son's Age} = 5 \times 5$$

$$\text{Son's Age} = 25 \text{ years}$$

For completeness, the man's age would be $11x = 11 \times 5 = 55$ years. Let's check if the average is correct: $\frac{55+25}{2} = \frac{80}{2} = 40$ years. This matches the information given in the question.

Summary of Ages

Person	Age Representation	Calculated Age
Man	$11x$	55 years
Son	$5x$	25 years
Total Age	$16x$	80 years

Based on these calculations, the son's age is 25 years.

---

31. Answer: b

Explanation:

Finding the Largest Fraction: Step-by-Step Comparison

To find the largest fraction among the given options, we can compare them. One common method for comparing fractions is to convert each fraction into its decimal equivalent. This allows for a direct comparison of their values.

Let's convert each of the given fractions into decimal form:

Decimal Conversion of Fractions

- For $\frac{7}{9}$: Divide 7 by 9. $\frac{7}{9} \approx 0.777...$ (It's a repeating decimal)
- For $\frac{11}{14}$: Divide 11 by 14. $\frac{11}{14} \approx 0.7857...$
- For $\frac{3}{4}$: Divide 3 by 4. $\frac{3}{4} = 0.75$
- For $\frac{10}{13}$: Divide 10 by 13. $\frac{10}{13} \approx 0.7692...$

Comparing the Decimal Values

Now we have the approximate decimal values for each fraction:

- $\frac{7}{9} \approx 0.777$
- $\frac{11}{14} \approx 0.7857$
- $\frac{3}{4} = 0.75$
- $\frac{10}{13} \approx 0.7692$

Let's list these decimal values in ascending order to clearly see which one is the largest:

$0.75 < 0.7692 < 0.777... < 0.7857...$

Fraction	Decimal Value (Approx.)
$\frac{3}{4}$	0.75
$\frac{10}{13}$	0.7692
$\frac{7}{9}$	0.777...
$\frac{11}{14}$	0.7857...

From the comparison, the largest decimal value is approximately 0.7857, which corresponds to the fraction $\frac{11}{14}$.

Therefore, the largest fraction among the given options is $\frac{11}{14}$.

Revision Table: Comparing Fractions for Size

Fraction	Calculation	Decimal (Approx.)	Rank (Largest = 1)
$\frac{7}{9}$	$7 \div 9$	0.777...	3
$\frac{11}{14}$	$11 \div 14$	0.7857...	1
$\frac{3}{4}$	$3 \div 4$	0.75	4
$\frac{10}{13}$	$10 \div 13$	0.7692...	2

Additional Information: Other Ways to Compare Fractions

While converting to decimals is straightforward, here are other methods to compare fractions:

- **Finding a Common Denominator:** Convert all fractions to equivalent fractions with the same denominator (the least common multiple of all denominators). Then, compare the numerators. The fraction with the largest numerator is the largest. For example, to compare $\frac{3}{4}$ and $\frac{2}{3}$, the common denominator is 12. $\frac{3}{4} = \frac{9}{12}$ and $\frac{2}{3} = \frac{8}{12}$. Since 9 > 8, $\frac{3}{4} > \frac{2}{3}$.
- **Cross-Multiplication:** To compare two fractions $\frac{a}{b}$ and $\frac{c}{d}$, compare $a \times d$ and $b \times c$.
  - If $a \times d > b \times c$, then $\frac{a}{b} > \frac{c}{d}$.
  - If $a \times d < b \times c$, then $\frac{a}{b} < \frac{c}{d}$.
  - If $a \times d = b \times c$, then $\frac{a}{b} = \frac{c}{d}$.

  For example, comparing $\frac{7}{9}$ and $\frac{11}{14}$: $7 \times 14 = 98$ and $9 \times 11 = 99$. Since 98 < 99, $\frac{7}{9} < \frac{11}{14}$. You can use this method to compare fractions two at a time.
- **Comparing with a Benchmark:** Compare fractions to a known value like $\frac{1}{2}$ or 1. For instance, $\frac{3}{4}$ is larger than $\frac{1}{2}$ because $3 \times 2 > 4 \times 1$.

Choosing the best method depends on the fractions you are comparing. Converting to decimals is often easiest when comparing multiple fractions directly, as done in this problem finding the largest fraction.

32. **Answer: c**

Explanation:

24

The average of the first three numbers (n_1, n_2, n_3) is given as 16

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33. **Answer: b**

Explanation:

Calculating the Loss Percentage for Banana Sales

This problem involves calculating the total cost price and total selling price of bananas purchased and sold by a shopkeeper to determine the overall loss percentage. We need to carefully consider the quantities and rates given in the problem.

Understanding the Problem Quantities

- The shopkeeper buys **2 dozen** bananas.
- The cost price is **Rs. 16 per dozen**.
- Initially, **18 bananas** are sold at a rate of **Rs. 12 per dozen**.
- The remaining bananas are sold at a reduced rate of **Rs. 4 per dozen**.
- The goal is to find the **loss percentage**.

Step 1: Calculate the Total Cost Price (CP)

First, let's find out how much the shopkeeper spent in total.

- Number of dozens bought = 2
- Cost per dozen = Rs. 16
- Total Cost Price (CP) = Number of dozens × Cost per dozen

- Using LaTeX:

  Total CP = 2×16

- Total CP = Rs. 32

Step 2: Calculate the Total Selling Price (SP)

Now, let's calculate the total amount the shopkeeper received from selling the bananas. We need to consider two different selling rates.

Total number of bananas = 2 dozens = $2 \times 12 = 24$ bananas.

Selling the first 18 bananas:

- Number of bananas sold = 18
- Selling rate = Rs. 12 per dozen
- Number of dozens sold = $\frac{18 \text{ bananas}}{12 \text{ bananas/dozen}} = 1.5$ dozens
- Selling Price (SP) for 18 bananas = Number of dozens sold × Selling rate
- Using LaTeX:

  SP_1 = 1.5×12

- SP_1 = Rs. 18

Selling the remaining bananas:

- Remaining bananas = Total bananas - Bananas already sold = $24 - 18 = 6$ bananas
- Selling rate = Rs. 4 per dozen
- Number of dozens sold = $\frac{6 \text{ bananas}}{12 \text{ bananas/dozen}} = 0.5$ dozens
- Selling Price (SP) for remaining 6 bananas = Number of dozens sold × Selling rate
- Using LaTeX:

  SP_2 = 0.5×4

- SP_2 = Rs. 2

Total Selling Price:

- Total SP = SP for first 18 bananas + SP for remaining 6 bananas
- Total SP = Rs. 18 + Rs. 2
- Total SP = Rs. 20

Step 3: Calculate the Loss Amount

We compare the Total Cost Price (CP) and the Total Selling Price (SP) to find the loss.

- Total CP = Rs. 32
- Total SP = Rs. 20
- Since CP > SP, the shopkeeper incurred a loss.
- Loss = Total CP - Total SP
- Using LaTeX:

  Loss = $32 - 20$

- Loss = Rs. 12

Step 4: Calculate the Loss Percentage

The loss percentage is calculated based on the cost price.

- Loss Percentage = $\left(\frac{\text{Loss}}{\text{Total CP}}\right) \times 100$
- Using the calculated values:
- Using LaTeX:

  Loss Percentage = $\left(\frac{12}{32}\right) \times 100$

- Simplify the fraction $\frac{12}{32}$:
- $\frac{12}{32} = \frac{3 \times 4}{8 \times 4} = \frac{3}{8}$
- Now calculate the percentage:
- Loss Percentage = $\frac{3}{8} \times 100$

- Loss Percentage = $3 \times \frac{100}{8}$
- Loss Percentage = 3×12.5
- Loss Percentage = 37.5%

Conclusion

The shopkeeper experienced a loss of Rs. 12 on his total investment of Rs. 32. The calculated loss percentage is 37.5%.

---

34. Answer: c

Explanation:

Calculating Remaining Milk After Replacement Process

This problem involves a common scenario in quantitative aptitude tests focusing on mixtures and alligations. We need to determine the final quantity of milk in a container after a specific process of removal and replacement has been repeated several times.

Understanding the Milk Replacement Scenario

The process described involves removing a portion of the liquid from a container and replacing it with another liquid (water in this case). This is done multiple times. Key details to note are:

- The initial volume of milk in the container.
- The volume of liquid removed in each step.
- The liquid used for replacement.
- The total number of times the process is performed.

Problem Breakdown and Key Information

Let's break down the information given in the question:

- Initial quantity of milk = 40 litres.
- Quantity of milk removed and replaced by water in each step = 4 litres.
- The process is repeated a total of 3 times (initial removal/replacement + 2 more times).

Formula for Replacement Problems

For problems where a substance is repeatedly removed and replaced by another substance, the quantity of the original substance remaining can be calculated using the following formula:

$$\text{Remaining Quantity} = \text{Initial Quantity} \times \left(1 - \frac{\text{Quantity Removed}}{\text{Initial Quantity}}\right)^n$$

Where:

- **Initial Quantity** is the starting amount of the substance (milk = 40 litres).
- **Quantity Removed** is the amount taken out in each step (4 litres).
- **n** is the number of times the process is repeated (3 times).

Step-by-Step Calculation

Now, let's apply the formula to this specific problem:

1. **Identify the values:**
   - Initial Quantity = 40 litres
   - Quantity Removed = 4 litres
   - Number of repetitions (n) = 3
2. **Calculate the fraction of milk remaining after one operation:**

   The fraction of the liquid removed is $\frac{4}{40}$.

   Therefore, the fraction of milk that remains in the mixture after one operation is $1 - \frac{4}{40}$.

   Calculating the fraction: $1 - \frac{4}{40} = 1 - \frac{1}{10} = \frac{10}{10} - \frac{1}{10} = \frac{9}{10}$.

3. **Calculate the remaining milk after 3 operations:**

Using the formula:

Remaining Milk = $40 \times \left(\frac{9}{10}\right)^3$

4. **Evaluate the expression:**

Remaining Milk = $40 \times \left(\frac{9 \times 9 \times 9}{10 \times 10 \times 10}\right)$

Remaining Milk = $40 \times \frac{729}{1000}$

5. **Simplify the result:**

Remaining Milk = $\frac{40 \times 729}{1000} = \frac{4 \times 729}{100}$

Remaining Milk = $\frac{2916}{100}$

Remaining Milk = 29.16 litres

Conclusion on Milk Quantity

After performing the process of removing 4 litres of the mixture and replacing it with water three times, the container will hold 29.16 litres of milk.

---

35. **Answer: d**

Explanation:

Understanding the Sample Space

When two dice are thrown together, each die has 6 possible outcomes (numbers 1 through 6). The total number of possible outcomes is the product of the outcomes for each die. Therefore, the total number of outcomes in the sample space is calculated as:

Total Outcomes = $6 \times 6 = 36$

We can list all possible pairs of outcomes as (Die 1, Die 2). Our goal is to find the probability that the sum of the numbers shown on the two faces is divisible by 4 OR divisible by 6.

Identifying Favorable Outcomes for Sum Divisible by 4

The possible sums when rolling two dice range from $1 + 1 = 2$ to $6 + 6 = 12$. We need to find the outcomes where the sum is divisible by 4. The sums divisible by 4 in this range are 4, 8, and 12.

- **Sum = 4:** The pairs are (1, 3), (2, 2), (3, 1). There are 3 outcomes.
- **Sum = 8:** The pairs are (2, 6), (3, 5), (4, 4), (5, 3), (6, 2). There are 5 outcomes.
- **Sum = 12:** The pair is (6, 6). There is 1 outcome.

The total number of outcomes where the sum is divisible by 4 is $3 + 5 + 1 = 9$.

The probability of the sum being divisible by 4 is $P(\text{Sum divisible by } 4) = \frac{9}{36}$.

Identifying Favorable Outcomes for Sum Divisible by 6

Next, we find the outcomes where the sum is divisible by 6. The sums divisible by 6 in the range 2 to 12 are 6 and 12.

- **Sum = 6:** The pairs are (1, 5), (2, 4), (3, 3), (4, 2), (5, 1). There are 5 outcomes.
- **Sum = 12:** The pair is (6, 6). There is 1 outcome.

The total number of outcomes where the sum is divisible by 6 is $5 + 1 = 6$.

The probability of the sum being divisible by 6 is $P(\text{Sum divisible by } 6) = \frac{6}{36}$.

Handling Overlapping Outcomes (Sum Divisible by 4 and 6)

The question asks for the probability of the sum being divisible by 4 OR 6. When using the "OR" condition in probability, we need to consider if any outcomes satisfy both conditions simultaneously to avoid double-counting. This involves using the Principle of Inclusion-Exclusion.

We need to find the outcomes where the sum is divisible by both 4 and 6. A number divisible by both 4 and 6 must be divisible by their Least Common Multiple (LCM). The LCM of 4 and 6 is 12.

- **Sum = 12:** The pair is (6, 6). There is 1 outcome.

The number of outcomes where the sum is divisible by both 4 and 6 is 1.

The probability of the sum being divisible by both 4 and 6 is $P(\text{Sum divisible by 4 and 6}) = \frac{1}{36}$.

Calculating the Probability Using Inclusion-Exclusion

The formula for the probability of event A OR event B is:

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

Let A be the event that the sum is divisible by 4.

Let B be the event that the sum is divisible by 6.

Substituting the probabilities we calculated:

$$P(\text{Sum divisible by 4 or 6}) = P(\text{Sum divisible by 4}) + P(\text{Sum divisible by 6}) - P(\text{Sum divisible by 4 and 6})$$

$$P(\text{Sum divisible by 4 or 6}) = \frac{9}{36} + \frac{6}{36} - \frac{1}{36}$$

Final Probability Calculation

Now, we perform the calculation:

$$P(\text{Sum divisible by 4 or 6}) = \frac{9+6-1}{36}$$

$$P(\text{Sum divisible by 4 or 6}) = \frac{14}{36}$$

Finally, we simplify the fraction:

$$P(\text{Sum divisible by 4 or 6}) = \frac{14 \div 2}{36 \div 2} = \frac{7}{18}$$

Thus, the probability that the sum of the numbers on the two faces is divisible by 4 or 6 is $\frac{7}{18}$.

---

36. **Answer: c**

Explanation:

Determining the Fraction Based on Given Conditions

This problem requires us to find a specific fraction based on relationships described between its numerator and denominator under two different scenarios. We need to set up algebraic equations to represent these conditions and solve them to find the original fraction.

Algebraic Representation of the Fraction

Let's represent the unknown fraction. We start by defining the components:

- Let the numerator of the fraction be 'n'.
- Let the denominator of the fraction be 'd'.

Therefore, the fraction can be written as $\frac{n}{d}$.

Setting Up Equations from the Problem Statement

The problem provides two key pieces of information that we can translate into equations:

1. **Condition 1:** "The denominator of a fraction is 4 more than twice the numerator." This translates to the equation:

$$d = 2n + 4 \quad (\text{Equation } 1)$$

2. **Condition 2:** "When both the numerator and denominator are decreased by 6, then the denominator becomes 12 times the numerator."
First, let's find the new numerator and denominator after decreasing by 6:

- New Numerator = $n - 6$
- New Denominator = $d - 6$

Now, apply the condition that the new denominator is 12 times the new numerator:

$$d - 6 = 12(n - 6) \quad \text{(Equation 2)}$$

Solving the System of Equations

We now have a system of two linear equations with two variables (n and d):

1. $d = 2n + 4$
2. $d - 6 = 12(n - 6)$

We can solve this system using substitution. Substitute the expression for 'd' from Equation 1 into Equation 2:

Replacing 'd' in Equation 2 with '$2n + 4$':

$$(2n + 4) - 6 = 12(n - 6)$$

Now, simplify and solve for 'n':

Combine the constants on the left side:

$$2n - 2 = 12(n - 6)$$

Distribute the 12 on the right side:

$$2n - 2 = 12n - 72$$

To solve for 'n', gather the 'n' terms on one side and the constant terms on the other. Subtract $2n$ from both sides:

$$-2 = 10n - 72$$

Add 72 to both sides:

$$-2 + 72 = 10n$$

$$70 = 10n$$

Divide by 10:

$$n = \frac{70}{10}$$

$$n = 7$$

So, the numerator is 7.

Calculating the Denominator

Now that we have found the value of the numerator $(n = 7)$, we can find the denominator (d) using Equation 1:

$$d = 2n + 4$$

Substitute $n = 7$ into the equation:

$$d = 2(7) + 4$$

$$d = 14 + 4$$

$$d = 18$$

The denominator is 18.

Final Fraction Determination

The original fraction is $\frac{n}{d}$. Using the values we found:

$$\text{Fraction} = \frac{7}{18}$$

Verifying the Fraction Conditions

Let's check if the fraction $\frac{7}{18}$ satisfies the conditions given in the problem:

- **Check Condition 1:** Is the denominator (18) equal to 4 more than twice the numerator (7)?
  $2 \times 7 + 4 = 14 + 4 = 18$. Yes, the condition is met.
- **Check Condition 2:** Decrease both numerator and denominator by 6.
  - New Numerator = $7 - 6 = 1$
  - New Denominator = $18 - 6 = 12$

  Is the new denominator (12) equal to 12 times the new numerator (1)?
  $12 \times 1 = 12$. Yes, this condition is also met.

Since both conditions are satisfied, the fraction $\frac{7}{18}$ is the correct answer.

---

37. **Answer: a**

Explanation:

Understanding the Problem

The question asks us to divide the number 94 into two parts. Let's call these Part 1 and Part 2. We are given a specific condition relating these two parts: the ratio between the fifth part of Part 1 and the eighth part of Part 2 must be equal to 3:4. Our goal is to find the value of the first part.

Setting Up the Equations for Division

Let's denote the first part as x and the second part as y. Based on the problem description, we know that the sum of these two parts must be 94: $x + y = 94$ (Equation 1) The problem states that "the fifth part of the first and the eighth part of the second are in the ratio 3 : 4". We can translate this into a mathematical equation. The fifth part of the first part (x) is $\frac{1}{5}x$. The eighth part of the second part (y) is $\frac{1}{8}y$. The ratio is given as 3:4, so we can write:

$$\frac{\frac{1}{5}x}{\frac{1}{8}y} = \frac{3}{4}$$

Simplifying the Ratio Condition

Let's simplify the left side of the ratio equation:

$$\frac{x/5}{y/8}$$

To divide fractions, we multiply by the reciprocal of the denominator:

$$\frac{x}{5} \times \frac{8}{y} = \frac{8x}{5y}$$

Now, we set this simplified expression equal to the given ratio:

$$\frac{8x}{5y} = \frac{3}{4}$$

To eliminate the denominators, we cross-multiply: $4 \times (8x) = 3 \times (5y)$ $32x = 15y$ (Equation 2)

Solving for the First Part

We now have two equations and two unknowns (x and y): 1. $x + y = 94$ 2. $32x = 15y$ We can use substitution to solve for x. From Equation 1, let's express y in terms of x: $y = 94 - x$ Now substitute this expression for y into Equation 2: $32x = 15(94 - x)$ Distribute the 15 on the right side of the equation: $32x = (15 \times 94) - (15 \times x)$ $32x = 1410 - 15x$ To isolate x, we need to bring all terms containing x to one side. Add $15x$ to both sides of the equation: $32x + 15x = 1410$ $47x = 1410$ Finally, divide both sides by 47 to find the value of x: $x = \frac{1410}{47}$ Performing the division: $x = 30$ So, the first part is 30.

Verification of the Solution

Let's check if this value of x satisfies the conditions of the problem. If the first part (x) is 30, then the second part (y) is: $y = 94 - x = 94 - 30 = 64$ Now, let's check the ratio condition: The fifth part of the first part $(x = 30)$ is:

$$\frac{1}{5}x = \frac{1}{5}(30) = 6$$

The eighth part of the second part $(y = 64)$ is:

$$\frac{1}{8}y = \frac{1}{8}(64) = 8$$

The ratio of these two values is $\frac{6}{8}$. Simplifying this ratio:

$$\frac{6}{8} = \frac{3}{4}$$

This ratio (3:4) matches the ratio given in the problem statement. Thus, our calculation for the first part is correct.

First Part Calculation

The calculation shows that the first part is $x = 30$.

---

38. Answer: d

Explanation:

Calculating the Cost of Fencing a Circular Field

This problem involves finding the total cost required to fence a circular field. We are given the area of the field in hectares and the rate of fencing per metre. To solve this, we need to perform several calculations: convert the area unit, find the field's radius, calculate its circumference (which is the length of the fence needed), and finally determine the total cost based on the given rate.

Step-by-Step Calculation for Fencing Cost

1. Convert Area from Hectares to Square Metres

The area of the circular field is given as 13.86 hectares. First, we need to convert this area into square metres, as the fencing rate is given per metre.

We know that 1 hectare = 10,000 square metres.

Therefore, the area of the field in square metres is:

```
Area = 13.86 \text{ hectares} \times 10000 \frac{\text{m}^2}{\text{hectare}}
```

$Area = 138600 \text{ m}^2$

2. Calculate the Radius of the Circular Field

The formula for the area of a circle is $A = \pi r^2$, where A is the area and r is the radius.

We have the area $A = 138600 \text{ m}^2$. We can use the value of $\pi \approx \frac{22}{7}$.

$$138600 = \frac{22}{7} \times r^2$$

To find r^2, we rearrange the formula:

$$r^2 = \frac{138600 \times 7}{22}$$

$$r^2 = 6300 \times 7$$

$$r^2 = 44100$$

Now, we find the radius r by taking the square root:

$$r = \sqrt{44100}$$

$$r = 210 \text{ metres}$$

So, the radius of the circular field is 210 metres.

3. Calculate the Circumference of the Field

The length of the fence required is equal to the circumference of the circular field. The formula for the circumference of a circle is $C = 2 \pi r$.

Using the radius $r = 210 \text{ m}$ and $\pi \approx \frac{22}{7}$:

$$C = 2 \times \frac{22}{7} \times 210$$

$$C = 2 \times 22 \times \frac{210}{7}$$

$$C = 2 \times 22 \times 30$$

$C = 44 \times 30$

$C = 1320 \text{ metres}$

The total length that needs to be fenced is 1320 metres.

4. Calculate the Total Cost of Fencing

The cost of fencing is given as Rs. 4.40 per metre. To find the total cost, we multiply the total length of the fence (circumference) by the rate per metre.

$$\text{Total Cost} = \text{Circumference} \times \text{Rate per metre}$$

$$\text{Total Cost} = 1320 \text{ m} \times \text{Rs. } 4.40/\text{m}$$

$$\text{Total Cost} = 1320 \times 4.40$$

$$\text{Total Cost} = 1320 \times \frac{440}{100}$$

$$\text{Total Cost} = 1320 \times \frac{44}{10}$$

$$\text{Total Cost} = 132 \times 44$$

$$\text{Total Cost} = 5808$$

The total cost of fencing the circular field is Rs. 5808.

Final Answer Summary

The calculation steps show that the cost of fencing the circular field at Rs. 4.40 per metre amounts to Rs. 5808.

---

39. **Answer: d**

Explanation:

Machine Work Calculation: Finding the Approximate Finishing Time

This problem requires us to calculate the time when a printing task will be completed. We are given the rates of three machines (P, Q, and R) and their working schedule. Machine P works for a limited time, while machines Q and R continue until the job is finished.

1. Calculating Individual Machine Work Rates

Let the total work of printing one lakh books be represented by 1 unit. We first find the rate of work for each machine:

- Machine P prints the books in 8 hours. So, the rate of Machine P (R_P) is $\frac{1}{8}$ of the work per hour.
- Machine Q prints the books in 10 hours. So, the rate of Machine Q (R_Q) is $\frac{1}{10}$ of the work per hour.
- Machine R prints the books in 12 hours. So, the rate of Machine R (R_R) is $\frac{1}{12}$ of the work per hour.

2. Calculating Work Done by All Machines Together

All machines start at 9 A.M. Machine P stops at 11 A.M. This means all three machines work together for 2 hours (from 9 A.M. to 11 A.M.).

First, we find the combined work rate when P, Q, and R are working:

Combined Rate (R_{PQR}) = $R_P + R_Q + R_R$

$R_{PQR} = \frac{1}{8} + \frac{1}{10} + \frac{1}{12}$

To sum these fractions, we find the least common multiple (LCM) of 8, 10, and 12, which is 120.

$R_{PQR} = \frac{15}{120} + \frac{12}{120} + \frac{10}{120} = \frac{15+12+10}{120} = \frac{37}{120}$ work per hour.

Next, we calculate the total work done in these 2 hours:

Work Done (9 A.M. to 11 A.M.) = Combined Rate $\times$ Time

Work Done = $\frac{37}{120} \times 2 = \frac{37}{60}$ of the total work.

3. Calculating the Remaining Work

After 11 A.M., machine P is closed. The work remaining is calculated as:

Remaining Work = Total Work - Work Done

Remaining Work = $1 - \frac{37}{60} = \frac{60-37}{60} = \frac{23}{60}$ of the total work.

4. Calculating the Combined Rate of Machines Q and R

Machines Q and R continue the work. Their combined work rate is:

Combined Rate (R_{QR}) = $R_Q + R_R$

$R_{QR} = \frac{1}{10} + \frac{1}{12}$

The LCM of 10 and 12 is 60.

$R_{QR} = \frac{6}{60} + \frac{5}{60} = \frac{6+5}{60} = \frac{11}{60}$ work per hour.

5. Calculating the Time to Complete the Remaining Work

We find the time needed for machines Q and R to finish the remaining $\frac{23}{60}$ of the work:

Time = $\frac{\text{Remaining Work}}{\text{Combined Rate of Q and R}}$

Time = $\frac{23/60}{11/60}$ hours

Time = $\frac{23}{11}$ hours

Converting this into hours and minutes:

Time = $2\frac{1}{11}$ hours

To convert $\frac{1}{11}$ hours to minutes:

Minutes = $\frac{1}{11} \times 60 = \frac{60}{11} \approx 5.45$ minutes.

So, machines Q and R take approximately 2 hours and 5.45 minutes to finish the remaining work.

6. Determining the Approximate Finishing Time

The remaining work began at 11 A.M. It took approximately 2 hours and 5.45 minutes to complete.

Approximate Finishing Time = 11 A.M. + 2 hours + 5.45 minutes

Approximate Finishing Time $\approx$ 1:05:27 P.M.

Looking at the options, 1:00 P.M. is the closest approximation to 1:05:27 P.M.

---

40. **Answer: b**

Explanation:

Calculating the Required Rate of Interest for Simple Interest

This solution explains how to determine the new rate of interest needed to achieve the same simple interest amount over a different time period, given an initial scenario.

Understanding Simple Interest Fundamentals

The core concept here is **simple interest**, calculated using the formula:

$$SI = \frac{P \times R \times T}{100}$$

Where:

- `SI` is the Simple Interest earned.

- `P` is the Principal amount (the initial sum of money).
- `R` is the Rate of interest per annum (in %).
- `T` is the Time period (in years).

We are given the initial **simple interest** (Rs. 840), the initial rate (5% p.a.), and the initial time period (8 years). We need to find a new rate (R) for the **same sum** (P) and the **same amount** of interest (Rs. 840), but over a new time period (5 years).

Step 1: Determining the Principal Sum

First, let's find the principal amount (`P`) using the information from the initial scenario. We know:

- `SI` = Rs. 840
- `R` = 5% p.a.
- `T` = 8 years

We rearrange the simple interest formula to solve for `P`:

$$P = \frac{SI \times 100}{R \times T}$$

Plugging in the values:

$$P = \frac{840 \times 100}{5 \times 8}$$

$$P = \frac{84000}{40}$$

$$P = 2100$$

Therefore, the **certain sum of money**, which is the principal, is Rs. 2100.

Step 2: Calculating the New Rate of Interest

Now, we need to find the new rate of interest (let's call it `R_new`) that will yield the **same amount** of interest (Rs. 840) on the **same sum** (Rs. 2100) but in a different time period (5 years).

We have:

- `SI` = Rs. 840
- `P` = Rs. 2100
- `T_new` = 5 years

Using the simple interest formula again and solving for `R_new`:

$$R_{new} = \frac{SI \times 100}{P \times T_{new}}$$

Substituting the values:

$$R_{new} = \frac{840 \times 100}{2100 \times 5}$$

$$R_{new} = \frac{84000}{10500}$$

$$R_{new} = 8$$

So, the new rate of interest required is 8% per annum.

Conclusion Summary

By first calculating the principal amount using the initial simple interest conditions and then using that principal with the target interest amount and the new time period, we found the necessary rate of interest.

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41. Answer: d

Explanation:

Calculating the Train Crossing Time

This solution explains how to determine the exact time when two trains, starting from different locations and at different times, will cross each other. We will analyze the speeds and travel times of the trains to find the meeting point.

Information Provided

- **Train 1:** Leaves Meerut at 5:00 a.m. and arrives in Delhi at 9:00 a.m.
- **Train 2:** Leaves Delhi at 7:00 a.m. and arrives in Meerut at 10:30 a.m.

Step 1: Calculate Travel Durations

- **Train 1 Duration:** From 5:00 a.m. to 9:00 a.m. is 4 hours.
- **Train 2 Duration:** From 7:00 a.m. to 10:30 a.m. is 3 hours and 30 minutes, which is equal to 3.5 hours or $\frac{7}{2}$ hours.

Step 2: Define Speeds Relative to Distance

Let the distance between Meerut and Delhi be denoted by D. We can express the speed of each train using this distance and their respective travel times.

- **Speed of Train 1 (S_1):**

$$S_1 = \frac{\text{Distance}}{\text{Time}} = \frac{D}{4} \text{ km/hr}$$

- **Speed of Train 2 (S_2):**

$$S_2 = \frac{\text{Distance}}{\text{Time}} = \frac{D}{3.5} = \frac{D}{7/2} = \frac{2D}{7} \text{ km/hr}$$

Step 3: Analyze the Situation at 7:00 a.m.

Train 2 starts its journey at 7:00 a.m. We need to determine the position of Train 1 at this exact moment.

- Train 1 starts at 5:00 a.m. By 7:00 a.m., it has been traveling for 2 hours (7:00 a.m. - 5:00 a.m.).
- **Distance covered by Train 1 by 7:00 a.m.:**

$$\text{Distance} = S_1 \times \text{Time} = \left(\frac{D}{4}\right) \times 2 = \frac{2D}{4} = \frac{D}{2}$$

- At 7:00 a.m., Train 1 is $\frac{D}{2}$ distance away from Meerut, heading towards Delhi.
- At 7:00 a.m., Train 2 is at Delhi, just starting its journey towards Meerut.
- Therefore, the distance remaining between the two trains at 7:00 a.m. is the distance Train 1 still needs to cover, which is $D - \frac{D}{2} = \frac{D}{2}$.

Step 4: Calculate the Relative Speed

Since the trains are moving towards each other from 7:00 a.m. onwards, their speeds add up. This is their relative speed.

- **Relative Speed (S_{rel}):**

$$S_{rel} = S_1 + S_2 = \frac{D}{4} + \frac{2D}{7}$$

- To add these fractions, we find a common denominator, which is 28:

$$S_{rel} = \frac{7D}{28} + \frac{8D}{28} = \frac{7D + 8D}{28} = \frac{15D}{28} \text{ km/hr}$$

Step 5: Calculate the Time to Meet After 7:00 a.m.

The time it takes for the trains to meet can be calculated using the distance between them at 7:00 a.m. and their relative speed.

- **Time to meet = Distance between trains / Relative Speed**

$$\text{Time} = \frac{D/2}{15D/28}$$

- Simplifying the expression:

$$\text{Time} = \frac{D}{2} \times \frac{28}{15D} = \frac{28}{2 \times 15} = \frac{28}{30} = \frac{14}{15} \text{ hours}$$

Step 6: Convert Time to Minutes and Find the Crossing Time

We need to convert the calculated time from hours to minutes.

- **Time in minutes:**

$$\text{Time} = \frac{14}{15} \times 60 \text{ minutes} = 14 \times 4 \text{ minutes} = 56 \text{ minutes}$$

- This means the trains will meet 56 minutes after 7:00 a.m.

- Actual Crossing Time:

$$7:00 \text{ a.m.} + 56 \text{ minutes} = 7:56 \text{ a.m.}$$

Conclusion

Based on the calculations, the two trains will cross each other at **7:56 a.m.**

---

42. **Answer: b**

Explanation:

Calculating the Speed of the Second Train

This problem involves calculating the speed of one train when it crosses another train moving in the opposite direction. We need to understand the concepts of relative speed and the total distance covered during the crossing.

Key Information Provided

- Length of the first train (L_1): 100 metres
- Speed of the first train (S_1): 50 km/h
- Length of the second train (L_2): 120 metres
- Time taken for the trains to cross each other (T): 6 seconds
- Direction of travel: Opposite

Understanding Train Crossing Concepts

When two trains travel in **opposite directions**, their speeds add up to determine how quickly they pass each other. This is known as their **relative speed**.

- Relative Speed (S_{rel}) = Speed of first train (S_1) + Speed of second train (S_2)

The **total distance** the trains cover relative to each other while crossing is the sum of their individual lengths.

- Total Distance (D) = Length of first train (L_1) + Length of second train (L_2)

The fundamental relationship between distance, speed, and time is:

- Distance = Speed $\times$ Time

Step-by-Step Calculation

To solve this problem, we need to ensure all units are consistent. We'll convert the speed from km/h to m/s, as the lengths are in metres and the time is in seconds.

Step 1: Convert Speed Units

The speed of the first train (S_1) is given as 50 km/h. To convert km/h to m/s, we multiply by $\frac{5}{18}$.

$$S_1 = 50\,\text{km/h} = 50 \times \frac{5}{18}\,\text{m/s} = \frac{250}{18}\,\text{m/s}$$

Step 2: Calculate Total Distance

The total distance (D) is the sum of the lengths of the two trains:

$$D = L_1 + L_2 = 100\,\text{m} + 120\,\text{m} = 220\,\text{m}$$

Step 3: Calculate Relative Speed

We know that Distance = Relative Speed $\times$ Time. We can use the total distance and the time taken to find the relative speed ($S_{rel} = S_1 + S_2$).

$$D = (S_1 + S_2) \times T$$

Plugging in the values:

$$220\,\text{m} = (S_1 + S_2) \times 6\,\text{s}$$

Now, solve for the combined speed ($S_1 + S_2$):

$$S_1 + S_2 = \frac{220}{6}\,\text{m/s} = \frac{110}{3}\,\text{m/s}$$

Step 4: Calculate the Speed of the Second Train (S_2) in m/s

We know $S_1 + S_2 = \frac{110}{3}\,\text{m/s}$ and $S_1 = \frac{250}{18}\,\text{m/s}$. We can find S_2 by subtraction:

$$S_2 = (\frac{110}{3}\,\text{m/s}) - S_1$$

$$S_2 = \frac{110}{3} - \frac{250}{18}$$

To subtract, find a common denominator, which is 18:

$$S_2 = \frac{110 \times 6}{3 \times 6} - \frac{250}{18} = \frac{660}{18} - \frac{250}{18}$$

$$S_2 = \frac{660 - 250}{18}\,\text{m/s} = \frac{410}{18}\,\text{m/s}$$

Step 5: Convert the Speed of the Second Train (S_2) back to km/h

To get the speed in km/h, we convert S_2 from m/s back using the factor $\frac{18}{5}$.

$$S_2 = \frac{410}{18} \times \frac{18}{5}\,\text{km/h}$$

$$S_2 = \frac{410}{5}\,\text{km/h}$$

$$S_2 = 82\,\text{km/h}$$

Conclusion

Therefore, the speed of the second train is 82 km/h.

---

43. Answer: c

Explanation:

This solution explains how to find the value of the given mathematical expression using fundamental algebraic principles. We need to evaluate the expression:

$$\frac{2.25^2 - 1.25^2}{2.25 - 1.25}$$

The problem involves calculating the value of a specific numerical expression. To solve this efficiently, we can utilize a well-known algebraic identity.

Understanding the Difference of Squares Identity

The expression's numerator, $2.25^2 - 1.25^2$, is in the form of $a^2 - b^2$. This is known as the difference of squares. The algebraic identity for the difference of squares is:

$$a^2 - b^2 = (a - b)(a + b)$$

This identity allows us to factor the difference of two squared terms into the product of their sum and difference.

Applying the Identity to the Expression

In our expression, we can identify $a = 2.25$ and $b = 1.25$. Applying the difference of squares identity to the numerator, we get:

$$2.25^2 - 1.25^2 = (2.25 - 1.25)(2.25 + 1.25)$$

Now, substitute this back into the original expression:

$$\frac{(2.25 - 1.25)(2.25 + 1.25)}{2.25 - 1.25}$$

Simplifying the Expression

We can observe that the term $(2.25 - 1.25)$ appears in both the numerator and the denominator. Since $2.25 - 1.25 = 1.00$, which is not zero, we can safely cancel this term out:

$$\frac{\cancel{(2.25 - 1.25)}(2.25 + 1.25)}{\cancel{2.25 - 1.25}}$$

After cancellation, the expression simplifies to:

$$2.25 + 1.25$$

Calculating the Final Value

Finally, we perform the addition:

$$2.25 + 1.25 = 3.50$$

Therefore, the value of the given expression is 3.5.

Evaluating the Options

Let's compare our result with the given options:

- Option 1: 1
- Option 2: 2.5
- Option 3: 3.5
- Option 4: 3

Our calculated value, 3.5, matches Option 3.

---

44. **Answer: b**

Explanation:

The problem requires simplifying a series of percentage calculations involving mixed fractions. We need to find the value of:

$$11\frac{1}{9}\% \text{ of } 9\frac{1}{11}\% \text{ of } 7\frac{1}{7}\% \text{ of } 6\frac{1}{4}\% \text{ of } 11088$$

Simplifying Percentage Calculations

To simplify this, we first convert each mixed fraction percentage into its equivalent simple fraction. A percentage means 'per hundred', so we divide the number by 100.

Converting Mixed Fraction Percentages

- **Convert $11\frac{1}{9}\%$:** First, change the mixed number $11\frac{1}{9}$ to an improper fraction: $11\frac{1}{9} = \frac{(11\times9)+1}{9} = \frac{100}{9}$. Now, convert this percentage to a fraction: $\frac{100}{9}\% = \frac{\frac{100}{9}}{100} = \frac{100}{9\times100} = \frac{1}{9}$.
- **Convert $9\frac{1}{11}\%$:** Change the mixed number $9\frac{1}{11}$ to an improper fraction: $9\frac{1}{11} = \frac{(9\times11)+1}{11} = \frac{100}{11}$. Convert this percentage to a fraction: $\frac{100}{11}\% = \frac{\frac{100}{11}}{100} = \frac{100}{11\times100} = \frac{1}{11}$.
- **Convert $7\frac{1}{7}\%$:** Change the mixed number $7\frac{1}{7}$ to an improper fraction: $7\frac{1}{7} = \frac{(7\times7)+1}{7} = \frac{50}{7}$. Convert this percentage to a fraction: $\frac{50}{7}\% = \frac{\frac{50}{7}}{100} = \frac{50}{7\times100} = \frac{50}{700} = \frac{1}{14}$.
- **Convert $6\frac{1}{4}\%$:** Change the mixed number $6\frac{1}{4}$ to an improper fraction: $6\frac{1}{4} = \frac{(6\times4)+1}{4} = \frac{25}{4}$. Convert this percentage to a fraction: $\frac{25}{4}\% = \frac{\frac{25}{4}}{100} = \frac{25}{4\times100} = \frac{25}{400} = \frac{1}{16}$.

Performing the Calculation

Now, we substitute these simplified fractions back into the original expression. The word 'of' in mathematics typically implies multiplication.

$$\text{Expression} = \frac{1}{9} \times \frac{1}{11} \times \frac{1}{14} \times \frac{1}{16} \times 11088$$

Step-by-Step Simplification

To find the final value, we multiply the fractions and the number 11088. We can perform the division step by step to make it easier:

1. Start with 11088 and divide by the first denominator, 9:

$$\frac{11088}{9} = 1232$$

2. Take the result (1232) and divide by the next denominator, 11:

$$\frac{1232}{11} = 112$$

3. Take the result (112) and divide by the next denominator, 14:

$$\frac{112}{14} = 8$$

4. Finally, take the result (8) and divide by the last denominator, 16:

$$\frac{8}{16} = \frac{1}{2}$$

Final Result and Option Selection

The simplified value is the fraction $\frac{1}{2}$. Converting this fraction to a decimal gives:

$$\frac{1}{2} = 0.5$$

Comparing this result to the given options, we see that 0.500 matches the value calculated. This corresponds to option 2.

---

45. **Answer: c**

Explanation:

Calculating Compound Interest on an Investment

This solution explains how to calculate the compound interest for a given principal amount, investment period, and annual interest rate when the interest is compounded annually. We will break down the calculation step-by-step.

Key Variables for Compound Interest Calculation

- **Principal (P):** The initial amount invested, which is ₹19,500.
- **Time (T):** The duration of the investment, which is $1\frac{2}{5}$ years.
- **Rate (R):** The annual interest rate, which is 10% per annum.
- **Compounding Frequency:** Interest is compounded annually.

Understanding Compound Interest with Fractional Time Periods

When the investment period is not a whole number of years, and interest is compounded annually, we first calculate the interest for the full years and the amount accrued. Then, we calculate the simple interest on this accumulated amount for the remaining fractional part of the year.

Step-by-Step Calculation of Compound Interest

Step 1: Calculate Interest for the First Full Year

The interest for the first year is calculated using the simple interest formula, as it's the first year of compounding.

Interest for 1st Year = Principal $\times$ Rate $\times$ Time

Interest = $19500 \times \frac{10}{100} \times 1$

Interest = $19500 \times 0.10 \times 1$

Interest = ₹1,950

Step 2: Determine the Amount After the First Full Year

The total amount after the first year is the sum of the principal and the interest earned during that year.

Amount after 1 Year = Principal + Interest for 1st Year

Amount = $19500 + 1950$

Amount = ₹21,450

Step 3: Calculate Simple Interest for the Fractional Time Period

The remaining time is $1\frac{2}{5} - 1 = \frac{2}{5}$ years. We calculate the simple interest on the amount accrued after the first year (₹21,450) for this fractional period.

Fractional Time = $\frac{2}{5}$ years

Simple Interest for Fractional Period = Amount after 1 Year $\times$ Rate $\times$ Fractional Time

SI = $21450 \times \frac{10}{100} \times \frac{2}{5}$

SI = $21450 \times 0.10 \times \frac{2}{5}$

SI = $2145 \times \frac{2}{5}$

SI = $\frac{4290}{5}$

SI = ₹858

Step 4: Calculate the Total Amount After $1\frac{2}{5}$ Years

The total amount at the end of the investment period is the amount after the first year plus the simple interest calculated for the fractional period.

Total Amount (A) = Amount after 1 Year + Simple Interest for Fractional Period

A = $21450 + 858$

A = ₹22,308

Step 5: Calculate the Final Compound Interest

The total compound interest earned is the difference between the final total amount and the initial principal amount.

Compound Interest (CI) = Total Amount (A) - Principal (P)

CI = $22308 - 19500$

CI = ₹2,808

Conclusion

Therefore, the compound interest on an investment of ₹19,500 for $1\frac{2}{5}$ years at a rate of 10% per annum, compounded annually, is ₹2,808.

---

46. Answer: a

Explanation:

Understanding Non-Terminating Decimals in Fractions

The question asks us to identify which of the given fractions results in a non-terminating decimal representation. A key concept in understanding decimal representations of fractions is to look at the prime factors of the denominator of the fraction when it is in its simplest form.

A fraction $\frac{p}{q}$, where p and q are integers with no common factors other than 1 (i.e., the fraction is in its simplest form), will have a terminating decimal representation if the prime factorization of the denominator q consists only of powers of 2 and 5 (i.e., $q = 2^m \times 5^n$ for non-negative integers m and n). If the denominator q has any prime factor other than 2 or 5, the decimal representation will be non-terminating (and repeating).

Analyzing Fraction Options for Non-Terminating Decimals

Option 1: Fraction $\frac{7}{18}$

- First, we check if the fraction $\frac{7}{18}$ is in its simplest form. The factors of 7 are 1 and 7. The factors of 18 are 1, 2, 3, 6, 9, and 18. Since the only common factor is 1, the fraction is already simplified.
- Next, we examine the denominator, which is 18.
- We find the prime factorization of the denominator: $18 = 2 \times 9 = 2 \times 3^2$.
- The prime factorization of 18 includes the prime factor 3.
- Because the denominator contains a prime factor (3) other than 2 or 5, the decimal representation of $\frac{7}{18}$ will be **non-terminating**.

Option 2: Fraction $\frac{11}{250}$

- We check if the fraction $\frac{11}{250}$ is in its simplest form. 11 is a prime number. The factors of 250 do not include 11. Thus, the fraction is simplified.
- The denominator is 250.

- We find the prime factorization of the denominator: $250 = 25 \times 10 = (5 \times 5) \times (2 \times 5) = 2 \times 5^3$.
- The prime factors of the denominator are only 2 and 5.
- Therefore, the decimal representation of $\frac{11}{250}$ will be **terminating**.

Option 3: Fraction $\frac{21}{28}$

- We first simplify the fraction $\frac{21}{28}$. Both the numerator (21) and the denominator (28) are divisible by 7.
- Dividing both by 7, we get: $\frac{21 \div 7}{28 \div 7} = \frac{3}{4}$.
- The simplified fraction is $\frac{3}{4}$. The denominator is 4.
- We find the prime factorization of the denominator: $4 = 2^2$.
- The prime factor of the denominator is only 2.
- Therefore, the decimal representation of $\frac{21}{28}$ (or $\frac{3}{4}$) will be **terminating**.

Option 4: None of the above

Since Option 1 resulted in a non-terminating decimal, this option is not the correct answer.

Conclusion

Based on the analysis of the prime factors of the denominators of the simplified fractions:

- $\frac{7}{18}$ has a denominator with prime factors 2 and 3, resulting in a **non-terminating** decimal.
- $\frac{11}{250}$ has a denominator with prime factors 2 and 5, resulting in a **terminating** decimal.
- $\frac{21}{28}$ simplifies to $\frac{3}{4}$, which has a denominator with only prime factor 2, resulting in a **terminating** decimal.

Thus, the fraction that can be written as a non-terminating decimal is $\frac{7}{18}$.

---

47. Answer: a

Explanation:

Understanding the Work and Efficiency Ratio

This problem involves calculating the time taken by individual workers based on their efficiency ratio and combined working time. We need to determine how long it takes for worker X to complete a specific fraction of a job.

Step 1: Defining Efficiencies based on the Ratio

The question states that the ratio of the efficiencies of X and Y is 5:9. Efficiency represents the amount of work done per day.

Let the efficiency of X be E_X and the efficiency of Y be E_Y.

According to the given ratio:

$$\frac{E_X}{E_Y} = \frac{5}{9}$$

We can represent their efficiencies using a common factor, say k:

Efficiency of X, $E_X = 5k$ units per day.

Efficiency of Y, $E_Y = 9k$ units per day.

Step 2: Calculating the Combined Efficiency

When X and Y work together, their efficiencies add up.

Combined Efficiency, $E_{X+Y} = E_X + E_Y = 5k + 9k = 14k$ units per day.

Step 3: Determining the Total Amount of Work

The problem states that working together, X and Y can complete the entire work in 15 days.

The total work (W) can be calculated as:

$$W = \text{Combined Efficiency} \times \text{Time Taken Together}$$

$$W = (14k) \times 15$$

$$W = 210k \text{ units of work}$$

Step 4: Calculating the Specific Portion of Work for X

X needs to complete $66\frac{2}{3}\%$ of the total work.

First, let's convert the percentage to a fraction:

$$66\frac{2}{3}\% = \frac{66 \times 3 + 2}{3}\% = \frac{200}{3}\%$$

$$\frac{200}{3}\% = \frac{200}{3 \times 100} = \frac{2}{3}$$

Now, calculate the amount of work X needs to complete:

$$\text{Work for X} = \frac{2}{3} \times W$$

$$\text{Work for X} = \frac{2}{3} \times (210k)$$

$$\text{Work for X} = 2 \times 70k = 140k \text{ units of work}$$

Step 5: Calculating the Time Taken by X Alone

The time taken by a worker is calculated by dividing the work to be done by their efficiency.

$$\text{Time taken by X} = \frac{\text{Work for X}}{\text{Efficiency of X}}$$

$$\text{Time taken by X} = \frac{140k}{5k}$$

$$\text{Time taken by X} = 28 \text{ days}$$

Conclusion

Based on the calculations, X alone will complete $66\frac{2}{3}\%$ of the same work in 28 days.

Therefore, the correct option is 28 days.

---

48. **Answer: a**

Explanation:

Given:

The cost price of pure milk = Rs.10/litre

The selling price of the mixture = Rs.8/litre

Profit = 20%

The cost price of pure milk is Rs. 10 per litre.

Formula Used:

Profit% = Profit/CP × 100

Loss% = Loss/CP × 100

Calculation:

Since, 8 × 100/120 = Rs.20/3

∴ The ratio of milk and water is 2 : 1.

⭐ Alternate Method

Cost price of 1 litre mixture = 8 × 100/120 = Rs.20/3

Cost of water = Rs. 0

It means in the mixture there is only milk's cost which is Rs.20/3.

Remaining cost = Rs. (10 – 20/3) = Rs. 10/3

Water/milk = cost of water which is mixed in place of milk/cost of milk which is mixed

Water/milk = (10/3)/(20/3) = 1/2

Milk : water = 2 : 1

∴ The ratio of milk and water is 2 : 1.

---

49. Answer: b

Explanation:

Finding the Coincidence Time for Clock Hands Between 3 and 4 O'Clock

This problem involves determining the specific time between 3 o'clock and 4 o'clock when the hour hand and the minute hand of a standard analog clock are exactly at the same position (coincide).

Understanding Clock Hand Movements

To solve this, we need to consider the speeds at which the hour and minute hands move:

- The minute hand completes a full circle (360°) in 60 minutes. Its speed is $\frac{360^\circ}{60 \text{ min}} = 6^\circ$ per minute.

- The hour hand completes a full circle (360°) in 12 hours (720 minutes). Its speed is $\frac{360^\circ}{720\ \text{min}} = 0.5^\circ$ per minute.

When the hands coincide, they are at the same angular position.

Calculating the Initial Angle at 3 O'Clock

At 3 o'clock exactly:

- The minute hand is pointing at the 12. Its position is considered 0°.
- The hour hand is pointing at the 3. Since each hour mark represents 30° ($\frac{360^\circ}{12}$), the hour hand is at $3 \times 30^\circ = 90^\circ$ from the 12 o'clock position.

Therefore, at 3:00, the minute hand is 90° behind the hour hand.

Determining the Relative Speed

The minute hand moves faster than the hour hand. The rate at which the minute hand gains on the hour hand is their relative speed:

Relative Speed = Speed of Minute Hand - Speed of Hour Hand

Relative Speed = $6^\circ/\text{min} - 0.5^\circ/\text{min} = 5.5^\circ/\text{min}$

This means the minute hand closes the gap between them by 5.5° every minute.

Calculating the Time to Coincide

For the hands to coincide, the minute hand must cover the initial 90° gap between them.

Time = $\frac{\text{Angle to Cover}}{\text{Relative Speed}}$

Time = $\frac{90^\circ}{5.5^\circ/\text{min}}$

Time = $\frac{90}{5.5}$ minutes

To simplify this, we can write 5.5 as $\frac{11}{2}$:

Time = $\frac{90}{\frac{11}{2}} = 90 \times \frac{2}{11} = \frac{180}{11}$ minutes

Converting to Mixed Fraction Format

Now, we convert the improper fraction $\frac{180}{11}$ into a mixed fraction:

Divide 180 by 11:

$180 \div 11 = 16$ with a remainder of 4.

So, $\frac{180}{11}$ minutes is equal to $16\frac{4}{11}$ minutes.

Final Answer Formulation

The hands will coincide $16\frac{4}{11}$ minutes after 3 o'clock.

This corresponds to the time $3{:}16\frac{4}{11}$.

---

50. **Answer: c**

Explanation:

Shanti Swaroop Bhatnagar Award: Recognizing Contributions in India

The question asks about the specific field in which the prestigious **Shanti Swaroop Bhatnagar Award** is presented in **India**. This award is one of the highest scientific awards in India, celebrating significant contributions to various domains.

Understanding the Shanti Swaroop Bhatnagar Award

The **Shanti Swaroop Bhatnagar (SSB) Award** is presented annually by the Council of Scientific and Industrial Research (CSIR), India. It is named after Dr. Shanti Swaroop Bhatnagar, a renowned Indian scientist and the founder director of CSIR, who played a pivotal role in establishing scientific institutions in post-independence India.

The primary objective of this award is to honor scientists and technologists for their outstanding contributions and achievements in specific scientific disciplines. It aims to encourage young Indian scientists and researchers to pursue excellence in their respective fields.

Analysis of Contribution Fields

Let's examine the fields mentioned in the options to determine where the **Shanti Swaroop Bhatnagar Award** focuses its recognition:

- **Sports:** While India has numerous awards to recognize excellence in sports, such as the Arjuna Award and the Major Dhyan Chand Khel Ratna Award, the *Shanti Swaroop Bhatnagar Award* is not associated with this field.
- **Social Work:** Contributions to social work are often recognized through different honors, including categories within the Padma Awards or specific awards dedicated to social service. The *Shanti Swaroop Bhatnagar Award* does not cover social work.
- **Science and Technology:** This is the core domain for the *Shanti Swaroop Bhatnagar Award*. The award specifically recognizes significant work done by Indian scientists and engineers in the following disciplines:
    - Physical Sciences
    - Chemical Sciences
    - Biological Sciences
    - Engineering Sciences
    - Medical Sciences
    - Earth, Atmosphere, Ocean, and Planetary Sciences
    - Mathematical Sciences
    - Agricultural Sciences
    - Environmental Sciences

  The award celebrates breakthroughs, innovation, and impactful research within these scientific and technological areas.
- **Literature:** Excellence in literature in India is typically honored by awards like the Sahitya Akademi Award or the Jnanpith Award. The *Shanti Swaroop Bhatnagar Award* is distinct from awards for literary achievements.

Conclusion on Award Field

Based on the established mandate and history of the award, the **Shanti Swaroop Bhatnagar Award** is exclusively given for outstanding contributions made in the field of **science and technology**.

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51. **Answer: c**

Explanation:

Indian Navy Nuclear Submarine Identification

The question asks to identify the nuclear-powered submarine among the given options belonging to the Indian Navy. Nuclear-powered submarines use a nuclear reactor to generate electricity, allowing them to stay submerged for very long periods and travel faster compared to conventionally powered submarines, which rely on diesel engines and batteries.

Analyzing Submarine Options

Let's examine each option to determine its power source:

- **INS Shishumar:** This submarine belongs to the Shishumar class (Type 1500) and is a conventionally powered diesel-electric submarine. It was acquired from Germany.
- **INS Shalki:** INS Shalki is the lead submarine of the Shishumar class (Type 209/1500) in the Indian Navy. It is also conventionally powered.
- **INS Chakra:** INS Chakra is a nuclear-powered attack submarine (SSN) operated by the Indian Navy. It is an Akula-class submarine leased from Russia. This submarine is capable of carrying nuclear weapons.
- **INS Sindhuvir:** INS Sindhuvir is a Sindhughosh-class (Kilo-class) submarine. These are diesel-electric, conventionally powered submarines acquired from Russia.

Submarine Power Source Comparison

The following table summarizes the power source for each submarine mentioned:

Submarine Name	Power Source	Class/Origin
INS Shishumar	Conventional (Diesel-Electric)	Shishumar Class (HDW Type 1500) / Germany
INS Shalki	Conventional (Diesel-Electric)	Shishumar Class (HDW Type 209) / Germany
INS Chakra	Nuclear (SSN)	Akula Class / Russia (Leased)
INS Sindhuvir	Conventional (Diesel-Electric)	Sindhughosh Class (Kilo Class) / Russia

Conclusion on Nuclear Power

Based on the analysis, INS Chakra is the only nuclear-powered submarine among the options provided. It represents a significant asset in the Indian Navy's strategic capabilities due to its nuclear propulsion.

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52. **Answer: a**

Explanation:

DRDO Anti-Tank Missile Capability

The Defence Research and Development Organisation (DRDO) plays a crucial role in developing advanced defence technologies for India. Anti-tank missiles are vital weapons designed to destroy enemy tanks and armoured vehicles. A key advancement in this field is the development of missiles that can be effectively

deployed from aerial platforms, such as helicopters, providing significant tactical advantages.

This question specifically asks to identify which DRDO-developed anti-tank missile is designed or capable of being launched from a helicopter.

Analyzing Missile Options for Helicopter Launch

Let's examine the anti-tank missiles listed in the options:

Helina: The Helicopter-Specific Missile

- **Helina** stands for 'Helicopter Nag'. It is a third-generation, fire-and-forget, anti-tank guided missile system developed by DRDO.
- It is the helicopter-borne version of the Nag missile system.
- Helina is specifically designed and integrated onto Advanced Light Helicopter (ALH) Dhruv platforms, enabling helicopters to engage heavily fortified enemy ground targets, including tanks, from a safe stand-off distance.
- Its guidance system ensures high accuracy, making it a potent weapon for anti-armour operations from the air.

Nag Missile: Ground-Based Powerhouse

- The **Nag missile** is DRDO's third-generation anti-tank missile, primarily designed as a 'fire-and-forget' weapon.
- Its main launch platform is the Nag Missile Carrier (NAMICA), an all-terrain vehicle.
- While the Nag missile technology can be adapted for helicopter integration (leading to Helina), the standard Nag system itself is primarily ground-launched.

SANT Missile: Stand-off Capability

- **SANT** stands for Stand-off Anti-Tank Missile. It is another DRDO development aimed at providing standoff engagement capabilities.
- Developed for the Indian Air Force and Army, it is designed to be launched from various platforms, potentially including helicopters, at longer ranges compared

to earlier systems.
- However, Helina is the variant most explicitly associated and integrated for helicopter-based anti-tank warfare.

Amogha Missile: Infantry Focus

- **Amogha** is a third-generation anti-tank missile developed by Bharat Dynamics Limited (BDL), leveraging DRDO technologies.
- It is primarily designed for infantry use and can be launched from ground-based platforms, including tripod launchers and potentially light vehicles.
- While effective, its design focus is not specifically on helicopter launch capabilities like Helina.

Comparative Analysis of Anti-Tank Missiles

Here's a comparison highlighting the primary launch platforms:

Missile	Developer	Type	Primary Launch Platform	Helicopter Launch Capability
Helina	DRDO	Fire-and-Forget ATGM	Helicopters (e.g., ALH Dhruv)	**Yes (Designed for)**
Nag	DRDO	Fire-and-Forget ATGM	Ground Vehicle (NAMICA)	No (Standard system); Yes (Via Helina variant)
SANT	DRDO	Fire-and-Forget ATGM	Various platforms (incl. potential helicopter use)	Possible/Intended
Amogha	BDL (DRDO tech)	Fire-and-Forget ATGM	Ground (Infantry/Vehicle)	No (Primary focus)

Conclusion on Helicopter Launch Capability

Based on the analysis, the **Helina** missile system is specifically developed and integrated for launch from helicopter platforms. While other missiles like SANT might also be deployable from helicopters, Helina is the most direct and established answer to the question concerning a DRDO anti-tank missile primarily capable of being launched from a helicopter.

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53. **Answer: a**

Explanation:

Identifying the Indigenous COVID-19 Vaccine

The question asks to identify which COVID-19 vaccine was developed and launched from within India. The term "indigenously" refers to something that originated or was produced domestically within a country.

Origin Analysis of Listed COVID-19 Vaccines

To answer this, let's review the development origin of each vaccine option provided:

- **Covaxin:** This vaccine was developed in India by Bharat Biotech, in collaboration with the Indian Council of Medical Research (ICMR). Its entire development process, from research to production, was an indigenous effort.
- **Pfizer:** The Pfizer-BioNTech vaccine was developed by the American company Pfizer in partnership with the German company BioNTech. Its origin is international, not Indian.
- **Sputnik:** The Sputnik V vaccine was developed by Russia's Gamaleya National Research Institute of Epidemiology and Microbiology. It is a Russian vaccine.
- **AstraZeneca:** This vaccine, also known as Covishield in India, was developed by the University of Oxford in the UK and the pharmaceutical company AstraZeneca. Although manufactured in India by the Serum Institute of India, its fundamental research and development were not indigenous to India.

Conclusion on Indigenous Vaccine Development

Comparing the origins, Covaxin stands out as the vaccine that was indigenously developed and launched in India. The other options represent vaccines developed in the USA/Germany, Russia, and the UK/Sweden, respectively.

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54. Answer: a

Explanation:

Asad Ali Khan's Prominence with the Rudra Veena

This question requires identifying the specific musical instrument that the renowned Indian classical musician, **Asad Ali Khan**, was known for playing. Understanding the instruments associated with famous artists helps in appreciating the diversity of Indian classical music.

About Asad Ali Khan

Asad Ali Khan (1937–2011) was a distinguished maestro of Hindustani classical music. He hailed from a respected musical lineage and dedicated his career to mastering and performing on a particular string instrument.

The Rudra Veena Association

Asad Ali Khan is famously associated with the **Rudra veena**. He was considered one of the most accomplished players of this ancient instrument in the modern era.

- **Instrument Details:** The **Rudra veena** is a plucked string instrument belonging to the lute family. It's one of the oldest instruments used in Indian classical music and is known for its deep, resonant sound.
- **Performance Style:** Playing the Rudra Veena requires immense technical skill and a deep understanding of musical nuances. **Asad Ali Khan** was celebrated for his masterful technique and soulful renditions on this instrument.
- **Legacy:** He played a crucial role in keeping the tradition of the Rudra Veena alive and introducing it to new generations of listeners.

Distinguishing Other Instruments

It's helpful to know the instruments mentioned in the other options:

- **Sitar:** A popular plucked string instrument, but different in structure and sound from the Rudra Veena. Famous sitar players include Ravi Shankar.
- **Tabla:** A pair of drums, fundamental to rhythm in Hindustani music. Artists like Zakir Hussain are renowned tabla players.
- **Shehnai:** A double-reed wind instrument, famously played by Ustad Bismillah Khan.

While **Asad Ali Khan** was a master musician, his specific contribution and recognition within the classical music fraternity are strongly tied to his exceptional command over the **Rudra Veena**.

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55. **Answer: a**

Explanation:

India's Air-Launched UAV Project Agreement Explained

India has recently advanced its defense technology capabilities by signing a significant Project Agreement (PA). This agreement focuses specifically on the development and potential deployment of an **Air-Launched Unmanned Aerial Vehicle (UAV)**.

Identifying India's Partner for UAV Development

The key aspect of this recent agreement is the international collaboration involved. After careful consideration and strategic alignment, India has chosen to partner with the **United States** for this critical project concerning the Air-Launched UAV.

Understanding the Air-Launched UAV Project Agreement

A Project Agreement (PA) is a formal document outlining the terms, scope, and responsibilities for a collaborative project between entities, in this case, nations. The specific focus on an **Air-Launched UAV** means a drone designed to be launched from a manned aircraft. This type of technology offers several strategic advantages:

- Enhanced reconnaissance and surveillance capabilities from higher altitudes.
- Potential for extending the operational range of drone missions.
- Improved flexibility in deployment scenarios.
- Leveraging advanced technology from international partners.

Significance of the India-United States Collaboration

This collaboration with the **United States** highlights the strengthening defense relationship between the two countries. It signifies a commitment to:

- Joint technological development in cutting-edge defense systems.
- Transfer of expertise and technology related to UAVs.
- Boosting India's indigenous defense manufacturing capabilities over time.
- Enhancing strategic cooperation and interoperability between Indian and US forces.

The agreement marks a step forward in equipping India's armed forces with advanced aerial platforms, bolstering national security and defense preparedness through strategic international partnership.

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56. **Answer: b**

Explanation:

Bahishkrit Bharat Newspaper Launch

The question asks to identify the founder of the newspaper named '**Bahishkrit Bharat**'. This publication was instrumental in highlighting the social and political issues faced by oppressed communities in India.

'**Bahishkrit Bharat**', which translates to 'Expelled India', served as a critical platform for social reform advocacy during the colonial era.

Role of Dr. B. R. Ambedkar

Dr. B. R. Ambedkar, a revered social reformer, jurist, and the primary architect of the Indian Constitution, established and edited the newspaper '**Bahishkrit Bharat**'.

He started this newspaper with specific objectives:

- To champion the cause of the Dalits (formerly known as 'untouchables') and fight against the injustices of the caste system.
- To raise awareness about the social discrimination and economic exploitation faced by marginalized groups.
- To provide a voice for those who were systematically excluded from mainstream society and political discourse.

Through '**Bahishkrit Bharat**', Dr. Ambedkar articulated his vision for social equality and justice, making it a significant part of his lifelong struggle against caste-based discrimination.

Context of Social Reform Journalism

The early 20th century saw many social reformers using the press as a vital tool to disseminate their ideas and mobilize support for their causes. '**Bahishkrit Bharat**' emerged in this context as a dedicated mouthpiece for Dalit rights.

Analysis of Other Figures

The other individuals mentioned were prominent figures in Indian social and political history, but they were not the founders of '**Bahishkrit Bharat**':

- **Jyotiba Phule**: A leading social reformer in Maharashtra, Jyotiba Phule was a strong advocate for the rights of the lower castes and women's education. He published newspapers like 'Deenbandhu' but lived before the era of 'Bahishkrit Bharat'.
- **M. K. Gandhi**: Mahatma Gandhi, the father of the nation, was deeply involved in the Indian independence movement and social reform. He published newspapers such as 'Harijan' and 'Young India' to promote his ideologies but did not start 'Bahishkrit Bharat'.
- **Maulana Abdul Kalam Azad**: A key leader of the Indian independence movement and the first Minister of Education in independent India, Maulana Azad was also a journalist, known for publications like 'Al-Hilal'. His focus was on national unity and political freedom.

In summary, the foundational work and editorship of the newspaper '**Bahishkrit Bharat**' belong to **Dr. B. R. Ambedkar**, reflecting his commitment to the emancipation of the oppressed.

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57. **Answer: a**

Explanation:

Raja Krishnadev Raya and the Golden Age of Telugu Literature

The question asks about the literary language that experienced its peak, often referred to as a "golden age," during the rule of Raja Krishnadev Raya. Understanding this historical period requires looking at the cultural and literary patronage provided by the Vijayanagara Empire, particularly under Krishnadev Raya's leadership.

Who was Raja Krishnadev Raya?

Raja Krishnadev Raya was one of the most famous emperors of the Vijayanagara Empire, ruling from 1509 to 1529. His reign is remembered for military successes, administrative efficiency, and immense patronage of the arts, culture, and literature. He was himself a renowned scholar and poet.

The Concept of a "Golden Age" in Literature

A "golden age" signifies a period when a particular art form, field of knowledge, or language reaches its highest point of development, creativity, and influence. For Raja Krishnadev Raya's reign, this label is strongly associated with literary achievements.

The Prominence of Telugu Literature

Raja Krishnadev Raya's era is widely celebrated as the zenith for **Telugu** literature. Several factors contributed to this:

- **Royal Patronage:** Krishnadev Raya was a multilingual scholar but wrote extensively in Telugu. His court actively supported poets and scholars.
- **The Ashtadiggajas:** The king famously hosted eight legendary poets, known as the "Ashtadiggajas," in his court. These poets significantly contributed to the richness and depth of Telugu literature. Notable among them was Allasani Peddana, often hailed as the "Andhra Kavi Alexander" (Alexander of poets in Andhra).
- **Literary Works:** Key literary works were composed during this period. Krishnadev Raya himself authored the epic poem *Amuktamalyada* in Telugu, which deals with the story of Vishnuchitta. Other significant works like *Sumanottaramu* and *Kalyanamagu Nrisimha Puranamu* also belong to this period.

Why Telugu?

While the Vijayanagara Empire encompassed diverse linguistic regions and cultural influences, the specific flourishing of courtly literature, epic poetry, and the development of Telugu prose and poetry reached unparalleled heights under Krishnadev Raya. His personal involvement and the patronage system created an environment where Telugu scholars and poets could produce masterpieces, cementing his reign as the golden age of Telugu literature. The other languages mentioned, Tamil, Hindi, and Malayalam, had their own rich literary traditions and periods of growth, but they did not experience this specific peak of royal patronage and literary output during the 16th century as prominently as Telugu did under Raja Krishnadev Raya.

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58. **Answer: c**

Explanation:

Explaining 'Why I am an Atheist' Author

The question asks to identify the author of the influential essay titled 'Why I am an Atheist'. This essay delves into philosophical and rationalist perspectives on religion and atheism.

Bhagat Singh's Atheist Essay Details

The essay 'Why I am an Atheist' was penned by the renowned revolutionary and socialist figure, **Bhagat Singh**. He was a central leader of the Hindustan Socialist Republican Association (HSRA).

- **Context:** Bhagat Singh wrote this essay while he was imprisoned in the Central Jail of Lahore. It is believed to be a response to his father, Kishan Singh, who had apparently tried to convince him to return to the fold of Sikhism and religion.
- **Content and Purpose:** In the essay, Bhagat Singh meticulously outlines his journey towards atheism. He explains his reasoning based on logic, reason, and scientific temper, challenging traditional religious beliefs and superstitions. He argues that belief in God is not necessary for revolutionary action or moral principles. The essay showcases his deep thinking on subjects beyond just political revolution, highlighting his intellectual depth.
- **Significance:** This work is considered a significant piece of literature reflecting rationalist thought in India during the pre-independence era. It offers insight into the philosophical underpinnings of the revolutionary movement Bhagat Singh was part of.

Reviewing Other Figures Associated with Independence Movement

Let's look at the other options provided:

- **Subhash Chandra Bose:** A prominent leader of the Indian independence movement, known for his military initiatives. While a prolific writer and thinker, he is not associated with the essay 'Why I am an Atheist'.
- **Khushwant Singh:** A celebrated historian, novelist, and journalist, famous for works like 'Train to Pakistan'. His writings covered various aspects of Indian life and history, but he did not author this specific essay.

- **Madan Lal Dhingra:** An Indian revolutionary who assassinated Sir William Hutt Curzon Wyllie. He was an activist, but historical records do not link him to the authorship of ''Why I am an Atheist''.

Therefore, based on historical records and literary attribution, **Bhagat Singh** is the author of the essay ''Why I am an Atheist''.

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59. **Answer: d**

Explanation:

Supernova Phenomenon Explained

A **supernova** refers to a powerful and luminous stellar explosion. This event occurs during the final evolutionary stages of certain types of stars. It's essentially the dramatic death throes of a star, marking the end of its life cycle in a spectacular burst of light and energy.

Understanding Supernovae: Key Characteristics

Supernovae are among the most energetic events in the universe. They happen in a couple of main ways:

- **Type II Supernova:** Occurs in massive stars (at least 8-10 times the mass of our Sun). When such a star exhausts the nuclear fuel in its core, the core can no longer support itself against gravity. It collapses catastrophically, then rebounds, creating a massive shockwave that blows the star apart.
- **Type Ia Supernova:** Occurs in a binary star system where one star is a white dwarf. The white dwarf pulls matter from its companion star. When its mass reaches a critical limit (the Chandrasekhar limit), it triggers runaway nuclear fusion, causing it to explode completely.

These explosions briefly outshine entire galaxies and are responsible for creating and dispersing heavy elements (like gold, silver, and uranium) into space, which are essential ingredients for forming new stars, planets, and even life.

Comparing Supernovae to Other Celestial Objects

Let's look at why the other options are not the correct definition of a supernova:

- **Asteroid:** An asteroid is a relatively small, rocky body that orbits the Sun, primarily found in the asteroid belt between Mars and Jupiter. It is not an explosion or a star.
- **Black Hole:** A black hole is an object with gravity so strong that nothing, not even light, can escape it. While the collapse of the core of a very massive star can lead to the formation of a black hole (often after a supernova explosion), a black hole itself is the resulting remnant, not the explosion event.
- **Comet:** A comet is a celestial body made mostly of ice, dust, and rock that orbits the Sun. As it approaches the Sun, it heats up and releases gases, forming a visible coma (atmosphere) and sometimes a tail. Comets are much smaller and less energetic than supernovae.

Conclusion: Supernova as Stellar Death

In summary, a **supernova** is the term used to describe the explosive death of certain stars. It represents a transient astronomical event of incredible brilliance and energy release, distinct from asteroids, comets, or the collapsed remnants like black holes.

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60. **Answer: c**

Explanation:

Attorney General of India: Key Roles and Privileges

This explanation clarifies the constitutional position and rights of the Attorney General (AG) of India, based on the provided statements.

Statement I: Highest Law Officer Status

The first statement asserts that the Attorney General is the **highest law officer** in the country. This is constitutionally accurate.

- The Attorney General of India is the primary legal advisor to the Government of India.
- Appointed by the President under Article 76 of the Constitution, the AG holds the senior-most position in the legal hierarchy of the country.
- This role makes the Attorney General the chief legal officer of the Union Government, hence referred to as the **highest law officer**.

Statement II: Right of Audience in Courts

The second statement concerns the Attorney General's **right of audience** in all courts throughout India.

- Article 76(3) of the Constitution explicitly grants the Attorney General the right to speak and to participate in the proceedings of the Supreme Court and all High Courts.
- This means the AG has the **right of audience**, allowing them to appear and represent the government in any judicial proceedings, irrespective of the court's location within the **territory of India**.
- This right is essential for the AG to perform their official duties effectively, which include advising the government and representing its legal interests.

Conclusion on Attorney General's Position

Both statements accurately reflect the constitutional provisions regarding the Attorney General of India:

- Statement I correctly identifies the AG as the **highest law officer**.
- Statement II correctly states that the AG possesses the **right of audience** in all courts across India for carrying out official duties.

Therefore, both statements are correct.

61. Answer: d

Explanation:

Sumit Antil Triumphs: Gold Medal in 2020 Paralympics Javelin Throw

This explanation details the winner of the Gold medal in the Javelin Throw event at the **2020 Paralympics**, clarifying the athlete's achievement.

Understanding the 2020 Paralympics Javelin Throw Achievement

The question asks to identify the specific athlete who won the **Gold medal** in the **Javelin Throw** competition during the **2020 Paralympics**.

Athlete Spotlight: Sumit Antil

Sumit Antil is an Indian Paralympic athlete who competed in the javelin throw. His performance at the **2020 Paralympics** in Tokyo was outstanding. He participated in the Men's Javelin Throw event under the F64 category.

Performance Breakdown

- Sumit Antil won the **Gold medal** in the Men's Javelin Throw (F64 category).
- He achieved a new world record throw of 68.55 meters during the event finals.
- This remarkable feat secured India's Gold medal in this discipline at the Paralympics.

Comparing with Other Options

It is important to distinguish achievements between the Olympics and Paralympics. While Neeraj Chopra (Option 3) is a celebrated Indian athlete who won Gold in Javelin Throw, his victory was at the Tokyo 2020 Olympics, not the Paralympics. Options 1 (Piyush Khanna) and 2 (Rameshwar Choudhary) are not associated with winning the Gold medal in this specific **2020 Paralympics** event.

Conclusion: 2020 Paralympics Javelin Throw Gold

Sumit Antil's exceptional performance, including a world record throw, confirms his status as the Gold medal winner in the **Javelin Throw** at the **2020 Paralympics**.

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62. **Answer: b**

Explanation:

Global Competitiveness Report Publisher Identified

This question requires identifying the specific international organization responsible for publishing the well-known **Global Competitiveness Report**. This report is a key resource for understanding the economic landscape and factors influencing growth across different countries.

Understanding the Global Competitiveness Report

The **Global Competitiveness Report** is an influential annual publication that benchmarks the economic competitiveness of nations. Competitiveness, in this context, refers to the set of factors, policies, and institutions that determine the level of productivity of a country.

Key aspects analyzed in the report typically include:

- Foundations of prosperity: Institutions, Infrastructure, Macroeconomic stability, Health, and Primary Education.
- Efficiency enhancers: Higher Education and Training, Goods market efficiency, Labour market efficiency, Financial market development, Technological readiness, and Market size.
- Innovation and sophistication factors: Business sophistication and Innovation.

The report provides insights into how economies are performing and identifies areas for improvement.

Evaluating Organizations and the Report's Publisher

Let's look at the options provided:

- **WTO (World Trade Organization):** The WTO is the global international organization dealing with the rules of trade between nations. Its primary mandate is to ensure that trade flows as smoothly, predictably, and freely as possible. The WTO does not publish the **Global Competitiveness Report**.
- **WEF (World Economic Forum):** The World Economic Forum is an international non-governmental organization based in Geneva, Switzerland. Founded in 1971, it is famous for its annual meeting in Davos, Switzerland, which brings together business leaders, political leaders, intellectuals, and journalists. The WEF is the organization that publishes the influential **Global Competitiveness Report**.
- **SAARC (South Asian Association for Regional Cooperation):** SAARC is a regional organization comprising eight member states that are predominantly in South Asia. Its focus is on promoting economic and regional integration among its member countries. SAARC is not the publisher of the global report.
- **EU (European Union):** The EU is a unique political and economic partnership between 27 European countries. While the EU focuses on economic policies and development within Europe, it is not the organization that releases the **Global Competitiveness Report** on a global scale.

WEF's Role in Global Competitiveness Assessment

The **World Economic Forum (WEF)** is the definitive publisher of the **Global Competitiveness Report**. Through extensive research and data collection, the WEF provides a detailed analysis and ranking of countries based on their competitiveness factors, contributing significantly to the global economic discourse.

Organization Name	Abbreviation	Primary Function	Publisher of Global Competitiveness Report
World Trade Organization	WTO	Regulating international trade	No
World Economic Forum	WEF	International cooperation on economic issues	**Yes**
South Asian Association for Regional Cooperation	SAARC	Regional cooperation in South Asia	No
European Union	EU	Political and economic union in Europe	No

Based on the functions and known publications of these organizations, the WEF is the correct publisher of the **Global Competitiveness Report**.

63. **Answer: d**

Explanation:

Understanding Semiconductor Elements

Semiconductor elements are crucial materials in modern electronics. They possess electrical conductivity between that of a conductor and an insulator. This unique property allows them to control electric current, making them fundamental components in devices like transistors, diodes, and integrated circuits (chips).

Semiconductor Elements Explained

In the realm of electronic components, specific elements are favoured for their semiconductor properties. These elements form the backbone of virtually all modern electronic devices. Let's explore the common elements and their characteristics:

- **Semiconductors:** Materials that exhibit conductivity that can be controlled. Their conductivity lies between that of conductors (like copper) and insulators (like glass).
- **Conductors:** Materials that allow electricity to flow easily.
- **Insulators:** Materials that resist the flow of electricity.

Identifying the Most Commonly Used Semiconductor

The question asks to identify the most commonly used semiconductor element. Among the options provided, we need to determine which element best fits this description.

Analysis of Options:

- **Copper (Cu):** Copper is a metal and an excellent electrical conductor, widely used in wiring, not as a semiconductor.
- **Carbon (C):** Carbon is a versatile element. While certain forms or compounds of carbon (like Silicon Carbide, SiC) can act as semiconductors, pure carbon itself is not the most common base element for semiconductor manufacturing. Diamond (an allotrope of carbon) is an insulator, and graphite is a conductor.
- **Silicon (Si):** Silicon is a Group 14 element. It is the most abundant element in the Earth's crust after oxygen. Its electrical properties are ideal for semiconductor applications. It has a suitable band gap, is relatively stable, and its oxide (silicon dioxide, SiO_2) is an excellent insulator, which is vital for creating transistors. The manufacturing processes for silicon-based semiconductors are highly developed and cost-effective.
- **A:** This option does not represent a standard chemical element symbol.

Silicon's Dominance in Semiconductors

Silicon (Si) stands out as the most prevalent material used in the semiconductor industry for several key reasons:

- **Abundance:** Silicon is readily available from sources like sand (silicon dioxide).
- **Cost-Effectiveness:** Its abundance makes it relatively inexpensive compared to other potential semiconductor materials like Germanium (Ge) or Gallium Arsenide (GaAs).
- **Oxide Formation:** Silicon readily forms a high-quality, stable insulating layer of silicon dioxide (SiO_2) through oxidation. This layer is crucial for fabricating transistors using the MOSFET (Metal-Oxide-Semiconductor Field-Effect Transistor) technology, which dominates the industry.
- **Well-Established Technology:** Decades of research and development have led to highly optimized and reliable manufacturing techniques for silicon wafers and devices.
- **Thermal Stability:** Silicon devices can operate reliably over a reasonable range of temperatures.

Therefore, due to its advantageous properties and the maturity of its production technology, Silicon (Si) is overwhelmingly the most commonly used semiconductor element in the electronics industry.

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64. **Answer: a**

Explanation:

Greenhouse Effect Explained

The **greenhouse effect** is a natural process that warms the Earth's surface. When the Sun's energy reaches the Earth's atmosphere, some of it is reflected back to space and the rest is absorbed and re-radiated by greenhouse gases. This absorbed energy warms the planet's lower atmosphere and surface. Without this natural effect, Earth would be a frozen planet.

Understanding Greenhouse Gases

Greenhouse gases are specific gases in the atmosphere that trap heat. They allow sunlight to pass through the atmosphere and reach the Earth's surface, but they prevent some of the outgoing infrared radiation (heat) from escaping back into space. Key greenhouse gases include water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and ozone (O_3). Synthetic chemicals like chlorofluorocarbons (CFCs) are also potent greenhouse gases.

Analysis of Options Contributing to the Greenhouse Effect

Let's examine each option provided in the context of the greenhouse effect:

- **CFCs (Chlorofluorocarbons):** These are powerful, man-made greenhouse gases. Even in small amounts, they trap significantly more heat than carbon dioxide, contributing substantially to global warming.
- **Water Vapours (H_2O):** Water vapor is the most abundant greenhouse gas. It plays a major role in the natural greenhouse effect, trapping heat and influencing weather patterns.
- **Ozone (O_3):** Ozone in the troposphere (the lower part of the atmosphere) acts as a greenhouse gas by absorbing infrared radiation, thus contributing to the warming of the planet. (Note: Ozone in the stratosphere plays a different role, protecting us from UV radiation).
- **Nitrogen (N_2):** Nitrogen gas constitutes about 78% of Earth's atmosphere. However, its molecular structure makes it very stable and unable to absorb or emit thermal infrared radiation effectively. Therefore, N_2 does **not** contribute significantly to the greenhouse effect.

Conclusion on Greenhouse Gas Contribution

Based on the analysis, while CFCs, Water Vapours, and Ozone all contribute to the greenhouse effect by trapping heat in the atmosphere, Nitrogen (N_2) does not possess the properties required to effectively absorb and re-emit infrared radiation. Therefore, Nitrogen is the gas among the options that does not contribute to the greenhouse effect.

65. **Answer: c**

Explanation:

Grassland Region Matching Explanation

The question asks us to match different types of grasslands mentioned in List I with their corresponding geographical regions listed in List II. Successfully answering this requires knowledge of global geography and the locations of major grassland ecosystems.

Identifying Grassland Locations

We need to determine the correct region for each grassland type:

- **Prairies:** These temperate grasslands are famously located in North America, primarily covering large parts of the central **USA** and southern Canada.
- **Downs:** This term is commonly used in **Australia** to describe open, hilly, treeless country, often covered in grass.
- **Llanos:** These tropical grasslands, characterized by seasonal flooding, are found in the Orinoco river basin, mainly in **Venezuela** and eastern Colombia.
- **Pampas:** These fertile temperate grasslands cover a vast area of **South America**, particularly Argentina, Uruguay, and parts of southern Brazil.

Detailed Matching of Grasslands and Regions

Let's systematically match each item from List I to List II based on their known locations:

Grassland (List I)	Region (List II)	Correct Match
1. Prairies	III. USA	1 - III
2. Downs	II. Australia	2 - II
3. Llanos	IV. Venezuela	3 - IV
4. Pampas	I. South America	4 - I

Finalizing the Correct Match Combination

Combining the individual matches, we find the complete correct pairing:

- Prairie maps to the USA (1 - III).
- Downs maps to Australia (2 - II).
- Llanos maps to Venezuela (3 - IV).
- Pampas maps to South America (4 - I).

This sequence of matches (1-III, 2-II, 3-IV, 4-I) represents the correct answer to the question.

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66. **Answer: a**

Explanation:

Understanding Global Warming Contributors

Global warming refers to the long-term heating of Earth's climate system observed since the pre-industrial period (between 1850 and 1900) due to human activities, primarily fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere. A greenhouse gas (GHG) is any gaseous compound in the atmosphere that is particularly effective at absorbing heat. These gases include water vapour (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases. They are essential for keeping the Earth warm enough to

support life, but increased concentrations, largely from human activities, lead to global warming.

Analysis of Substances and Global Warming

Let's analyze each option to determine which substance does not contribute to global warming:

- **Methane (CH_4)**: Methane is a powerful greenhouse gas. While present in the atmosphere in smaller concentrations than CO_2, it is significantly more potent at trapping heat over shorter timescales. Sources include natural gas leaks, agriculture (livestock digestion, rice paddies), and decomposition of waste. Its contribution to global warming is substantial.
- **Carbon dioxide (CO_2)**: Carbon dioxide is the primary greenhouse gas associated with human activities. It is released through burning fossil fuels (coal, oil, and natural gas), deforestation, and industrial processes. CO_2 remains in the atmosphere for a very long time, making it a major driver of current global warming.
- **Water vapour (H_2O)**: Water vapour is the most abundant greenhouse gas. It plays a crucial role in the greenhouse effect. However, unlike CO_2 and CH_4, its concentration in the atmosphere is primarily controlled by temperature through evaporation and precipitation cycles, acting more as a feedback mechanism that amplifies warming caused by other gases, rather than being a primary driver initiated by direct emissions. Despite this difference in mechanism, it does contribute to the warming effect.
- **Oxides of Sulphur (SO_x) and Nitrogen (NO_x)**: Oxides of Sulphur (like SO_2) and Nitrogen (like NO_x) are major air pollutants primarily resulting from burning fossil fuels. Their main environmental impact is causing acid rain, which damages forests, lakes, and buildings, and contributing to smog and respiratory problems. While these gases can indirectly affect climate (e.g., sulphate aerosols can have a cooling effect by reflecting sunlight), they are not considered direct greenhouse gases contributing to the warming effect in the same way as CO_2, CH_4, or H_2O. Their primary association is with air pollution and acid rain, not heat-trapping.

Identifying the Non-Contributor

Based on the analysis, Oxides of Sulphur and Nitrogen are primarily associated with air pollution and acid rain. They do not significantly contribute to the greenhouse effect that causes global warming by trapping heat. In contrast, Methane, Carbon dioxide, and Water vapour are all greenhouse gases that play a role in regulating Earth's temperature and contribute to the warming phenomenon.

Therefore, the substance among the options that does not contribute to global warming is Oxides of Sulphur and Nitrogen.

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67. **Answer: d**

Explanation:

Matching Operations with Their Related Events

This question requires matching specific Indian military and rescue operations from List I with their corresponding events or contexts from List II.

Detailed Matching of Operations

Here's a breakdown of each operation and its correct association:

Correctly Matched Operations

List I (Operation Name)	List II (Related To)
I. Operation Nistar	A. Rescue operation in Yemen
II. Operation Pawan	B. Control of Jaffna peninsula
III. Operation Trident	C. Indo-Pak Navy 1971 War
IV. Operation Brasstacks	D. 1986 Joint military exercise

Operation Nistar Explanation

Operation Nistar was conducted by India in 2015. Its primary goal was to evacuate Indian citizens and also people from other nations from war-torn Yemen during a significant political crisis and conflict there. This directly corresponds to **A. Rescue operation in Yemen**.

Operation Pawan Explanation

Operation Pawan was undertaken by the Indian Peace Keeping Force (IPKF) in Sri Lanka, starting in 1987. The objective was to gain control over the Jaffna peninsula, which was a stronghold of the Liberation Tigers of Tamil Eelam (LTTE). This matches with **B. Control of Jaffna peninsula**.

Operation Trident Explanation

Operation Trident stands as a significant naval offensive during the Indo-Pak War of 1971. The Indian Navy successfully targeted the Pakistani naval headquarters in Karachi, causing substantial damage. This correctly links to **C. Indo-Pak Navy 1971 War**.

Operation Brasstacks Explanation

Operation Brasstacks was a large-scale military exercise involving the Indian Army. Conducted between 1986 and 1987, it was one of the biggest military drills held in India, simulating various aspects of warfare. This aligns with **D. 1986 Joint military exercise**.

Conclusion on Matching

Based on the explanations, the correct pairings are:

- Operation Nistar (I) relates to Rescue operation in Yemen (A).
- Operation Pawan (II) relates to Control of Jaffna peninsula (B).
- Operation Trident (III) relates to Indo-Pak Navy 1971 War (C).
- Operation Brasstacks (IV) relates to 1986 Joint military exercise (D).

Therefore, the correct option is the one that lists these matches: I-A, II-B, III-C, IV-D.

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68. **Answer: c**

Explanation:

Identifying the Short Range Surface to Surface Missile

This solution focuses on identifying which missile among the given options qualifies as a **short range surface to surface missile**. We will analyze the characteristics of each missile listed to determine the correct classification.

Understanding Missile Classifications

Missiles are classified based on their launch platform, target, range, and guidance system. A **surface to surface missile** is launched from the ground or a mobile platform and targets another surface target (like enemy positions, vehicles, or infrastructure). "Short range" typically refers to missiles with a range of up to a few hundred kilometers, although the exact definition can vary.

Analysis of Missile Options

- **NAG Missile:**
  - **Type:** Anti-tank Guided Missile (ATGM).
  - **Role:** Designed to engage heavily armored enemy tanks.
  - **Range:** Approximately 4 to 7 kilometers.
  - **Classification:** It is a surface-to-surface missile, but primarily an anti-tank weapon, and its range is very short.
- **AKASH Missile:**
  - **Type:** Surface-to-Air Missile (SAM).
  - **Role:** Designed to intercept and destroy aerial threats like aircraft, helicopters, and drones.
  - **Range:** Various versions have ranges up to about 30 kilometers.
  - **Classification:** This is a surface-to-air missile, meaning it is launched from the surface but targets targets in the air. It does not fit the **surface to surface** criteria.
- **PRITHVI Missile:**
  - **Type:** Tactical Ballistic Missile.
  - **Role:** Designed for surface-to-surface engagement, striking ground targets.
  - **Range:** Prithvi variants have different ranges. Prithvi-I has a range of about 150 km, and Prithvi-II has a range of about 250-350 km. These fall within the short to medium range category for tactical ballistic missiles.
  - **Classification:** This missile fits the description of a **short range surface to surface missile**, specifically designed for tactical ground support.
- **TRISHUL Missile:**
  - **Type:** Short Range Surface-to-Air Missile (SRSAM).
  - **Role:** Designed for air defence, intercepting low-altitude aerial targets.
  - **Range:** Approximately 9 to 12 kilometers.
  - **Classification:** Similar to Akash, this is a surface-to-air missile and not a **surface to surface** missile.

Conclusion on Missile Type

Comparing the classifications, the **PRITHVI** missile is the only option that is consistently defined as a **surface to surface missile** with ranges falling into the short-to-medium category, making it the appropriate answer. NAG is surface-to-

surface but primarily an anti-tank missile with a shorter range. Akash and Trishul are surface-to-air systems.

---

69. **Answer: a**

Explanation:

Exploring India's First Flood Early Warning System Initiative

Understanding flood risks is crucial for urban planning and disaster management in India. Many Indian cities face significant challenges due to heavy monsoon rains and complex drainage systems, leading to urban flooding. An effective measure to mitigate these risks is the implementation of a robust **flood early warning system**. This system provides timely information to authorities and the public, enabling proactive measures to be taken.

Kolkata's Pioneering Role in Flood Alerts

The question asks to identify the **first city in India** to initiate a **flood early warning system**. Among the major metropolitan areas, **Kolkata** holds the distinction of being the first city to implement such a critical system.

Details of Kolkata's Flood Warning System

Kolkata, being a low-lying deltaic city, is particularly vulnerable to flooding caused by heavy rainfall, poor drainage, and high tides. Recognizing this vulnerability, the city authorities established an early warning system. This initiative was designed to:

- Monitor rainfall patterns and river levels.
- Analyze drainage network conditions.
- Predict potential flood events in different parts of the city.
- Disseminate timely alerts to residents and relevant agencies.

This proactive approach helps in minimizing potential damage to property and, more importantly, safeguarding lives by allowing for timely evacuation and preparedness measures.

Comparison with Other Cities

While cities like Mumbai, Chennai, and Lucknow also face challenges related to water management and flooding, Kolkata was the frontrunner in developing and operationalizing a dedicated early warning system specifically for floods. These other cities have their own disaster management strategies, but Kolkata's initiative marked a significant first step in leveraging technology for flood prediction and warning at the city level in India.

Significance of the Flood Early Warning System

The establishment of a **flood early warning system** in **Kolkata** highlights the importance of preparedness in disaster management. It serves as a model for other Indian cities facing similar challenges, emphasizing the need for integrated systems that combine meteorological data, hydrological information, and communication strategies to effectively combat the impacts of urban flooding.

---

70. **Answer: b**

Explanation:

PM CARES Fund: Analysing Key Statements

This explanation delves into the specifics of the PM CARES Fund, focusing on two key statements provided in the question to determine their accuracy.

Understanding Statement I: Fund Flow

Statement I posits that the amounts collected by the PM CARES Fund directly flow into the Consolidated Fund of India.

- **The PM CARES Fund Structure:** It's important to note that the PM CARES Fund was established as a 'Public Charitable Trust'.
- **Distinction from Consolidated Fund:** Funds collected by such trusts are managed separately by the trust entity. This is different from the Consolidated Fund of India, which serves as the primary account for government revenues (like taxes) and from which expenditures are sanctioned by Parliament.
- **Verdict on Statement I:** Consequently, the statement that collected amounts *directly* go into the Consolidated Fund of India is incorrect. The funds are held and administered by the trust, distinct from the government's main treasury account.

Understanding Statement II: Foreign Donations and Tax Benefits

Statement II makes two claims: the fund can receive donations from foreign contributions, and these donations qualify for 100% tax exemption.

- **Foreign Contribution Eligibility:** The PM CARES Fund is indeed permitted to accept contributions from Non-Resident Indians (NRIs), Persons of Indian Origin (PIOs), and also from foreign sources, subject to applicable regulations. Amendments and clarifications have enabled the fund to receive such foreign contributions.
- **Tax Exemption Details:** Donations made to the PM CARES Fund are eligible for a full tax deduction. Specifically, under Section 80G of the Income Tax Act, 1961, contributions to this fund qualify for 100% tax exemption. This allows donors to reduce their taxable income by the amount they donate.
- **Verdict on Statement II:** As both parts of this statement (eligibility for foreign contributions and 100% tax exemption) are factually accurate, Statement II is correct.

Final Assessment of Statements

Summarizing the analysis:

- Statement I is incorrect due to the separate trust structure of the PM CARES Fund, which prevents funds from directly entering the Consolidated Fund of India.

- Statement II is correct because the PM CARES Fund can receive foreign donations and offers a 100% tax exemption on contributions under Section 80G of the Income Tax Act.

Therefore, the correct assessment is that only Statement II is accurate.

---

71. Answer: c

Explanation:

Understanding Heron Drones and Indian Defence Acquisitions

The question asks about the origin country from which India acquires Heron drones to boost its surveillance capabilities. Heron drones are advanced unmanned aerial vehicles (UAVs) used by various countries, including India, for reconnaissance and surveillance purposes.

Origin of Heron Drones

Heron drones are manufactured by Israel Aerospace Industries (IAI). India has acquired these drones from Israel as part of its efforts to modernize its military and enhance its intelligence, surveillance, and reconnaissance (ISR) capabilities along borders and in strategic areas.

These drones are known for their long endurance and ability to carry various payloads, making them suitable for extended surveillance missions.

Heron Drones in Indian Service

The Indian Army, Navy, and Air Force operate Heron drones. Their induction significantly enhances the operational capabilities of the Indian forces, allowing them to monitor large areas over long periods. The use of Heron drones for enhancing surveillance capabilities is a key aspect of India's defense strategy.

Therefore, the country from which the Indian forces acquired Heron drones for enhancing their surveillance capabilities is Israel.

Drone Name	Type	Origin/Manufacturer	Acquired by India for...
Heron (IAI Heron)	Medium Altitude, Long Endurance (MALE) UAV	Israel Aerospace Industries (IAI), Israel	Surveillance, Reconnaissance, Intelligence Gathering

Statement Analysis

- Heron drones are used by Indian forces. This is correct.
- They are used for enhancing surveillance capabilities. This is correct.
- They are acquired from a specific country. We need to identify this country.

Based on defence procurement information, Heron drones inducted by India come from Israel.

Revision Table: Key Facts about Heron Drones

Feature	Description
Purpose in India	Enhancing Surveillance Capabilities
Country of Origin	Israel
Manufacturer	Israel Aerospace Industries (IAI)
Role	Reconnaissance, Intelligence, Surveillance

Additional Information: India-Israel Defence Cooperation

India and Israel have a strong defence cooperation relationship. Apart from Heron drones, India has acquired various other defence systems and technologies from Israel, including:

- Radar systems
- Missile systems (like MRSAM - Medium Range Surface to Air Missile, developed jointly)
- Precision-guided munitions
- Other surveillance equipment

This partnership is crucial for India's defence modernization efforts. The acquisition of systems like the Heron drone highlights the importance of advanced technology in modern warfare and surveillance.

---

72. **Answer: d**

Explanation:

Examining Factors Influencing Earthquakes

An earthquake is the sudden shaking of the Earth's surface, typically caused by the movement of tectonic plates or volcanic activity. Understanding the elements that contribute to or affect earthquakes is essential in seismology. This question requires identifying the factor among the choices provided that does **not** contribute to the phenomenon of earthquakes.

Analysis of Factors Contributing to Earthquakes

Several factors influence the occurrence, characteristics, and impact of earthquakes. Let's analyze the options provided:

- **Location**: The **location** is a primary factor in earthquake activity. Most earthquakes originate along tectonic plate boundaries, known as fault lines. Places situated in seismically active zones, such as regions along the Pacific Ring of Fire, experience earthquakes frequently due to the constant movement

and interaction of these massive plates. Therefore, the **location** directly relates to the probability of an earthquake occurring.

- **Distance from the Epicentre**: The **distance from the epicentre** significantly influences the intensity of shaking felt at a specific location. The epicentre is the point on the Earth's surface directly above the focus (where the earthquake rupture begins). Seismic waves spread out from the focus, losing energy as they travel. Consequently, the shaking is usually strongest near the epicentre and diminishes with increasing **distance from the epicentre**. While not a cause, it's a crucial factor determining the earthquake's observable effects.
- **Local Geological Conditions**: The subsurface geology of a specific area plays a vital role in how earthquake waves propagate and how intense the ground shaking becomes. For instance, areas with soft, unconsolidated sediments or artificial fill tend to amplify seismic waves more than areas with solid bedrock. These **local geological conditions** can therefore significantly affect the severity of shaking and potential damage during an earthquake.

Analysis of the Non-Contributing Factor

- **Rate of Evaporation**: **Evaporation** is the process by which water transforms from a liquid into a gas or vapour. This process is mainly driven by heat energy, typically from the sun, and is a key component of the Earth's water cycle and weather systems. There is no established scientific evidence or mechanism that connects the **rate of evaporation** to the geological forces, such as tectonic plate movement or stress build-up along faults, that cause **earthquakes**. The processes involved in evaporation are atmospheric and hydrological, entirely separate from the tectonic processes responsible for seismic activity.

Conclusion

In summary, while **Location** determines where earthquakes are likely to occur, **Distance from the epicentre** affects the intensity of shaking experienced, and **Local geological conditions** influence how seismic waves impact a specific site, the **Rate of Evaporation** is unrelated to the causes or characteristics of earthquakes. It is an atmospheric phenomenon that does not contribute to seismic events.

73. Answer: d

Explanation:

Understanding Motion When Jumping Out of a Boat

The question asks why a boat moves in the opposite direction when someone jumps out of it. This involves the principles of force and motion, specifically as described by Newton's laws of motion.

Exploring Newton's Laws in this Scenario

Let's briefly consider the relevance of each of Newton's laws:

- **Newton's First Law of Motion (Law of Inertia):** This law states that an object at rest stays at rest, and an object in motion stays in motion with the same speed and in the same direction unless acted upon by an unbalanced force. While relevant to motion in general, it doesn't directly explain the action-reaction interaction between the person and the boat during the jump.
- **Newton's Second Law of Motion (Law of Acceleration):** This law states that the acceleration of an object is directly proportional to the net force acting on the object, is in the same direction as the net force, and is inversely proportional to the mass of the object ($F = ma$). This law describes how the boat accelerates due to the force applied to it, and how the person accelerates due to the force applied to them. However, it doesn't explain *why* the force exists or its relationship to the person's action.
- **Newton's Third Law of Motion (Law of Action-Reaction):** This law states that for every action, there is an equal and opposite reaction. Whenever one body exerts a force on a second body, the second body simultaneously exerts a force equal in magnitude and opposite in direction on the first body.

Applying Newton's Third Law to Jumping from a Boat

When a person jumps forward out of a boat onto a dock or shore, they push backward on the boat with their feet. This push is the "action" force.

According to Newton's Third Law, the boat simultaneously exerts an equal and opposite "reaction" force forward on the person. This reaction force is what propels the person forward off the boat.

Crucially, the "action" force that the person exerted backward on the boat causes the boat to move backward (or accelerate in the backward direction). Since there is a net force acting on the boat (the person's push), the boat's state of motion changes. If the boat was at rest, it will start moving backward. If it was already moving, its backward velocity will increase or forward velocity will decrease.

In summary, the movement of the boat in the opposite direction of the jump is a direct consequence of the action-reaction pair described by Newton's Third Law of Motion. The force the person applies to the boat is equal in magnitude and opposite in direction to the force the boat applies to the person.

Therefore, the phenomenon where the boat moves in the opposite direction when we jump out is explained by Newton's Third Law of Motion.

---

74. Answer: d

Explanation:

Assertion: Portuguese Sea Route Discovery

This section analyzes Assertion (A), which states: **The Portuguese were the first European community to discover a direct sea route to India.**

- Historical evidence confirms that the Portuguese explorer Vasco da Gama reached Calicut, India, via a sea route in 1498.
- This voyage marked a significant milestone as it established the first direct maritime link between Europe and India.
- Prior to this breakthrough, trade between Europe and India relied on traditional overland routes or sea routes involving intermediaries, which were often lengthy and costly.
- Therefore, Assertion (A) is factually accurate.

Reason: Ottoman Trade Policies and Taxes

This part examines Reason (R), stating: **The Turks started levying too many taxes on the goods passing through the routes of trade and commerce between Asia and Europe.**

- Following the expansion of the Ottoman Empire (often referred to as the Turks in this context) in the 15th century, they gained control over crucial land and sea trade routes linking Asia and Europe.
- As controllers of these vital trade arteries, the Ottoman authorities imposed taxes and tolls on the goods transiting their territories.
- These taxes significantly increased the overall cost of conducting trade between Europe and Asia, making it less profitable for European merchants.
- Thus, Reason (R) accurately describes a key aspect of the trade dynamics during that period.

Link: Taxes as Motivation for Sea Route Discovery

Here, we evaluate whether Reason (R) provides a correct explanation for Assertion (A).

- The economic challenges posed by the Ottoman control, specifically the imposition of high taxes on traditional trade routes, created a strong incentive for European nations to seek alternative pathways to the East.
- Finding a direct sea route was seen as a strategic way to bypass the intermediaries and their associated costs, thereby potentially gaining direct access to the lucrative markets of India and the Spice Islands.
- The Portuguese, motivated by this objective, spearheaded maritime exploration efforts, which ultimately led to Vasco da Gama's successful voyage.
- Therefore, the high taxes imposed by the Turks (R) were a primary catalyst for the Portuguese endeavor to discover a direct sea route to India (A).

Overall Conclusion

Synthesizing the analysis of both statements:

- Assertion (A) is true, as the Portuguese did pioneer the direct sea route to India.

- Reason (R) is also true, reflecting the historical reality of Ottoman taxation on trade routes.
- Crucially, Reason (R) serves as a correct explanation for Assertion (A). The desire to overcome the economic barriers presented by the Turks' control and taxation of traditional routes was a major driving force behind the Portuguese Age of Discovery and their specific goal of finding a sea passage to India.

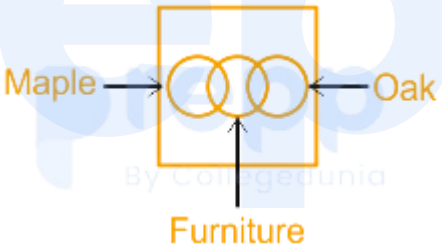
Consequently, both statements are true, and the reason correctly explains the assertion.

---

75. Answer: b

Explanation:

According to the given information Venn diagram is given below.



Some Furniture are made from Maple's tree wood.

Some Furniture are made from Oak's tree wood.

⭐ Additional Information

Maple trees are mostly native to Asia, though some originate from Europe, northern Africa, and North America.Their wood is used by the lumber industry to make flooring, furniture, interior woodwork, plywood and veneer.

The **oak** is a kind of hardwood forest tree. They are well known as a climax vegetation in the temperate zone of the northern hemisphere. Oak is strong and durable wood used for making furniture.

---

76. **Answer: a**

Explanation:

Analogy Explanation: Understanding Animal Movements

This question presents an analogy, which is a comparison between two things to show how they are similar. We need to figure out the relationship between the first pair of words, '**Rabbit**' and '**Hop**', and then find the word that has a similar relationship with '**Duck**'.

Rabbit and Hop Relationship Analysis

The first pair shows an animal, '**Rabbit**', and its characteristic way of moving, which is to '**Hop**'. Rabbits typically move by jumping forward on their hind legs.

Analyzing the Duck's Characteristic Movement

Our task now is to find the word that best describes how a **duck** moves, similar to how '**Hop**' describes a **rabbit**'s movement. Let's look at the given options:

- **Waddle:** This term describes the short-legged, side-to-side gait characteristic of ducks and penguins. It matches the unique way ducks walk on land.
- **Slither:** This refers to a smooth, slippery, or gliding motion, often associated with snakes or eels. Ducks do not slither.
- **Creep:** This means moving slowly, quietly, and often stealthily. While a duck might creep sometimes, it's not its defining movement.
- **Crawl:** This involves moving low on the ground using hands and knees, or the belly. This is not how ducks move.

Conclusion: Matching Duck's Gait

Based on the analysis, '**Waddle**' is the term that accurately describes the distinctive way a **duck** walks. It mirrors the relationship between **rabbit** and **hop**, where each word represents an animal and its specific mode of locomotion.

Therefore, the completed analogy is: **Rabbit** : **Hop** :: **Duck** : **Waddle**.

---

77. **Answer: d**

Explanation:

Pigeons are a specific type of birds. Thus pigeons will be completely inside birds. And Birds and Dogs are mutually exclusive of each other that mean they will not intersect each other.

Hence option 4 is the correct answer.

---

78. **Answer: d**

Explanation:

The figure that will replace the question mark (?) in the following figure series is shown below:

Hence, ' option 4 ' is the correct answer.

---

79. **Answer: a**

Explanation:

Understanding Divya's Journey and Return Distance

This problem involves tracking a person's movements in different directions and then calculating the shortest distance required to return to the initial starting point. We need to carefully follow each step of Divya's journey to determine her final location relative to where she began.

Tracking Divya's Movements Step-by-Step

Let's trace Divya's path and calculate her position relative to her starting point. We can think of the starting point as the origin (0, 0) on a coordinate plane, with South being the negative y-axis and East being the positive x-axis.

- **Starting Point:** Let's call this Point A, located at (0, 0).
- **Movement 1:** Divya travels 15 km South. Her new position (Point B) is 15 km south of A. Coordinates: (0, -15).
- **Movement 2:** She turns left from South. A left turn from South means she is now heading East. She travels 40 km East. Her new position (Point C) is 40 km east and 15 km south of A. Coordinates: (40, -15).
- **Movement 3:** She turns right from East. A right turn from East means she is now heading South. She travels 50 km South. Her new position (Point D) is 40 km east and (15 + 50) = 65 km south of A. Coordinates: (40, -65).
- **Movement 4:** She turns right from South. A right turn from South means she is now heading West. She travels 40 km West. Her new position (Point E) is (40 - 40) = 0 km east/west and 65 km south of A. Coordinates: (0, -65).

Calculating the Final Displacement

After all the movements, Divya's final position (Point E) is at coordinates (0, -65). This means she is directly 65 km South of her starting point (Point A at (0, 0)).

We can also summarize the net movement:

- **North-South Movement:** 15 km South + 50 km South = 65 km South.

- **East-West Movement:** 40 km East + 40 km West = 0 km net displacement in the East-West direction.

Therefore, her final location is exactly 65 km south of her starting point.

Determining the Minimum Distance to Return

The minimum distance Divya has to travel to go back to her starting point is the straight-line distance between her final position (0, -65) and her starting position (0, 0). Since the final position is directly south of the start, the distance is simply the difference in the north-south position.

Using the distance formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$, where $(x_1, y_1) = (0, 0)$ and $(x_2, y_2) = (0, -65)$:

$$d = \sqrt{(0 - 0)^2 + (-65 - 0)^2}$$

$$d = \sqrt{0^2 + (-65)^2}$$

$$d = \sqrt{0 + 4225}$$

$$d = \sqrt{4225}$$

$$d = 65 \text{ km}$$

So, the minimum distance Divya needs to travel to return to her starting point is 65 km.

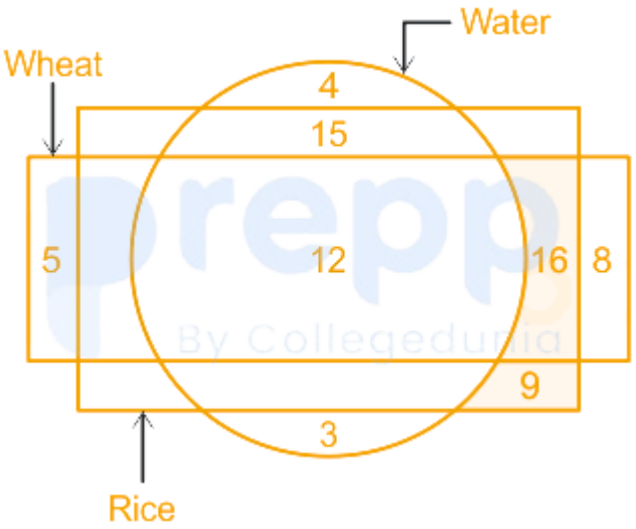
---

80. Answer: b

Explanation:

According to the given information:

I. Number of rice which are not water.



- As per the given diagram the shaded part represents number of rice which are not water is 9 + 16 = 25.

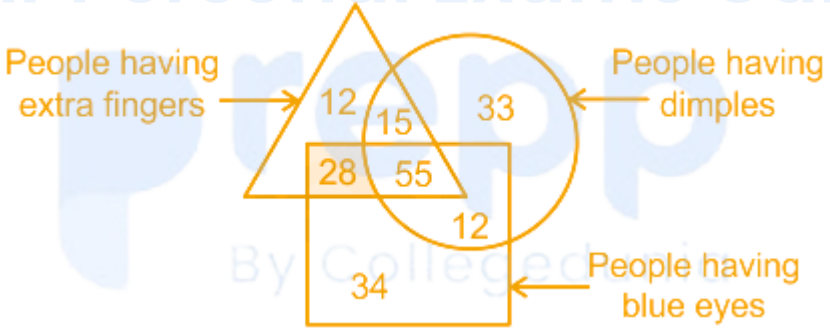
Hence, the correct answer is "option (2)".

---

81. Answer: d

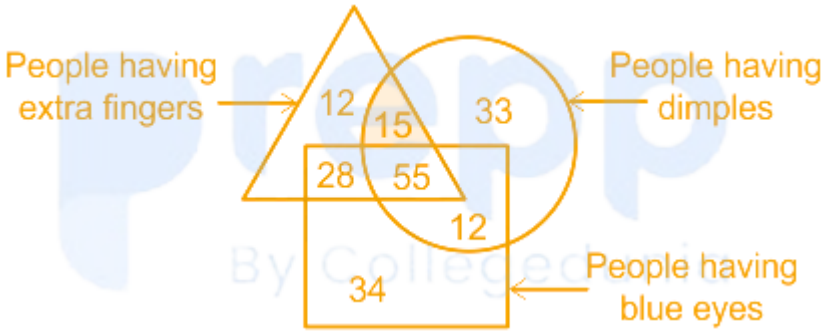
Explanation:

The number of people who have extra fingers and blue eyes and no dimples is A.



- A = 28

The number of people who have extra fingers and dimples and no blue eyes is B.



- B = 15

The sum of A and B = 28 + 15 = 43

Hence, ' **43** ' is the correct answer.

---

82. **Answer: d**

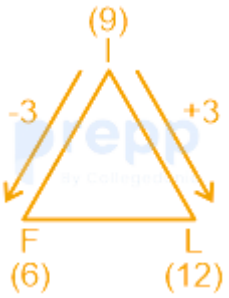
Explanation:

Table show alphabet serial number –

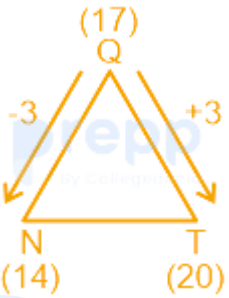
Alphabets	A	B	C	D	E	F	G	H	I	J	K	L	M
Positional value	1	2	3	4	5	6	7	8	9	10	11	12	13
Positional value	26	25	24	23	22	21	20	19	18	17	16	15	14
Alphabets	Z	Y	X	W	V	U	T	S	R	Q	P	O	N

The pattern for the code is as follows,

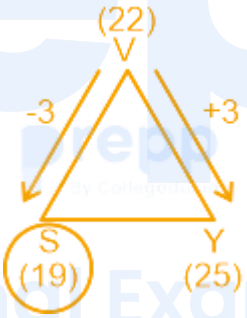
In the tringle, if the upper side alphabet adds three we get the tringle right side alphabet and if we subtract three we get the left side alphabet.



And,



Similarly,



Hence, the missing term is **S**.

---

83. Answer: b

Explanation:

Evaluating Symbol Substitution Statements

This problem requires us to evaluate two statements involving mathematical expressions where specific symbols represent arithmetic operations. We need to

substitute the symbols with their corresponding operations and verify if the given equality holds true for each statement. The order of operations (BODMAS/PEMDAS: Brackets, Orders, Division/Multiplication, Addition/Subtraction) must be followed.

Symbol Definitions

The problem defines the following symbols:

- P denotes Addition (+)
- Q denotes Division (/)
- R denotes Multiplication (*)
- S denotes Subtraction (-)

Statement I: Symbol Substitution and Verification

Let's analyze Statement I: `32 Q 4 P 16 S 4 R 2 = 24`.

First, we substitute the symbols with their operations:

- Q becomes /
- P becomes +
- S becomes -
- R becomes *

The expression becomes:

```
32 / 4 + 16 - 4 * 2
```

Now, we apply the order of operations (BODMAS/PEMDAS):

1. **Division**: $32 \div 4 = 8$
2. **Multiplication**: $4 \times 2 = 8$
3. The expression now is: $8 + 16 - 8$
4. **Addition**: $8 + 16 = 24$
5. **Subtraction**: $24 - 8 = 16$

The calculated result for Statement I is *16*. The statement claims the result is *24*. Since $16 \neq 24$, Statement I is **incorrect**.

Statement II: Symbol Substitution and Verification

Next, let's analyze Statement II: `27 Q 3 R 2 P 5 S 7 = 16`.

Substitute the symbols with their corresponding operations:

- Q becomes /
- R becomes *
- P becomes +
- S becomes -

The expression becomes:

```
27 / 3 * 2 + 5 - 7
```

Applying the order of operations (BODMAS/PEMDAS):

1. **Division**: $27 \div 3 = 9$
2. **Multiplication**: $9 \times 2 = 18$
3. The expression now is: $18 + 5 - 7$
4. **Addition**: $18 + 5 = 23$
5. **Subtraction**: $23 - 7 = 16$

The calculated result for Statement II is *16*. The statement claims the result is *16*. Since $16 = 16$, Statement II is **correct**.

Conclusion: Correct Statement Identification

After evaluating both statements based on the provided symbol definitions and the order of operations:

- Statement I evaluates to 16, which does not match the claimed value of 24. Thus, Statement I is incorrect.
- Statement II evaluates to 16, which matches the claimed value of 16. Thus, Statement II is correct.

Therefore, only Statement II is correct.

84. Answer: a

Explanation:

Jumbled Letters Rearrangement and Odd One Out Analysis

The task is to unscramble the given sets of **jumbled letters** to form meaningful words. Once the words are formed, we need to figure out the common category they belong to and identify the word that doesn't fit into that category, which will be the **odd one out**.

Unscrambling the Jumbled Letters into Natural Sequence

First, let's unscramble each set of letters to find the actual words:

Jumbled Letters	Meaningful Word
TOGA	GOAT
GEPONI	PIGEON
RARPOT	RAPTOR
LEEGA	EAGLE

Identifying the Category of Unscrambled Words

Now, let's understand the type of each word we obtained:

- **GOAT**: A goat is a mammal, which is a type of animal.
- **PIGEON**: A pigeon is a type of bird.
- **RAPTOR**: A raptor is a bird of prey, like an eagle or a hawk. So, it falls under the category of birds.

- **EAGLE**: An eagle is also a bird, specifically a large bird of prey.

Determining the Odd One Out

We can observe that three of the unscrambled words represent types of birds:

- PIGEON
- RAPTOR (a bird of prey)
- EAGLE

The word **GOAT** is the exception because it represents a mammal, not a bird. Therefore, GOAT is the odd one out among the words formed from the given **jumbled letters**.

---

85. **Answer: a**

Explanation:

In figure (X), one of the dots lies in the region common to circle and parallelogram, the second dot lies in the region of parallelogram, and the third dot lie in region common to parallelogram, circle and triangle. Only figure (B) consists of these types of regions.

---

86. **Answer: b**

Explanation:

Four letter - clusters have been given:

NGMAO → MANGO

CNILPE → PENCIL

ANNABA → BANANA

APELP → APPLE

All are the names of the fruits except, Pencil which is a stationary item.

Hence, **CNILPE** is different from all.

---

87. **Answer: b**

Explanation:

Understanding K's Journey and Displacement

This problem involves calculating the final position of K relative to his starting point after a series of movements in different directions. We need to determine both the distance and the direction.

Step 1: Analyzing the Movements

Let's break down K's walk step by step:

- **Initial Movement:** K walks **10 km** towards North.
- **Second Movement:** K walks **6 km** towards South. This movement partially reverses the first one.
- **Third Movement:** K walks **3 km** towards East. This movement is perpendicular to the North-South axis.

Step 2: Calculating Net Displacement along North-South Axis

K's movements along the North-South axis are 10 km North and 6 km South. We can represent North as positive and South as negative:

Net North-South displacement = (Distance North) - (Distance South)

Net North-South displacement = $10\ \text{km} - 6\ \text{km} = 4\ \text{km}$

So, K's final position is 4 km North of his starting latitude.

Step 3: Calculating Net Displacement along East-West Axis

K walks 3 km towards East. There are no movements towards the West.

Net East-West displacement = $3\ \text{km}$

So, K's final position is 3 km East of his starting longitude.

Step 4: Calculating the Direct Distance from the Starting Point

K's final position is effectively 4 km North and 3 km East of his starting point. These two displacements form the legs of a right-angled triangle. The direct distance (hypotenuse) from the starting point can be calculated using the Pythagorean theorem:

Let d be the distance from the starting point.

$$d^2 = (\text{Net Northward Displacement})^2 + (\text{Net Eastward Displacement})^2$$

$$d^2 = (4\ \text{km})^2 + (3\ \text{km})^2$$

$$d^2 = 16\ \text{km}^2 + 9\ \text{km}^2$$

$$d^2 = 25\ \text{km}^2$$

$$d = \sqrt{25\ \text{km}^2}$$

$$d = 5\ \text{km}$$

The direct distance from the starting point is 5 km.

Step 5: Determining the Direction

Since K's net displacement is 4 km North and 3 km East, his final position relative to the start is in the North-East direction.

Conclusion: Final Position

Combining the distance and direction, K is **5 km** away from his starting point in the **North-East** direction.

88. **Answer: d**

Explanation:

The figure which will complete the pattern is:

Hence, option 4 is the correct answer.

89. **Answer: a**

Explanation:

Locating Points Step-by-Step

Let's break down the movement step-by-step to determine the final position of point E relative to point B.

1. **Start with Point A:** Imagine point A as our starting reference point. We can think of it as the origin (0, 0) on a coordinate plane for simplicity.
2. **Position Point B:** Point B is 3m North of point A. If A is at (0, 0), then B is located 3 meters upwards along the North direction.
    - Coordinates of B: (0, 3)
3. **Position Point C:** Point C is 3m West of point B. Starting from B (0, 3), we move 3 meters to the left (West).
    - Coordinates of C: (0 - 3, 3) = (-3, 3)
4. **Position Point D:** Point D is 5m South of point C. Starting from C (-3, 3), we move 5 meters downwards (South).
    - Coordinates of D: (-3, 3 - 5) = (-3, -2)

5. **Position Point E:** Point E is 7m East of point D. Starting from D (-3, -2), we move 7 meters to the right (East).
    - Coordinates of E: (-3 + 7, -2) = (4, -2)

Determining Direction of E from B

Now we need to find the direction of point E relative to point B. We have the coordinates:

- Point B: (0, 3)
- Point E: (4, -2)

To find the direction of E from B, we look at the difference in their coordinates:

- **East-West Change:** The x-coordinate of E (4) is greater than the x-coordinate of B (0). The difference is $4 - 0 = +4$. This positive difference indicates that E is **East** of B.
- **North-South Change:** The y-coordinate of E (-2) is less than the y-coordinate of B (3). The difference is $-2 - 3 = -5$. This negative difference indicates that E is **South** of B.

Since point E is both South and East of point B, the direction is **South-East**.

Summary Table

Point	Coordinates (Relative to A)	Movement Description
A	(0, 0)	Starting Point
B	(0, 3)	3m North of A
C	(-3, 3)	3m West of B
D	(-3, -2)	5m South of C
E	(4, -2)	7m East of D

Final Direction Calculation

Comparing the final coordinates of E (4, -2) with the coordinates of B (0, 3):

- E is located 4 units East of B.
- E is located 5 units South of B.

Therefore, point E is in the **South-East** direction with reference to point B.

---

90. **Answer: b**

Explanation:

Evaluating the Mathematical Expression

The question asks us to find the value of a given mathematical expression by substituting specific letters with arithmetic operations. We need to carefully replace the symbols and then compute the result using the standard order of operations (BODMAS/PEMDAS).

Understanding the Symbol Substitution

The provided mapping for the letters to operations is:

- L means multiplication (`\times`)
- M means subtraction (`-`)
- N means addition (`+`)
- O means division (`\div`)

Transforming the Expression

The original expression given is: `6 L 25 M 15 N 45 O 5`

By substituting the letters with their corresponding operations, the expression becomes:

$6 \times 25 - 15 + 45 \div 5$

Calculating the Value using BODMAS/PEMDAS

We will now evaluate the transformed expression $6 \times 25 - 15 + 45 \div 5$ following the order of operations (BODMAS/PEMDAS):

- Brackets / Parentheses
- Orders / Exponents
- Division and Multiplication (from left to right)
- Addition and Subtraction (from left to right)

Step 1: Perform Division

According to BODMAS/PEMDAS, division should be done before addition and subtraction.

Calculate $45 \div 5$:

$$45 \div 5 = 9$$

The expression is now simplified to: $6 \times 25 - 15 + 9$

Step 2: Perform Multiplication

Next, we perform the multiplication.

Calculate 6×25:

$$6 \times 25 = 150$$

The expression simplifies further to: $150 - 15 + 9$

Step 3: Perform Subtraction

Now, we handle addition and subtraction from left to right. First, perform the subtraction.

Calculate $150 - 15$:

`150 - 15 = 135`

The expression becomes: `135 + 9`

Step 4: Perform Addition

Finally, perform the addition.

Calculate `135 + 9`:

`135 + 9 = 144`

Conclusion

The final calculated value of the expression is **144**. This matches the second option provided.

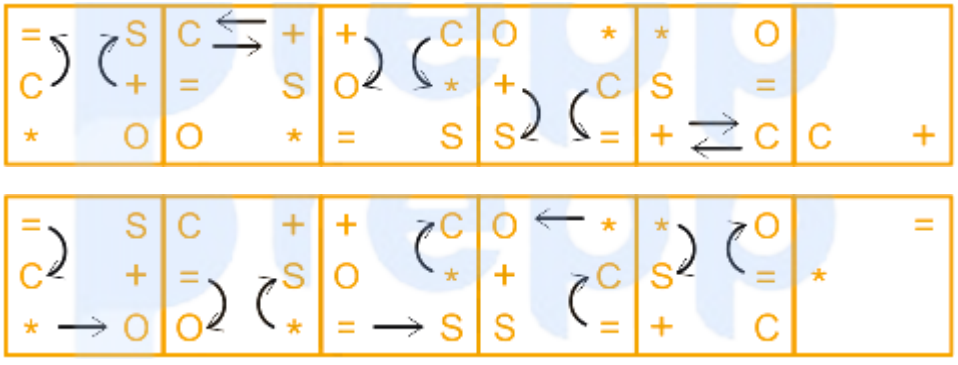
---

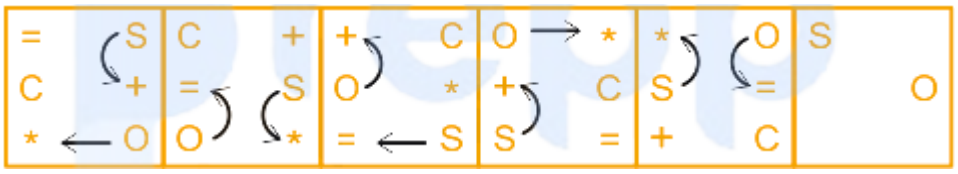
91. Answer: b

Explanation:

Logic:

In the given figure the symbols O, C and S are moving in a clockwise direction and the other symbols +, = and star(*) moving in an anticlockwise direction.





Here, the answer figure is

Hence, the correct answer is **"Option (2)"**.

---

92. **Answer: a**

Explanation:

Coding Pattern Analysis

This question involves a coding-decoding puzzle where we need to find the pattern used to transform words. We are given two examples:

- 'BREAD' is coded as 'JGKXH'
- 'DANCE' is coded as 'KITGJ'

We need to apply the same logic to find the code for 'CROWN'. Let's analyze the transformation letter by letter, mapping letters to their position in the alphabet (A=1, B=2, ..., Z=26).

Example Analysis: Shifts

BREAD -> JGKXH

Let's find the shift for each letter:

- B (2) -> J (10): Shift = 10 - 2 = +8

- R (18) -> G (7): Shift = 7 - 18 = -11 (equivalent to +15 mod 26)
- E (5) -> K (11): Shift = 11 - 5 = +6
- A (1) -> X (24): Shift = 24 - 1 = +23 (equivalent to -3 mod 26)
- D (4) -> H (8): Shift = 8 - 4 = +4

The sequence of shifts for 'BREAD' is: `+8, -11, +6, -3, +4`

DANCE -> KITGJ

Let's find the shift for each letter:

- D (4) -> K (11): Shift = 11 - 4 = +7
- A (1) -> I (9): Shift = 9 - 1 = +8
- N (14) -> T (20): Shift = 20 - 14 = +6
- C (3) -> G (7): Shift = 7 - 3 = +4
- E (5) -> J (10): Shift = 10 - 5 = +5

The sequence of shifts for 'DANCE' is: `+7, +8, +6, +4, +5`

Pattern Identification Logic

By comparing the shifts in both examples, we observe:

- **Middle Letter (Position 3):** The shift is consistently `+6`. For 'BREAD', E(5) shifts to K(11) ($5 + 6 = 11$). For 'DANCE', N(14) shifts to T(20) ($14 + 6 = 20$). This is a key consistent pattern.
- **Other Positions:** The shifts for positions 1, 2, 4, and 5 vary between the examples (e.g., Position 1 shifts are +8 for 'BREAD' and +7 for 'DANCE'). This suggests the coding pattern depends on more than just the letter's position; it might involve the letter's value or other complex rules.

To solve for 'CROWN', we look at the provided options and the correct answer 'TCUXI'. Let's determine the shifts needed:

- C (3) -> T (20): Requires a shift of $20 - 3 = +17$.
- R (18) -> C (3): Requires a shift of $3 - 18 = -15$ (or +11 mod 26).
- O (15) -> U (21): Requires a shift of $21 - 15 = +6$. This matches our observation for the middle letter.

- W (23) -> X (24): Requires a shift of $24 - 23 = +1$.
- N (14) -> I (9): Requires a shift of $9 - 14 = -5$ (or +21 mod 26).

The specific shifts required for 'CROWN' are therefore: `+17, -15, +6, +1, -5`. While the exact rule generating these specific shifts based on the input letters isn't fully determined from only two examples, these shifts successfully transform 'CROWN' into 'TCUXI'.

Applying Pattern to CROWN

We apply the determined shifts to each letter of 'CROWN':

- **C** (position 1): Letter value is 3. Apply shift `+17`. Calculation: $3 + 17 = 20$. The 20th letter is **T**.
- **R** (position 2): Letter value is 18. Apply shift `-15`. Calculation: $18 - 15 = 3$. The 3rd letter is **C**.
- **O** (position 3): Letter value is 15. Apply shift `+6`. Calculation: $15 + 6 = 21$. The 21st letter is **U**.
- **W** (position 4): Letter value is 23. Apply shift `+1`. Calculation: $23 + 1 = 24$. The 24th letter is **X**.
- **N** (position 5): Letter value is 14. Apply shift `-5`. Calculation: $14 - 5 = 9$. The 9th letter is **I**.

Combining these results, 'CROWN' is coded as 'TCUXI'.

---

93. **Answer: a**

Explanation:

Analyzing Neelam's Statement to Understand Family Ties

Let's break down the core statement made by Neelam to figure out the family connections:

- Neelam states: "Anita's father Raj is the only son of my father-in-law Sunil."
- **Sunil's Role:** Neelam identifies Sunil as her father-in-law. This tells us that Neelam is married to Sunil's son.
- **Raj's Identity:** The statement explicitly says that Raj is Anita's father.
- **Linking Raj and Sunil:** Crucially, the statement identifies Raj as the **only son** of Neelam's father-in-law, Sunil.
- **Conclusion from Statement:** Combining these points, we deduce that Raj is Sunil's son, and therefore, Raj is Neelam's husband.

Determining Kavita's Relationship to Sunil

Now, let's connect Kavita to Sunil using the established relationships:

- We know Raj is Anita's father.
- The question states that Kavita is the sister of Anita.
- Since sisters share the same parents, Kavita's father must also be Raj.
- We previously established that Raj is the son of Sunil.
- Therefore, Kavita, being the daughter of Raj, is the granddaughter of Sunil.

To summarize the lineage:

- Sunil is the father.
- Raj is Sunil's son.
- Anita and Kavita are Raj's daughters.
- Thus, Anita and Kavita are Sunil's granddaughters.

The question asks how Kavita is related to Sunil. Based on our analysis, Kavita is Sunil's Grand Daughter.

---

94. **Answer: a**

Explanation:

Understanding the Family Relationships: A Detailed Breakdown

This problem involves deciphering a family tree based on several relationship statements. We need to determine the relationship between A and F by carefully analyzing each piece of information.

Step-by-Step Analysis of Blood Relations

Let's break down the given statements to build the family structure:

1. Analyzing the Connection between M, G, and B

- Statement: "B is the daughter of M who is the wife of G."
- Implication: This tells us that M and G are a couple. M is female, and G is male. B is their daughter. So, G is the father of B, and M is the mother of B.

2. Identifying N's Role as Son-in-Law

- Statement: "N is the only son-in-law of G."
- Implication: This signifies that G has exactly one daughter, and this daughter is married to N.
- Connecting with Step 1: Since we know G is the father of B (from step 1), B must be G's only daughter. Therefore, N is married to B.

3. Understanding B's Position as Daughter-in-Law

- Statement: "B is the daughter-in-law of C who is grandparent of F."
- Implication 1: B is a daughter-in-law, meaning she is married to someone whose parent is C. Since B is married to N (from step 2), C must be the parent of N.
- Implication 2: C is a grandparent of F. Since C's child is N, and N is married to B, F must be the child of N and B. This makes C the grandparent of F through their son N.

4. Determining A's Relationship to B

- Statement: "A is the brother-in-law of B."
- Definition: A brother-in-law can be the brother of one's spouse or the husband of one's sister.
- Analysis:
- Case 1: A is the brother of B's spouse. B is married to N. So, A could be the brother of N.
- Case 2: A is the husband of B's sister. From step 2, we know B is the *only* daughter of G. This means B has no sisters.
- Conclusion: Therefore, A cannot be the husband of B's sister. A must be the brother of N.

5. Connecting A to F

- Summary of relationships derived:
- N is married to B.
- A is the brother of N.
- F is the child of N and B.
- Therefore, N is the father of F.
- A is the brother of F's father (N).
- The brother of one's father is the paternal uncle.

Final Conclusion on A's Relation to F

Based on the step-by-step analysis, A is the brother of N, and N is the father of F. Consequently, A is the paternal uncle of F.

---

95. Answer: a

Explanation:

Understanding the School-Principal Analogy

The question presents an analogy based on relationships between entities and their heads or chief administrators. The first pair is "School : Principal". In this relationship,

the **Principal** is the head of the **School**. The Principal oversees the administration, staff, and overall functioning of the educational institution.

Identifying the Newspaper Head Role

We need to find a similar relationship for "Newspaper : ?". We are looking for the person who holds a similar position of authority or ultimate responsibility for a **Newspaper**, analogous to the Principal's role in a School.

Let's examine the options:

- **Editor**: The Editor is typically the senior journalist who leads the newspaper's staff, decides what goes into the newspaper, and is responsible for the final content. This role aligns closely with the leadership and oversight function of a Principal.
- **Printer**: The Printer is responsible for the physical printing process of the newspaper. This is a technical role, not a leadership one concerning content.
- **Reporter**: A Reporter gathers information and writes news stories. While crucial, they are not the final authority or head of the newspaper's editorial content.
- **Distributor**: The Distributor handles the logistics of delivering the newspaper to readers and vendors. This is a distribution and sales function, separate from editorial leadership.

Analogy Justification

Comparing the roles, the **Editor** holds the position most analogous to the **Principal**. Both are ultimately responsible for the management and output of their respective organizations – the Principal for the school's operations and the Editor for the newspaper's content and editorial direction. The Printer, Reporter, and Distributor have specific functions but do not represent the overall leadership comparable to a Principal.

---

96. **Answer: b**

Explanation:

The logic followed here is,

⇒ (23 + 15) - 32 = 38 - 32 = 6

⇒ (19 + 26) - 29 = 45 - 29 = 16

Similarly,

⇒ (27 + 9) - 18 = 36 - 18 = 18

So, the missing term is **18** .

Hence, the correct answer is **Option 2** .

---

97. Answer: a

Explanation:

⭐ Hint

If exact figure is not shown in options, mark the most appropriate option present.

On observing the given figures carefully, we get:

In the question figure (X),

1. One dot is in the common area of the Y-shape,Kite-shape, and square.

2. One dot is in the common area of the Y-shape and circle.

3. One dot is solely placed in the Kite-shape only.

Figure (A) → All the required conditions are fulfilled as shown below:

Figure (B) → Common area of the Y-shape,Kite-shape, and square isn't present.

Figure (C) → Common area of the Y-shape,Kite-shape, and square isn't present.

Figure (D) → Common area of the Y-shape,Kite-shape, and square isn't present.

Hence, the correct answer is "Figure (A)".

We should not think of the exact shape and size of the figures in these questions.

Just resemblance will work like if an Equilateral triangle is given in the question figure, any shape of a triangle in the answer figure will work, be it right triangle or scalene triangle.

---

98. **Answer: a**

Explanation:

The pattern followed in the given series is:
There is a repetition of triangle, square and pentagon in the series.
In each step a new alphabet is introduced at the corner in clockwise pattern.
Next step will be:
The alphabet will be 'D' and it will be placed at the only corner left i.e. bottom left.
The shapes in the first step will repeat itself.

Now we compare the given options:
Option 1) The pattern matches completely.
Option 2) Shaded shape is the wrong shape.
Option 3) Alphabet 'D' is missing.
Option 4) Shaded shape is the wrong shape.

Hence **the correct answer is option 1)**

---

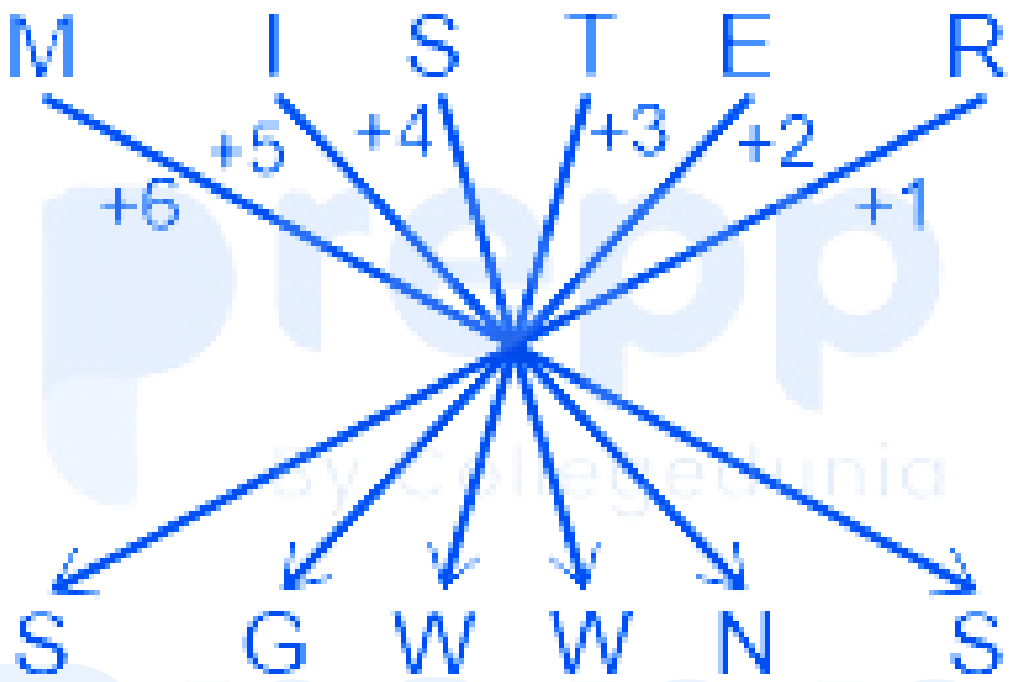
99. **Answer: b**

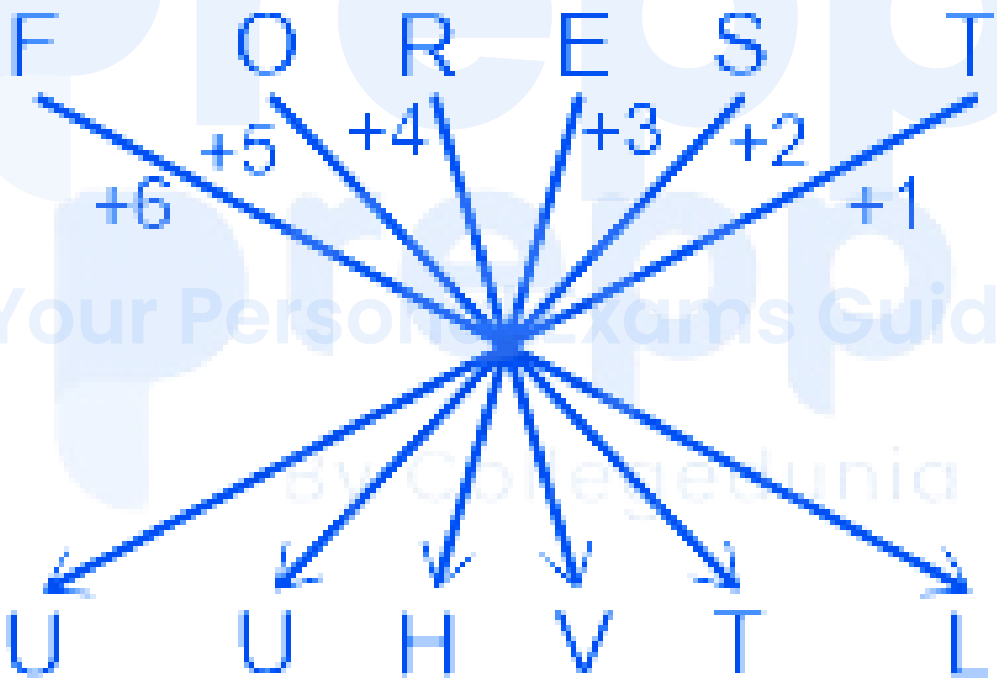
Explanation:

Alphabets	A	B	C	D	E	F	G	H	I	J	K	L	M
Positional value	1	2	3	4	5	6	7	8	9	10	11	12	13
Positional value	26	25	24	23	22	21	20	19	18	17	16	15	14
Alphabets	Z	Y	X	W	V	U	T	S	R	Q	P	O	N

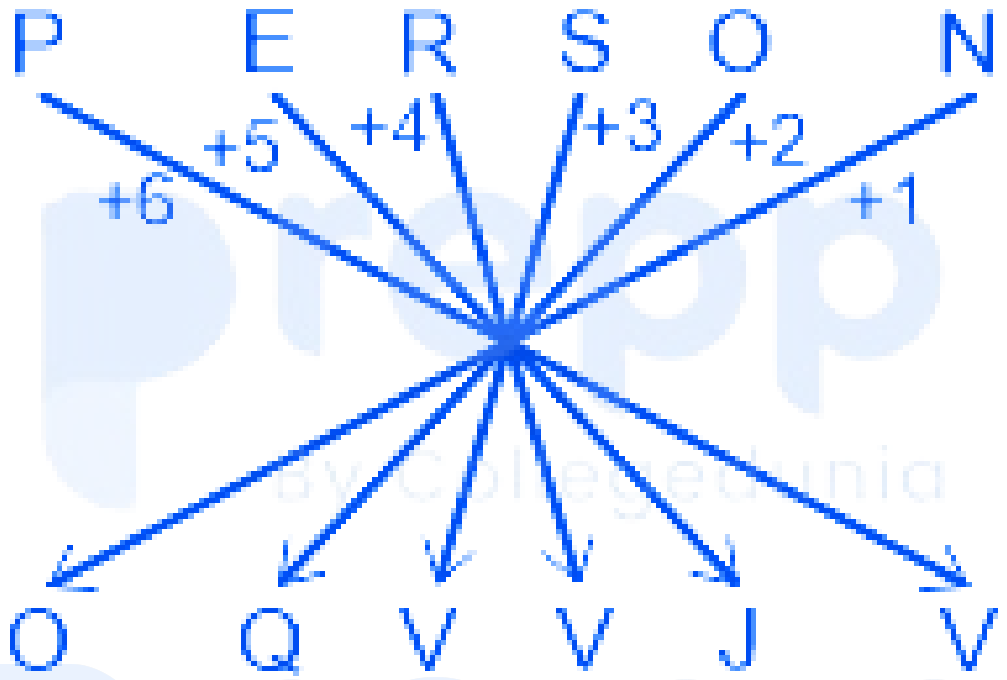
The logic followed here is:

'MISTER' is coded as SGWWNS

- 

- 'FOREST' is coded as 'UUHVTL'
- 

Similarly, PERSON



Hence, 'OQVVJV' is the correct answer.

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100. **Answer: b**

Explanation:

Understanding the Earth-Globe Analogy

This question presents a word analogy problem. The task is to identify the relationship between the first pair of words, 'Earth' and 'Globe', and then apply that same relationship to find the correct word for the second pair, starting with 'Dry'.

- **Earth** refers to our planet, the celestial body.
- A **Globe** is a spherical model or representation of the Earth. It visually depicts the Earth's surface.

The relationship here is that a 'Globe' serves as a model or representation of the 'Earth'.

Analyzing the 'Dry' Relationship

We need to find a word among the options that relates to 'Dry' in the same way 'Globe' relates to 'Earth'. This means we are looking for a term that represents a specific type, classification, or characteristic related to being 'Dry'.

Evaluating Options for the 'Dry' Analogy

Let's examine each option in the context of the 'Dry' word:

1. **Fresh**: 'Fresh' is typically an antonym (opposite) of 'Dry'. For instance, we talk about fresh air versus dry air. This relationship is oppositional, not representational.
2. **Arid**: The term 'Arid' describes a climate or region that is extremely dry, usually due to a severe lack of rainfall. It signifies a specific, often intense, condition of dryness. This fits the pattern where 'Arid' specifies a particular state or type related to 'Dry', much like a 'Globe' specifies a representation of the 'Earth'.
3. **Wet**: 'Wet' is the direct opposite of 'Dry'. This is an antonym relationship and does not match the analogy's pattern.
4. **Lively**: 'Lively' pertains to having energy or spirit. It does not share a representational or specific-state relationship with 'Dry'.

Conclusion on the Word Analogy

The analogy requires finding a specific representation or classification. Just as a 'Globe' is a representation of the 'Earth', 'Arid' is a term that describes a specific condition characterized by extreme dryness. Therefore, 'Arid' completes the analogy.

The completed analogy is: Earth : Globe :: Dry : Arid.