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TANATA General Aptitude & Mental Ability

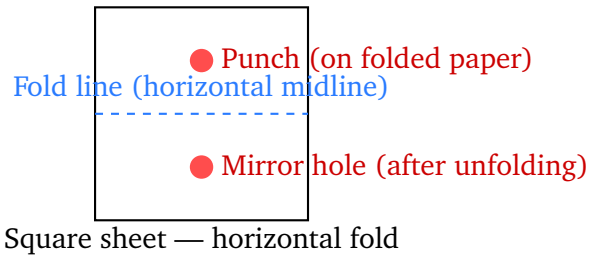
Sample Paper – 7

Duration: 38 Minutes	Questions: 25	Max Marks: 50

Instructions

- This paper contains **25** Multiple Choice Questions (Single Correct Answer), modelled on the General Aptitude & Mental Ability portion of **TANATA** entrance.
- Each correct answer carries **+2 marks**. There is **no negative marking** for incorrect or unattempted answers.
- Only **one** option is correct. Choose carefully.
- Syllabus level: **General Aptitude section of TANATA — Mental Ability (visual, numerical, verbal), Architectural Awareness (Indian & International), Mathematical Reasoning, and Sets & Relations.**
- Use of mobile phones, calculators, or electronic gadgets is strictly prohibited.

Q.1. A square sheet of paper is folded once along its horizontal midline (bottom half folded up onto top half). A circular hole is then punched at the centre of the folded paper. When the sheet is fully unfolded, where are the holes?



Square sheet — horizontal fold

(A) One hole at the centre of the sheet

(B) Two holes at the left and right edges

(C) Two holes symmetric about the horizontal midline — one in the upper half, one in the lower half at the same horizontal position

(D) No holes visible after unfolding

Answer: (C)

Q.2. Four figures are shown. Three share the property of having at least one axis of symmetry; one does not. Which figure has **NO** axis of symmetry?

(A) Equilateral triangle (3 axes of symmetry)

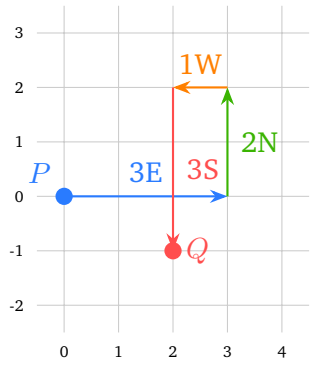
(B) Circle (infinite axes of symmetry)

(C) Regular pentagon (5 axes of symmetry)

(D) Scalene triangle (all three sides of different lengths)

Answer: (D)

Q.3. A person starts at point P on a grid and moves: 3 steps East, 2 steps North, 1 step West, 3 steps South. What is the final position relative to P?



(A) 2 steps East and 1 step South of P

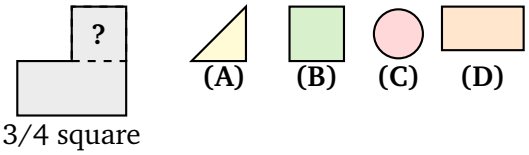
(B) 3 steps East and 2 steps North of P

(C) 1 step East and 2 steps South of P

(D) 2 steps East and 3 steps South of P

Answer: (A)

Q.4. A square has its top-right quarter missing (removed). Which of the following pieces correctly fills the gap?



3/4 square

(A) A right triangle

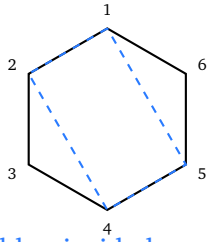
(B) A small square (quarter-size)

(C) A circle

(D) A wide rectangle

Answer: (B)

Q.5. Which of the following simple shapes is hidden within the regular hexagon drawn below (formed by connecting certain vertices of the hexagon)?



Rhombus hidden inside hexagon (dashed)

(A) Circle

(B) Pentagon

(C) Rhombus (connecting two pairs of adjacent vertices on opposite sides of the hexagon)

(D) Octagon

Answer: (C)

Q.6. Two trains start simultaneously from stations P and Q, which are 300 km apart, and travel toward each other. The train from P travels at 60 km/h and the train from Q travels at 90 km/h. After how many hours do the two trains meet?

(A) 1 hour

(B) 1.5 hours

(C) 3 hours

(D) 2 hours

Answer: (D)

Q.7. Find the missing number (?) in the following 3×3 grid.

	C1	C2	C3
R1	1	2	3
R2	2	4	6
R3	3	6	?

(A) 9

(B) 12

(C) 6

(D) 8

Answer: (A)

Q.8. In how many different ways can 4 boys be arranged in a single row?

(A) 12

(B) 24

(C) 48

(D) 16

Answer: (B)

Q.9. A bag contains 3 red balls and 5 blue balls. One ball is drawn at random. What is the probability that it is a red ball?

(A) $\frac{1}{3}$

(B) $\frac{5}{8}$

(C) $\frac{3}{8}$

(D) $\frac{3}{5}$

Answer: (C)

Q.10. Scalpel : Surgeon :: Chisel : _____

(A) Painter

(B) Architect

(C) Doctor

(D) Sculptor

Answer: (D)

Q.11. Which of the following does **NOT** belong in the same category as the others?

(A) Blueprint

(B) Gothic

(C) Baroque

(D) Mughal

Answer: (A)

Q.12. Order : Chaos :: Creation : _____

(A) Innovation

(B) Destruction

(C) Imagination

(D) Evolution

Answer: (B)

Q.13. Mango : Fruit :: Rose : _____

(A) Tree

(B) Thorn

(C) Flower

(D) Plant

Answer: (C)

Q.14. The Red Fort (Lal Qila) in Delhi, a UNESCO World Heritage Site built primarily of red sandstone, was constructed as the palatial residence of the Mughal emperor who also commissioned the Taj Mahal. Who was this emperor?

(A) Akbar

(B) Babur

(C) Aurangzeb

(D) Shah Jahan

Answer: (D)

Q.15. The Ajanta Caves in Maharashtra, celebrated for their exquisite Buddhist rock-cut architecture, painting, and sculpture, were primarily excavated and decorated during which historical period?

(A) Gupta era (5th–6th century CE)

(B) Mughal era

(C) British colonial era

(D) Maratha era

Answer: (A)

Q.16. The Capitol Complex in Chandigarh — comprising the High Court, Secretariat, and Legislative Assembly — was designed as part of the planned city master plan by which architect?

(A) Charles Correa

(B) Le Corbusier

(C) B.V. Doshi

(D) Achyut Kanvinde

Answer: (B)

Q.17. Rashtrapati Bhavan in New Delhi, the official residence of the President of India, was designed by:

(A) Herbert Baker

(B) Charles Correa

(C) Sir Edwin Lutyens

(D) Raj Rewal

Answer: (C)

Q.18. The Eiffel Tower in Paris, built in 1889 for the World's Fair, is constructed primarily of:

(A) Steel

(B) Aluminium

(C) Reinforced concrete

(D) Wrought (puddled) iron

Answer: (D)

Q.19. The Sagrada Família basilica in Barcelona, under continuous construction since 1882 and still unfinished, was originally designed by which architect?

(A) Antoni Gaudí

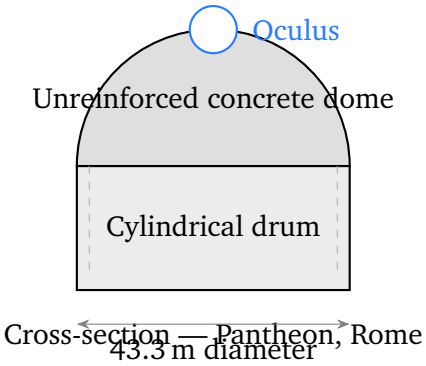
(B) Santiago Calatrava

(C) Rafael Moneo

(D) Álvaro Siza

Answer: (A)

Q.20. The Pantheon in Rome (completed c. 125 CE) is renowned for which groundbreaking structural feature?



Cross-section — Pantheon, Rome

(A) First use of flying buttresses

(B) Unreinforced concrete dome with a central circular opening (oculus)

(C) First all-glass curtain wall

(D) Largest Gothic nave in the ancient world

Answer: (B)

Q.21. The statement "$\forall x,\ P(x)$" (where $\forall$ is the universal quantifier) means:

(A) There exists at least one x for which $P(x)$ is true

(B) $P(x)$ is true for some x but not all

(C) $P(x)$ is true for every x in the domain

(D) $P(x)$ is never true for any x

Answer: (C)

Q.22. Which of the following is an **open statement** (its truth value depends on the value of a variable)?

(A) $2 + 2 = 4$

(B) The sky is blue

(C) All triangles have three sides

(D) $x + 2 = 7$

Answer: (D)

Q.23. If $p \to q$ and $q \to r$ are both true, which of the following conclusions follows necessarily?

(A) $p \to r$

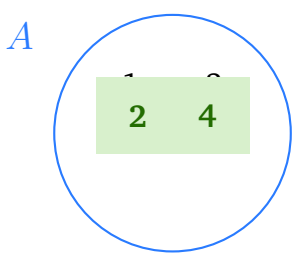
(B) $q \to p$

(C) $r \to p$

(D) $p \wedge q$

Answer: (A)

Q.24. Which of the following is a *subset* of $A = \{1, 2, 3, 4, 5\}$?



Shaded subset: $\{2, 4\} \subseteq A$

(A) $\{6\}$

(B) $\{2, 4\}$

(C) $\{0, 1\}$

(D) $\{1, 2, 6\}$

Answer: (B)

Q.25. If $A = \{1, 2, 3, 4\}$ and $B = \{3, 4, 5, 6\}$, what is $A \triangle B$ (the symmetric difference of A and B)?

(A) $\{3, 4\}$

(B) $\{1, 2, 3, 4, 5, 6\}$

(C) $\{1, 2, 5, 6\}$

(D) $\{3, 4, 5, 6\}$

Answer: (C)

Solutions

Q.1.

Solution

Concept & Chapter: Paper Folding & Punch — Visual Reasoning. Folding along the horizontal midline creates two layers; a single punch produces two symmetric holes (upper and lower halves) when unfolded. Answer: **(C)**.

Visual — Fold and Punch.

When the sheet is folded along the horizontal midline (bottom half up onto top half), the paper has two layers. The punch goes through *both* layers simultaneously. On the top layer the hole appears at the horizontal centre of the upper half; on the bottom layer (which is the folded-up lower half) the hole appears at its mirror image position, i.e., the horizontal centre of the lower half.

After fully unfolding, **two holes** are visible, one in the upper half and one in the lower half, both at the same horizontal centre — symmetric about the fold line.

Option (C) is correct. Option (A) would require the fold to be along both midlines simultaneously; options (B) and (D) are geometrically impossible.

Go Back to Q 1

Solution

Concept & Chapter: Figure Classification (Symmetry) — Visual Reasoning. Identify the shape with zero axes of symmetry; a scalene triangle has all unequal sides and no line of symmetry. Answer: **(D)**.

Visual — Figure Classification (Axes of Symmetry).

Q.2.

- Equilateral triangle (A): 3 axes of symmetry (each vertex to midpoint of opposite side).
- Circle (B): infinitely many axes of symmetry (every diameter is an axis).
- Regular pentagon (C): 5 axes of symmetry (one per vertex, through midpoint of opposite side).
- **Scalene triangle (D):** all three sides have different lengths, so no line maps the triangle onto itself — **zero axes of symmetry**.

Option (D) is the figure with NO axis of symmetry.

Go Back to Q 2

Solution

Concept & Chapter: Path Tracing — Visual Reasoning. Compute net displacement: East $3-1=2$, North/South $2-3=-1$ (1 South); final position is 2 East and 1 South of P. Answer: **(A)**.

Visual — Path Tracing on Grid.

Starting at $P=(0,\,0)$:

Q.3.

- 3 steps East $\Rightarrow (3,\,0)$
- 2 steps North $\Rightarrow (3,\,2)$
- 1 step West $\Rightarrow (2,\,2)$
- 3 steps South $\Rightarrow (2,\,-1)$

$$\text{Net East} = 3-1=2, \qquad \text{Net North} = 2-3=-1 \text{ (i.e., 1 step South)}.$$

Final position Q: **2 steps East and 1 step South** of P.

Option (A) is correct.

Go Back to Q 3

Q.4.

Solution

Concept & Chapter: Shape Completion — Visual Reasoning. The missing top-right quarter of the square is itself a square of half the original side length; only a quarter-size square fills the gap exactly. Answer: **(B)**.

Visual — Shape Completion.

The original figure is a square with its top-right quarter removed. The missing region is therefore a square whose side length is *half* the side length of the original square (i.e., one quarter of its area). The only piece that fills this rectangular gap precisely — with straight sides and right angles — is a **small square of quarter-size**.

Option (A) (triangle) leaves unfilled space in the corner; option (C) (circle) does not fit the square gap; option (D) (wide rectangle) overshoots the boundary.

Option (B) is correct.

Go Back to Q 4

Q.5.

Solution

Concept & Chapter: Embedded Figure (Hidden Figure) — Visual Reasoning. Connecting four alternating vertices of a regular hexagon traces a rhombus hidden within the figure. Answer: **(C)**.

Visual — Hidden Figure in Hexagon.

A regular hexagon has 6 vertices. Selecting *four* vertices in a pattern such as $1 \to 2 \to 4 \to 5 \to 1$ (i.e., two adjacent vertices, skip one, two adjacent, skip one) traces a **rhombus** — a parallelogram with all four sides equal — embedded within the hexagon. This shape is clearly visible within the figure when the relevant diagonals are drawn.

A circle (A) cannot be traced using hexagon vertices; a pentagon (B) requires 5 vertices; an octagon (D) has more sides than the hexagon has vertices.

Option (C) is correct.

Go Back to Q 5

Q.6.

Solution

Concept & Chapter: Relative Speed (Train Meeting) — Numerical Ability. Add speeds for head-on travel; time $= 300 \div (60 + 90) = 2$ hours. Answer: **(D)**.

Numerical — Train Meeting Problem.

The two trains travel *toward* each other, so their speeds add:

$$\text{Relative speed} = 60 + 90 = 150\,\text{km/h}.$$

$$\text{Time to meet} = \frac{\text{Distance}}{\text{Relative speed}} = \frac{300}{150} = \mathbf{2}\ \text{hours}.$$

Option (D) is correct.

Go Back to Q 6

Q.7.

Solution

Concept & Chapter: Number Grid Pattern — Numerical Ability. Each cell value equals row number $\times$ column number; the missing cell (R3, C3) $= 3 \times 3 = 9$. Answer: **(A)**.

Numerical — Missing Number in Grid.

Inspecting the 3×3 grid reveals the rule: each cell value equals its **row number** $\times$ **column number**.

	C1	C2	C3
R1	$1 \times 1 = 1$	$1 \times 2 = 2$	$1 \times 3 = 3$
R2	$2 \times 1 = 2$	$2 \times 2 = 4$	$2 \times 3 = 6$
R3	$3 \times 1 = 3$	$3 \times 2 = 6$	$3 \times 3 = \mathbf{9}$

The missing value is $3 \times 3 = \mathbf{9}$.

Option (A) is correct.

Go Back to Q 7

Q.8.

Solution

Concept & Chapter: Permutations (Factorial) — Numerical Ability. Number of arrangements of 4 distinct objects in a row $= 4! = 24$. Answer: **(B)**.

Numerical — Permutations.

The number of ways to arrange n distinct objects in a row is $n!$.

$$4! = 4 \times 3 \times 2 \times 1 = \mathbf{24}.$$

There are **24** different arrangements. Option (B) is correct.

Go Back to Q 8

Q.9.

Solution

Concept & Chapter: Classical Probability — Numerical Ability. P(red) = favourable outcomes ÷ total $= 3/8$. Answer: **(C)**.

Numerical — Probability.

Total balls $= 3 + 5 = 8$.

$$P(\text{red}) = \frac{\text{Number of red balls}}{\text{Total balls}} = \frac{3}{8}.$$

Option (C) is correct.

Go Back to Q 9

Q.10.

Solution

Concept & Chapter: Tool–User Analogy — Verbal Reasoning. A scalpel is the surgeon's precision tool; a chisel is the sculptor's precision carving tool. Answer: **(D)**.

Verbal — Tool–User Analogy.

A *scalpel* is the primary precision cutting instrument used by a *surgeon*. By the same relationship, a *chisel* is the primary shaping and carving instrument used by a *sculptor*.

A painter uses brushes; an architect uses drawing instruments; a doctor is too

broad (the surgeon is already a doctor). The specific craftsperson who uses a chisel for shaping stone, wood, or metal is the **sculptor**.

Option (D) is correct.

Go Back to Q 10

Q.11.

Solution

Concept & Chapter: Odd One Out (Classification) — Verbal Reasoning. Gothic, Baroque, and Mughal are architectural styles; Blueprint is a technical drawing type, making it the odd one out. Answer: **(A)**.

Verbal — Odd One Out (Architectural Styles vs. Drawing Type).

Gothic (B), Baroque (C), and Mughal (D) are all historical **architectural styles/periods**: Gothic (medieval European), Baroque (17th century European), and Mughal (Indo-Islamic, 16th–18th century India).

A **Blueprint** (A) is a type of *technical architectural drawing* (a reprographic copy of a design document), not an architectural style. It belongs to an entirely different category.

Option (A) is the odd one out.

Go Back to Q 11

Q.12.

Solution

Concept & Chapter: Antonym Analogy — Verbal Reasoning. Order:Chaos are antonyms; the antonym of Creation is Destruction. Answer: **(B)**.

Verbal — Abstract Analogy (Opposites).

Order and *Chaos* are antonyms — each is the absence or opposite of the other. The analogy asks for the opposite of *Creation*.

The opposite of Creation is **Destruction** — creation brings something into existence, destruction removes it. Innovation, Imagination, and Evolution are all related to creation or change but are not true antonyms.

Option (B) is correct.

Go Back to Q 12

Solution

Concept & Chapter: Category–Member Analogy — Verbal Reasoning. Mango is to Fruit as Rose is to Flower (species-to-category relationship). Answer: **(C)**.

Verbal — Category–Member Analogy.

A *Mango* is a *species (member) of the category Fruit*. The analogy requires identifying which category *Rose* belongs to in the same way.

A Rose is a species (member) of the category **Flower**.

Q.13.

- "Tree" (A): a rose is a shrub, not a tree; and "tree" is not the categorical grouping.
- "Thorn" (B): a thorn is a *part* of a rose plant, not a category.
- "Plant" (D): too broad a superordinate category — a mango is also a plant.

Option (C) is correct.

Go Back to Q 13

Q.14.

Solution

Concept & Chapter: Indian Architecture (Mughal — Red Fort) — Architectural Awareness. Shah Jahan built both the Red Fort (1638–1648) and the Taj Mahal, making him the commissioner of both UNESCO monuments. Answer: **(D)**.

Architectural Awareness — Indian (Mughal: Red Fort).

Shah Jahan (r. 1628–1658) built the **Red Fort** (Lal Qila) as his new imperial palace in Delhi. Construction began in 1638 and was completed in 1648. He also commissioned the **Taj Mahal** in Agra (completed c. 1653) as the mausoleum for his wife Mumtaz Mahal. Both monuments are UNESCO World Heritage Sites.

Akbar built Fatehpur Sikri; Babur was the founder of the Mughal dynasty and built no surviving major monument; Aurangzeb was Shah Jahan's son and successor.

Option (D) is correct.

Go Back to Q 14

Solution

Concept & Chapter: Indian Architecture (Ajanta Caves) — Architectural Awareness. The Ajanta Caves' major artistic phase (polychrome murals) belongs to the Gupta era (5th–6th century CE). Answer: **(A)**.

Architectural Awareness — Indian (Ajanta Caves).

The Ajanta Caves were excavated in two main phases:

Q.15.

- **Phase I** (c. 2nd century BCE): early Hinayana Buddhist caves (simple chaitya halls and viharas).
- **Phase II** (5th–6th century CE): the major florescence under the patronage of the **Vakataka** rulers (contemporary with the **Gupta** golden age), produc-

ing the famous polychrome murals depicting Jataka tales and the life of the Buddha.

The question asks about the period of the primary artistic decoration, which corresponds to the **Gupta era (5th–6th century CE)**.

Option (A) is correct.

Go Back to Q 15

Q.16.

Solution

Concept & Chapter: Indian Architecture (Chandigarh Capitol Complex) — Architectural Awareness. Le Corbusier designed Chandigarh's Capitol Complex and city master plan in the early 1950s (UNESCO 2016). Answer: **(B)**.

Architectural Awareness — Indian (Chandigarh Capitol Complex).

Le Corbusier (Charles-Édouard Jeanneret, 1887–1965) designed the Capitol Complex and the overall master plan for **Chandigarh** in the early 1950s. Chandigarh was built as Punjab's new capital after Lahore was assigned to Pakistan at Partition (1947). Le Corbusier collaborated with his cousin Pierre Jeanneret, Jane Drew, and Maxwell Fry on the project.

The Capitol Complex — comprising the High Court (1956), Secretariat (1958), and Legislative Assembly (1962) — is a UNESCO World Heritage Site (inscribed 2016). Charles Correa, B.V. Doshi, and Achyut Kanvinde are distinguished Indian architects but did not design the Capitol Complex.

Option (B) is correct.

Go Back to Q 16

Q.17.

Solution

Concept & Chapter: Indian Architecture (Rashtrapati Bhavan) — Architectural Awareness. Sir Edwin Lutyens designed Rashtrapati Bhavan (completed 1929), blending Classical and Mughal styles. Answer: **(C)**.

Architectural Awareness — Indian (Rashtrapati Bhavan).

Sir Edwin Lutyens (1869–1944) designed **Rashtrapati Bhavan** (completed 1929, originally called Viceroy's House). The building blends Classical colonnades, Palladian proportions, and a large Mughal-inspired *chhatri*-crowned dome. Lutyens collaborated with Herbert Baker on New Delhi's layout; Baker designed the flanking Secretariat buildings.

Charles Correa (B) and Raj Rewal (D) are contemporary Indian architects; neither designed Rashtrapati Bhavan.

Option (C) is correct.

Go Back to Q 17

Q.18.

Solution

Concept & Chapter: International Architecture (Eiffel Tower) — Architectural Awareness. The Eiffel Tower (1887–1889) was constructed from wrought (puddled) iron, not modern structural steel. Answer: **(D)**.

Architectural Awareness — International (Eiffel Tower).

The Eiffel Tower was constructed between 1887 and 1889 using approximately 7,300 tonnes of **wrought (puddled) iron** — not modern structural steel. Wrought iron is a low-carbon iron with slag inclusions, making it malleable, weldable, and more corrosion-resistant than cast iron. Gustave Eiffel's engineering firm selected it specifically for its properties.

Aluminium (B) was rare and expensive in 1889; reinforced concrete (C) was not suitable for such a lattice structure; modern structural steel (A) was not yet the industry standard when construction began.

Option (D) is correct.

Go Back to Q 18

Q.19.

Solution

Concept & Chapter: International Architecture (Sagrada Família) — Architectural Awareness. Antoni Gaudí took over the Sagrada Família in 1883 and devoted 43 years to its unique Catalan Modernisme design. Answer: **(A)**.

Architectural Awareness — International (Sagrada Família).

Antoni Gaudí (1852–1926) took over the Sagrada Família project in 1883 (one year after it began under Francisco de Paula del Villar) and devoted the last 43 years of his life to it. He radically transformed the design using his unique **Catalan Modernisme** style — hyperboloid vaults, branching columns that eliminate the need for flying buttresses, and elaborate stone facades inspired by natural organic forms.

Santiago Calatrava (B), Rafael Moneo (C), and Álvaro Siza (D) are other prominent Spanish and Portuguese architects but had no role in the Sagrada Família.

Option (A) is correct.

Go Back to Q 19

Q.20.

Solution

Concept & Chapter: International Architecture (The Pantheon, Rome) — Architectural Awareness. The Pantheon's hallmark is its 43.3 m unreinforced concrete dome with a central oculus — the world's largest such dome for 1,300 years. Answer: **(B)**.

Architectural Awareness — International (The Pantheon, Rome).

The Pantheon (completed c. 125 CE under Emperor Hadrian) is celebrated for its **unreinforced concrete dome** of 43.3 m diameter — the largest such dome in the world for over 1,300 years (surpassed only by Brunelleschi's Florence Cathedral dome in 1436). At the dome's apex is the **oculus** (8.7 m diameter), a circular opening that is the building's sole light source. The dome's concrete mix becomes progressively lighter near the crown (using pumice aggregate) to reduce structural loads.

Flying buttresses (A) are a Gothic invention, centuries later; glass curtain walls (C) are a 20th-century technology; Gothic naves (D) are entirely unrelated to ancient Rome.

Option (B) is correct.

Go Back to Q 20

Solution

Concept & Chapter: Universal Quantifier ($\forall$) — Mathematical Reasoning. $\forall x\, P(x)$ asserts $P(x)$ is true for *every* x in the domain, distinct from the existential quantifier $\exists$. Answer: **(C)**.

Mathematical Reasoning — Universal Quantifier.

The two fundamental quantifiers in predicate logic are:

Q.21.

- $\forall x\ P(x)$: **"For all x in the domain, $P(x)$ is true."** (Universal quantifier)
- $\exists x\ P(x)$: **"There exists at least one x such that $P(x)$ is true."** (Existential quantifier)

Option (A) describes $\exists x\ \ P(x)$; option (B) describes a partial truth; option (D) describes the negation $\forall x\ \neg P(x)$.

Option (C) is the correct reading of $\forall x\ P(x)$.

Go Back to Q 21

Solution

Concept & Chapter: Open Statement (Free Variable) — Mathematical Reasoning. An open statement contains a free variable; $x + 2 = 7$ has no fixed truth value until x is assigned. Answer: **(D)**.

Mathematical Reasoning — Open Statement.

An **open statement** (open sentence) contains one or more free variables and has no definite truth value until the variables are assigned specific values.

Q.22.

- (A) $2 + 2 = 4$: a *closed* proposition; always True.
- (B) "The sky is blue": a *closed* proposition with a definite truth value.
- (C) "All triangles have three sides": a *closed* universal statement; always True.
- (D) $x + 2 = 7$: contains the **free variable** x. It is true when $x = 5$, false otherwise — its truth value depends on the assigned value of x.

Option (D) is the open statement.

Go Back to Q 22

Q.23.

Solution

Concept & Chapter: Hypothetical Syllogism — Mathematical Reasoning. From $p \to q$ and $q \to r$, chaining implications gives $p \to r$ by the hypothetical syllogism rule. Answer: **(A)**.

Mathematical Reasoning — Hypothetical Syllogism.

Hypothetical Syllogism is the valid argument form:

$$\frac{p \to q, \quad q \to r}{\therefore \; p \to r}$$

Informal proof: Suppose p is true. Since $p \to q$, q must be true. Since $q \to r$, r must be true. Therefore, whenever p is true, r is true: $p \to r$.

Options (B) ($q \to p$) and (C) ($r \to p$) reverse the direction of implication without justification; option (D) ($p \wedge q$) requires knowing p and q are individually true, which is not given.

Option (A) is correct.

Go Back to Q 23

Solution

Concept & Chapter: Subset — Sets & Relations. $\{2, 4\}$ is the only option whose every element belongs to $A = \{1, 2, 3, 4, 5\}$, satisfying $S \subseteq A$. Answer: **(B)**.

Sets — Subset.

A set S is a **subset** of A if and only if every element of S is also an element of A: $S \subseteq A \iff \forall x(x \in S \Rightarrow x \in A)$.

$$A = \{1,\ 2,\ 3,\ 4,\ 5\}.$$

Q.24.

- (A) $\{6\}$: $6 \notin A \Rightarrow$ **not a subset.**
- (B) $\{2,\ 4\}$: $2 \in A$ and $4 \in A \Rightarrow \{\mathbf{2}, \mathbf{4}\} \subseteq \mathbf{A}$. ✓
- (C) $\{0,\ 1\}$: $0 \notin A \Rightarrow$ **not a subset.**
- (D) $\{1,\ 2,\ 6\}$: $6 \notin A \Rightarrow$ **not a subset.**

Option (B) is correct.

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Q.25.

Solution

Concept & Chapter: Symmetric Difference — Sets & Relations. $A \triangle B = (A - B) \cup (B - A) = \{1, 2\} \cup \{5, 6\} = \{1, 2, 5, 6\}$, the elements in one set but not both. Answer: **(C)**.

Sets — Symmetric Difference.

$$A = \{1,\ 2,\ 3,\ 4\}, \qquad B = \{3,\ 4,\ 5,\ 6\}.$$

$$A \cap B = \{3,\ 4\} \quad \text{(elements in both)}.$$

$$A \triangle B = (A - B) \cup (B - A) = \{1,\ 2\} \cup \{5,\ 6\} = \{\mathbf{1},\ \mathbf{2},\ \mathbf{5},\ \mathbf{6}\}.$$

Equivalently, $A \triangle B = (A \cup B) \setminus (A \cap B) = \{1, 2, 3, 4, 5, 6\} \setminus \{3, 4\} = \{1, 2, 5, 6\}$.

Option (A) gives only $A \cap B$; option (B) gives $A \cup B$; option (D) gives B.

Option (C) is correct.

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Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	C	2	D	3	A	4	B	5	C
6	D	7	A	8	B	9	C	10	D
11	A	12	B	13	C	14	D	15	A
16	B	17	C	18	D	19	A	20	B
21	C	22	D	23	A	24	B	25	C