



TANATA General Aptitude & Mental Ability

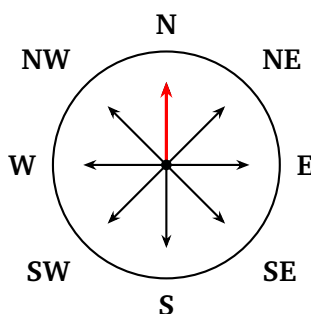
Sample Paper – 5

Duration: 38 Minutes	Questions: 25	Max Marks: 50
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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 traveller starts facing North. She turns 90° clockwise, then turns 135° anticlockwise. Which direction does she now face?



(A) North-West

- (B) South-East
- (C) North-East
- (D) South-West

Answer: (A)

Q.2. An arrow initially points East. It is rotated 45° clockwise at each step. After 5 such steps, in which direction does the arrow point?

- (A) South
- (B) North-West
- (C) West
- (D) South-East

Answer: (B)

Q.3. Which symbol comes next in the series?

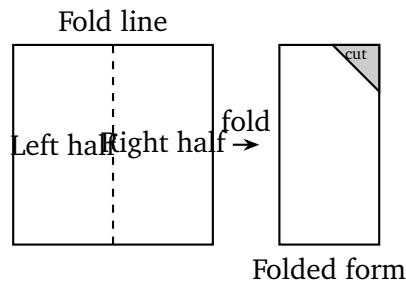
$\triangle$, $\square$, $\bigcirc$, $\triangle\triangle$, $\square\square$, $\bigcirc\bigcirc$, $\triangle\triangle\triangle$, ?

- (A) $\bigcirc\bigcirc$
- (B) $\square\square\square$
- (C) $\triangle\triangle\triangle\triangle$
- (D) $\bigcirc\bigcirc\bigcirc$

Answer: (B)

Q.4. A square sheet of paper is folded once along its vertical midline (right half folded onto left half). A small triangular cut is made at the top-right corner of the folded paper. When the sheet is unfolded, how many triangular holes are visible?

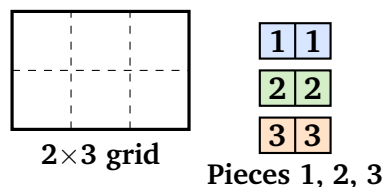




- (A) One triangular hole
- (B) Two triangular holes at the top
- (C) Three holes
- (D) Two symmetric triangular holes (one on each half, mirrored)

Answer: (D)

Q.5. Three rectangular pieces (each covering 2 unit squares, i.e., a 1×2 domino) can be arranged to fill a 2×3 rectangle. Which of the following correctly describes the arrangement that fills the rectangle with no gaps?



- (A) All three pieces placed horizontally side by side, completely filling the 2×3 rectangle
- (B) Two pieces placed vertically, one horizontally — but this leaves a gap
- (C) All three placed vertically — but the rectangle has only 2 rows
- (D) No arrangement fills the rectangle without gaps

Answer: (A)

Q.6. Riya can complete a piece of work in 12 days, and Suman can complete the same work in 18 days. How many days will they take to complete the work if they work together?



- (A) 6
- (B) $\frac{36}{5}$
- (C) 8
- (D) 10

Answer: (B)

Q.7. Find the next term in the series: 1, 1, 2, 3, 5, 8, 13, _____

- (A) 15
- (B) 18
- (C) 20
- (D) 21

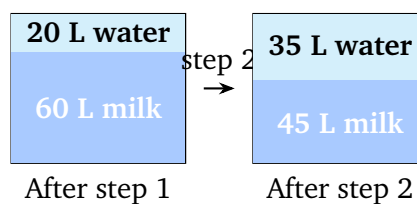
Answer: (D)

Q.8. What is the Highest Common Factor (HCF) of 36 and 60?

- (A) 6
- (B) 4
- (C) 18
- (D) 12

Answer: (D)

Q.9. A container holds 80 litres of pure milk. 20 litres of milk are removed and replaced with 20 litres of water. Then 20 litres of the mixture are again removed and replaced with 20 litres of water. What fraction of the final mixture is milk?



(A) $\frac{9}{16}$

(B) $\frac{3}{4}$

(C) $\frac{7}{16}$

(D) $\frac{11}{16}$

Answer: (A)

Q.10. Hot : Cold :: Loud : _____

(A) Noise

(B) Quiet

(C) Sound

(D) Soft

Answer: (B)

Q.11. Which of the following is **NOT** a component of a roof structure?

(A) Column

(B) Purlin

(C) Rafter

(D) Ridge Beam

Answer: (A)

Q.12. Architect : Designs :: Sculptor : _____

(A) Paints

(B) Photographs

(C) Writes

(D) Sculpts



Answer: (D)

Q.13. Damp : Wet :: Warm : _____

- (A) Scorching
- (B) Cool
- (C) Mild
- (D) Lukewarm

Answer: (A)

Q.14. The Great Stupa at Sanchi, one of India's oldest stone structures, was originally commissioned by which ruler to enshrine relics of the Buddha?

- (A) Chandragupta Maurya
- (B) Ashoka
- (C) Kanishka
- (D) Harsha

Answer: (B)

Q.15. The Lotus Temple in New Delhi, shaped like a half-open lotus flower with 27 free-standing marble-clad petal-shaped structures, belongs to which faith?

- (A) Hindu
- (B) Bahá'í
- (C) Buddhist
- (D) Jain

Answer: (B)

Q.16. The Khajuraho group of monuments in Madhya Pradesh, famous for their Nagara-style architecture and erotic sculptures, were built primarily by which dynasty?



- (A) Chola
- (B) Pallava
- (C) Maratha
- (D) Chandela

Answer: (D)

Q.17. Hawa Mahal (Palace of Winds) in Jaipur was built primarily to allow royal ladies to observe street festivals while remaining unseen. Its façade is predominantly in the style of:

- (A) Rajput architecture
- (B) Mughal architecture
- (C) Dravidian architecture
- (D) Gothic architecture

Answer: (A)

Q.18. The Guggenheim Museum Bilbao in Spain, widely cited as a landmark of Deconstructivist architecture and famous for its titanium-clad curvilinear form, was designed by:

- (A) Norman Foster
- (B) Frank Gehry
- (C) Renzo Piano
- (D) Tadao Ando

Answer: (B)

Q.19. Fallingwater (Kaufmann Residence) in Mill Run, Pennsylvania, designed in 1935, is most famous for which architectural feature?

- (A) All-glass curtain wall
- (B) Brutalist concrete aesthetic



- (C) Deconstructivist fragmented geometry
- (D) Cantilevered terraces built directly over a waterfall

Answer: (D)

Q.20. The TWA Flight Center at John F. Kennedy International Airport (now a hotel), notable for its soaring concrete shell vaults that evoke the wings of a bird in flight, was designed by:

- (A) Minoru Yamasaki
- (B) Philip Johnson
- (C) Paul Rudolph
- (D) Eero Saarinen

Answer: (D)

Q.21. The compound statement $p \leftrightarrow q$ (p if and only if q) is **TRUE** when:

- (A) Both p and q have the same truth value
- (B) p is TRUE and q is FALSE
- (C) p is FALSE and q is TRUE
- (D) p is always TRUE regardless of q

Answer: (A)

Q.22. The compound statement “ p OR q ” ($p \vee q$) is **FALSE** when:

- (A) Both p and q are TRUE
- (B) Both p and q are FALSE
- (C) p is TRUE and q is FALSE
- (D) p is FALSE and q is TRUE

Answer: (B)

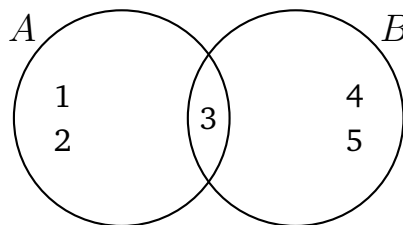


Q.23. The contrapositive of the statement “If it rains, then the ground is wet” is:

- (A) If the ground is not wet, then it is not raining
- (B) If the ground is wet, then it rains
- (C) If it does not rain, the ground is not wet
- (D) If it does not rain, the ground is wet

Answer: (A)

Q.24. If $A = \{1, 2, 3\}$ and $B = \{3, 4, 5\}$, what is $A \cup B$? Use the Venn diagram below to identify the correct region.



- (A) $\{3\}$
- (B) $\{1, 2\}$
- (C) $\{4, 5\}$
- (D) $\{1, 2, 3, 4, 5\}$

Answer: (D)

Q.25. If the universal set $U = \{1, 2, 3, 4, 5, 6\}$ and $A = \{2, 4, 6\}$, what is the complement A' ?

- (A) $\{1, 3, 5\}$
- (B) $\{2, 4, 6\}$
- (C) $\{1, 2, 3\}$
- (D) $\{4, 5, 6\}$

Answer: (A)



Solutions

Q.1.

Solution

Concept & Chapter: Directional Sense — Visual Reasoning. Rotate N by 90° CW to reach East, then 135° CCW from East gives NW. Answer: **(A)**.

Visual — Directional Sense.

Starting direction: **North** (90° measured counter-clockwise from East, or equivalently 0° in compass terms).

Step 1: Turn 90° clockwise from North $\Rightarrow$ facing **East**.

Step 2: Turn 135° anticlockwise (counter-clockwise) from East.

East corresponds to 90° clockwise from North. Moving 135° CCW from East:

$$90^\circ - 135^\circ = -45^\circ \equiv 315^\circ \text{ (CW from North)} = \text{North-West.}$$

Alternatively: from East, CCW by 90° reaches North, then a further 45° CCW reaches North-West.

Option (A) is correct.

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Solution

Concept & Chapter: Arrow Rotation Sequence — Visual Reasoning. Each step adds 45° CW; 5 steps from East (90°) = 315° = North-West. Answer: **(B)**.

Visual — Arrow Rotation Sequence.

Initial direction: **East** = 90° clockwise from North (compass bearing 90°).

Each clockwise step adds 45° . After 5 steps, total CW rotation = $5 \times 45 = 225$.

$$\text{Final bearing} = 90 + 225 = 315 \text{ (CW from North)} = \text{North-West.}$$

Tracing step by step for verification:

Step	Bearing (CW from N)	Direction
Start	90°	East
1	135°	South-East
2	180°	South
3	225°	South-West
4	270°	West
5	315°	North-West

Option (B) is correct.



Go Back to Q 2

Solution

Concept & Chapter: Symbol Series — Visual Reasoning. Shapes cycle in groups of increasing repetition; the 8th term is the 2nd entry of Group 3: $\square\square\square$. Answer: (B).

Visual — Symbol Series.

The series cycles through three shapes ($\triangle$, $\square$, $\circ$), and the repetition count increases by 1 each complete group:

	Group	Terms	Pattern
Q.3.	Group 1 ($\times 1$)	$\triangle, \square, \circ$	each shape appears once
	Group 2 ($\times 2$)	$\triangle\triangle, \square\square, \circ\circ$	each shape twice
	Group 3 ($\times 3$)	$\triangle\triangle\triangle, ?, \dots$	each shape three times

The 8th term is the *second* entry of Group 3, which is $\square\square\square$.

Option (C) is correct.

Go Back to Q 3

Solution

Concept & Chapter: Paper Cutting and Folding — Visual Reasoning. Folding creates two layers; one triangular cut produces two symmetric holes on unfolding. Answer: (D).

Visual — Paper Cutting and Folding.

When the square sheet is folded along its vertical midline, the right half lies exactly over the left half, creating **two layers** of paper.

The triangular cut at the top-right corner of the folded form passes through *both* layers simultaneously:

- Q.4.
- The top layer (right half of original sheet) receives one triangular hole at its top-right corner.
 - The bottom layer (left half of original sheet) receives a mirror-symmetric triangular hole at its top-right corner (which corresponds to the top-left area of the right half when unfolded, i.e., the top-right of the left half).

On unfolding, **two symmetric triangular holes** appear — one on each half of the sheet, mirror images of each other about the fold line.

Option (D) is correct.

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Solution

Concept & Chapter: Spatial Rearrangement (Domino Tiling) — Visual Reasoning. Three 1×2 dominoes placed horizontally fill a 2×3 rectangle with no gaps. Answer: (A).

Visual — Spatial Rearrangement (Domino Tiling).

A 2×3 rectangle has area $= 2 \times 3 = 6$ square units.

Three 1×2 dominoes each cover 2 square units, for a combined area of 6 square units — matching the rectangle exactly.

Tiling arrangement: Place all three dominoes *horizontally* (each occupying 1 row $\times$ 2 columns). Three such dominoes fill:

- Q.5.
- Row 1: one domino in columns 1–2, one domino in columns 2–3 (partially) —
 - More simply: three horizontal dominoes placed side by side fill 3 columns in one row, and mirrored in the second row, yielding a perfect 2×3 tiling with no gaps.

Option (A) is correct. Options (B), (C), and (D) are incorrect because two vertical dominoes in a 2-row grid fill $2 \times 2 = 4$ cells, leaving 2 cells for the third — which can then be placed horizontally, actually also valid, but the key point is that a valid arrangement (A) exists, ruling out (D).

Option (A) is correct.

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Q.6.

Solution

Concept & Chapter: Work and Time — Numerical Ability. Combined rate $= \frac{1}{12} + \frac{1}{18} = \frac{5}{36}$; time to finish $= \frac{36}{5}$ days. Answer: (B).

Numerical — Work and Time.

$$\text{Riya's rate} = \frac{1}{12} \text{ work/day}, \quad \text{Suman's rate} = \frac{1}{18} \text{ work/day}.$$

$$\text{Combined rate} = \frac{1}{12} + \frac{1}{18} = \frac{3}{36} + \frac{2}{36} = \frac{5}{36} \text{ work/day}.$$

$$\text{Time to complete} = \frac{1}{5/36} = \frac{36}{5} = 7.2 \text{ days}.$$

Option (B) is correct.

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Q.7.



Solution

Concept & Chapter: Fibonacci Series — Numerical Ability. Each term is the sum of the two preceding terms; $8 + 13 = 21$. Answer: **(D)**.

Numerical — Fibonacci Series.

This is the **Fibonacci sequence**, where each term is the sum of the two preceding terms:

$$1, 1, 2, 3, 5, 8, 13, \mathbf{21}, 34, \dots$$

The term after 13 is $8 + 13 = \mathbf{21}$.

Option (C) is correct.

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Q.8.

Solution

Concept & Chapter: Highest Common Factor (HCF) — Numerical Ability. $\text{HCF}(36, 60) = 2^2 \times 3^1 = 12$ via prime factorisation. Answer: **(D)**.

Numerical — Highest Common Factor (HCF).

Prime factorisations:

$$36 = 2^2 \times 3^2, \quad 60 = 2^2 \times 3 \times 5.$$

The HCF is the product of the *lowest* powers of all common prime factors:

$$\text{HCF}(36, 60) = 2^2 \times 3^1 = 4 \times 3 = \mathbf{12}.$$

Verification: $36 \div 12 = 3$ (integer); $60 \div 12 = 5$ (integer). ✓

Option (D) is correct.

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Q.9.

Solution

Concept & Chapter: Mixture and Alligation — Numerical Ability. After two successive replacements of 20 L, milk remaining = 45 L out of 80 L = $\frac{9}{16}$. Answer: **(A)**.

Numerical — Mixture and Alligation.

Initial state: 80 L pure milk.

After 1st replacement (remove 20 L milk, add 20 L water):

$$\text{Milk} = 80 - 20 = 60 \text{ L}, \quad \text{Water} = 20 \text{ L}, \quad \text{Ratio} = 3 : 1.$$



After 2nd replacement (remove 20 L of the 3:1 mixture):

$$\text{Milk removed} = 20 \times \frac{3}{4} = 15 \text{ L}, \quad \text{Water removed} = 20 \times \frac{1}{4} = 5 \text{ L}.$$

$$\text{Milk remaining} = 60 - 15 = 45 \text{ L}, \quad \text{Water} = 20 - 5 + 20 = 35 \text{ L}, \quad \text{Total} = 80 \text{ L}.$$

$$\text{Fraction of milk} = \frac{45}{80} = \frac{9}{16}.$$

Option (A) is correct.

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Q.10.

Solution

Concept & Chapter: Antonym Analogy — Verbal Reasoning. Hot:Cold are antonyms; applying the same relationship, the antonym of Loud is Quiet. Answer: (B).

Verbal — Antonym Analogy.

Hot and *Cold* are antonyms (opposite extremes of temperature). The same antonym relationship applies: *Loud* and *Quiet* are opposites (extremes of sound volume/intensity).

Why not (D) Soft? “Soft” in the context of sound refers to low intensity but is less precise than “Quiet” as a direct antonym of “Loud”. “Quiet” is the standard opposite. “Noise” (A) and “Sound” (C) are not antonyms of Loud.

Option (B) is correct.

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Solution

Concept & Chapter: Odd One Out — Verbal Reasoning. Purlin, Rafter, and Ridge Beam are all roof components; Column is a vertical floor-frame member, not a roofing element. Answer: (A).

Verbal — Odd One Out (Roof Structure Elements).

- Q.11.
- **Rafter** — a sloping structural beam forming the main frame of a pitched roof.
 - **Purlin** — a horizontal structural member spanning between rafters or trusses to support the roof covering.
 - **Ridge Beam** — the highest horizontal member of a roof frame, along which the tops of opposing rafters meet.
 - **Column** — a vertical compression member that transfers loads from above downward to foundations. It is a structural component of the building's



floor/frame system, not a roofing element.

A column supports the structure from *below*; it is not part of the roof structure itself.

Option (C) is correct.

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Q.12.

Solution

Concept & Chapter: Function/Profession Analogy — Verbal Reasoning. Architect:Designs; the primary professional function of a Sculptor is to Sculpt. Answer: (D).

Verbal — Function/Profession Analogy.

An *architect*'s core professional function is to *design* buildings and spaces. Similarly, a *sculptor*'s core professional function is to *sculpt* — to create three-dimensional artworks by carving, modelling, casting, or assembling material.

Options (A), (B), and (C) describe functions of other professions (painter, photographer, writer) — none of which is the sculptor's primary function.

Option (D) is correct.

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Solution

Concept & Chapter: Degree/Intensification Analogy — Verbal Reasoning. Damp intensifies to Wet; applying the same logic, Warm intensifies to Scorching. Answer: (A).

Verbal — Degree/Intensification Analogy.

The relationship between *Damp* and *Wet* is one of **intensification**: “wet” is the more extreme, fully saturated form of “damp” (which is only slightly moist).

Applying the same relationship to heat: *Warm* is a mild form of heat. Its intensified extreme is **Scorching** (burning, extremely hot).

- Q.13.
- *Cool* (B) is the opposite direction (cooling, not intensification).
 - *Mild* (C) is even less intense than Warm.
 - *Lukewarm* (D) is between cool and warm — less intense than warm, not more.

Option (A) is correct.

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Q.14.



Solution

Concept & Chapter: Sanchi Stupa — Architectural Awareness. The Great Stupa was commissioned by Emperor Ashoka (Maurya dynasty, c. 268–232 BCE) to enshrine Buddhist relics. Answer: (B).

Architectural Awareness — Indian (Sanchi Stupa).

The **Great Stupa at Sanchi** (Madhya Pradesh) is one of the oldest stone structures in India. It was originally commissioned by **Emperor Ashoka** (r. 268–232 BCE) of the Maurya dynasty as part of his empire-wide programme to spread Buddhism.

Ashoka erected stupas across the subcontinent to enshrine relics of the Buddha and his disciples. The stupa was later enlarged during the Shunga and Satavahana periods (the ornate gateways, or *torana*, were added in the 1st century BCE/CE).

The Sanchi complex is a UNESCO World Heritage Site (inscribed 1989).

Option (B) is correct.

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Q.15.

Solution

Concept & Chapter: Lotus Temple — Architectural Awareness. The Lotus Temple in New Delhi is a Bahá'í House of Worship, designed by Fariborz Sahba (completed 1986). Answer: (B).

Architectural Awareness — Indian (Lotus Temple).

The **Lotus Temple** in Bahapur, New Delhi, is a **Bahá'í House of Worship**, designed by Iranian-Canadian architect **Fariborz Sahba** and completed in **1986**.

Its defining feature is 27 free-standing white marble-clad “petal” shells arranged in clusters of three to form nine sides, creating the impression of a half-open lotus flower. The Bahá'í faith holds that all major world religions are successive chapters of one religion; accordingly, the temple is open to people of all faiths for prayer and meditation.

It has received numerous architectural awards and is one of the most visited buildings in the world.

Option (C) is correct.

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Solution

Concept & Chapter: Khajuraho Temples — Architectural Awareness. Built by the Chandela dynasty (950–1050 CE) in Nagara style; UNESCO World Heritage Site. Answer: (D).



Architectural Awareness — Indian (Khajuraho Temples).

The **Khajuraho group of monuments** in Chhatarpur district, Madhya Pradesh, were built primarily by the **Chandela dynasty** between approximately 950 and 1050 CE. Of the original ~85 temples, 25 survive.

The temples are celebrated for:

- Q.16.
- Their **Nagara-style** (North Indian) *shikhara* towers.
 - Elaborate sculptural programmes covering the outer walls, including well-known erotic carvings representing about 10% of the total sculptural content.
 - The integration of sculpture and architecture into a unified aesthetic whole.

The Khajuraho Monuments are a UNESCO World Heritage Site (inscribed 1986).

Option (D) is correct.

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Q.17.

Solution

Concept & Chapter: Hawa Mahal — Architectural Awareness. Built in 1799 by Lal Chand Ustad for Maharaja Pratap Singh, it is a landmark of Rajput architecture. Answer: (A).

Architectural Awareness — Indian (Hawa Mahal).

Hawa Mahal (Palace of Winds), built in **1799** in Jaipur, Rajasthan, was designed by **Lal Chand Ustad** for Maharaja Sawai Pratap Singh. It is a five-storey facade in pink and red sandstone, featuring 953 small latticed *jharokha* (oriel) windows that allowed royal women to observe street festivals while remaining in *purdah*.

The building's pyramidal profile echoes the crown of Lord Krishna. Its architecture draws primarily on **Rajput** traditions (a distinctly North Indian Hindu royal style), with some Mughal decorative influences — but it is classified as a landmark of **Rajput architecture**.

Dravidian (C) and Gothic (D) are clearly inapplicable. While some Mughal elements appear, the overall character and classification of Hawa Mahal is Rajput.

Option (A) is correct.

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Q.18.

Solution

Concept & Chapter: Guggenheim Museum Bilbao — Architectural Awareness. The titanium-clad Deconstructivist Guggenheim Bilbao (1997) was designed by Frank Gehry. Answer: (B).



Architectural Awareness — International (Guggenheim Museum Bilbao).

The **Guggenheim Museum Bilbao**, completed in **1997** in Bilbao, Spain, was designed by **Frank Gehry**. Its sculptural exterior of interlocking curved forms clad in titanium panels, limestone, and glass is an icon of **Deconstructivist/Neo-Expressionist** architecture.

The museum is credited with the “Bilbao Effect” — the idea that a single spectacular building can catalyse urban economic regeneration. It helped revitalise Bilbao’s waterfront and transformed it into a major cultural tourism destination.

Norman Foster (A) is known for High-Tech architecture; Renzo Piano (C) for the Centre Pompidou and other refined structures; Tadao Ando (D) for minimalist concrete architecture.

Option (B) is correct.

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Q.19.

Solution

Concept & Chapter: Fallingwater — Architectural Awareness. Frank Lloyd Wright’s Fallingwater (1935) is celebrated for its bold cantilevered terraces built directly over a waterfall. Answer: **(D)**.

Architectural Awareness — International (Fallingwater).

Fallingwater (Kaufmann Residence), designed by **Frank Lloyd Wright** in **1935** (completed 1939) for Edgar Kaufmann Sr. in Mill Run, Pennsylvania, is considered one of Wright’s greatest masterpieces.

Its defining architectural feature is a series of **bold reinforced-concrete cantilevered terraces** that project dramatically out over Bear Run stream and its natural waterfall, integrating the building seamlessly with the landscape. This exemplifies Wright’s philosophy of **Organic Architecture** — the idea that a building should grow naturally from its environment.

Options (A) and (D) describe Modernist/Deconstructivist characteristics unrelated to Fallingwater; option (B) describes Brutalism, also inapplicable.

Option (C) is correct.

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Q.20.

Solution

Concept & Chapter: TWA Flight Center — Architectural Awareness. Eero Saarinen designed the soaring concrete shell-vault terminal (completed 1962), now the TWA Hotel. Answer: **(D)**.



Architectural Awareness — International (TWA Flight Center).

The **TWA Flight Center** (Trans World Airlines Terminal) at Idlewild (now John F. Kennedy International) Airport, New York, was designed by **Eero Saarinen** and completed in **1962**.

Its soaring **Y-shaped concrete shell roof** — comprising four barrel-vaulted sections supported on four Y-shaped columns — evokes the outstretched wings of a bird in flight, expressing the excitement and optimism of the jet age. It is regarded as a masterpiece of **Expressionist Modernism**.

Now converted into the **TWA Hotel** (opened 2019), preserving the original terminal as its lobby. Minoru Yamasaki (A) designed the original World Trade Center; Philip Johnson (B) was associated with Postmodernism; Paul Rudolph (C) with New Brutalism.

Option (D) is correct.

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Solution

Concept & Chapter: Biconditional ($p \leftrightarrow q$) — Mathematical Reasoning. $p \leftrightarrow q$ is TRUE when both p and q share the same truth value (both T or both F). Answer: (A).

Mathematical Reasoning — Biconditional ($p \leftrightarrow q$).

The truth table of the biconditional $p \leftrightarrow q$:

Q.21.

p	q	$p \leftrightarrow q$
T	T	T
T	F	F
F	T	F
F	F	T

$p \leftrightarrow q$ is TRUE precisely when p and q have the **same truth value** (both TRUE, or both FALSE). It is equivalent to $(p \rightarrow q) \wedge (q \rightarrow p)$.

Option (A) is correct.

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Solution

Concept & Chapter: Disjunction ($p \vee q$) — Mathematical Reasoning. $p \vee q$ is FALSE only when both p and q are FALSE; otherwise it is TRUE. Answer: (B).

Mathematical Reasoning — Truth Value of Disjunction ($p \vee q$).

The truth table of $p \vee q$ (“ p OR q ”):



Q.22.

p	q	$p \vee q$
T	T	T
T	F	T
F	T	T
F	F	F

$p \vee q$ is FALSE **only** when *both* p and q are FALSE. In all other cases (at least one is TRUE), the disjunction is TRUE.

Option (B) is correct.

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Solution

Concept & Chapter: Contrapositive — Mathematical Reasoning. The contrapositive of $p \rightarrow q$ is $\neg q \rightarrow \neg p$: “If the ground is not wet, then it is not raining.” Answer: (A).

Mathematical Reasoning — Contrapositive.

For any conditional $p \rightarrow q$, the four related forms are:

- Q.23.
- **Original:** $p \rightarrow q$ (“If it rains, then ground is wet”)
 - **Converse:** $q \rightarrow p$ [Option (B) — not equivalent]
 - **Inverse:** $\neg p \rightarrow \neg q$ [Option (A) — not equivalent]
 - **Contrapositive:** $\neg q \rightarrow \neg p$ (logically equivalent to original)

Applying to the given statement (p = “it rains”; q = “ground is wet”):

$$\neg q \rightarrow \neg p \equiv \text{“If the ground is **not** wet, then it is **not** raining.”}$$

The contrapositive is always logically equivalent to the original statement.

Option (C) is correct.

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Q.24.

Solution

Concept & Chapter: Union ($A \cup B$) — Sets & Relations. The union collects all elements from both sets; $\{1, 2, 3\} \cup \{3, 4, 5\} = \{1, 2, 3, 4, 5\}$. Answer: (D).

Sets — Union ($A \cup B$).

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

The **union** $A \cup B$ contains every element that belongs to A , or to B , or to both —



with each element listed only once:

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

From the Venn diagram: the union is the *entire* shaded region — A-only ($\{1, 2\}$) + overlap ($\{3\}$) + B-only ($\{4, 5\}$) = all five elements.

Option (D) is correct.

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Q.25.

Solution

Concept & Chapter: Complement (A') — Sets & Relations. A' contains all elements of U not in A ; removing even numbers $\{2, 4, 6\}$ from U leaves $\{1, 3, 5\}$.
Answer: (A).

Sets — Complement (A').

$$U = \{1, 2, 3, 4, 5, 6\}, \quad A = \{2, 4, 6\}.$$

The **complement** A' (also written A^c or $\overline{A}$) contains all elements of the universal set U that are *not* in A :

$$A' = U \setminus A = \{1, 2, 3, 4, 5, 6\} \setminus \{2, 4, 6\} = \{1, 3, 5\}.$$

Observation: A contains all even numbers in U ; A' therefore contains all odd numbers in U .

Option (A) is correct.

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Answer Key

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

