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TANATA General Aptitude & Mental Ability

Sample Paper – 2

Questions	Duration	Max Marks	Marking
25	38 Minutes	50	+2 / No Negative

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.

SECTION A — General Aptitude & Mental Ability (25 Questions × 2 Marks = 50 Marks)

Q1. The figure below shows a symbol. Which option correctly represents its water image (reflection about the horizontal axis)?

Original

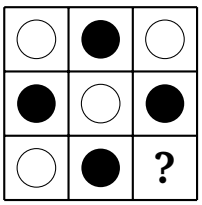
(A) 

(B) 

(C) 

(D) 

Q2. The following 3×3 matrix has a pattern. Which figure should replace the question mark?



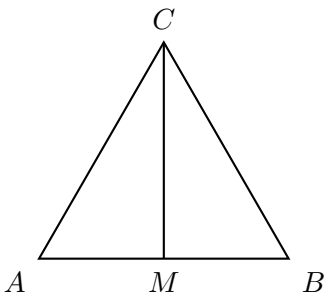
(A) • (Filled circle)

(B) ■ (Filled square)

(C) □ (Empty square)

(D) ○ (Empty circle)

Q3. How many triangles are there in the figure below?



(A) 3

(B) 4

(C) 5

(D) 6

Q4. A standard die has opposite faces summing to 7. If the face showing **2** is at the bottom and the face showing **3** faces the viewer, which number is on top?

(A) 4

(B) 6

(C) 5

(D) 3

Q5. A square piece of paper has the letter **'R'** written at its top-left corner. If the paper is rotated 90° clockwise, where does the 'R' appear?

(A) Top-left

(B) Top-right

(C) Bottom-right

(D) Bottom-left

Q6. Find the missing term in the series:

$1,\ 2,\ 4,\ 3,\ 9,\ 4,\ 16,\ 5,\ \_\_\_$

(A) 25

(B) 17

(C) 20

(D) 6

Q7. What is the Least Common Multiple (LCM) of 12 and 18?

(A) 6

(B) 24

(C) 36

(D) 72

Q8. A principal of Rs. 1000 is invested at 5% per annum simple interest for 3 years. What is the total amount (in Rs.) at the end of 3 years?

(A) 1050

(B) 1100

(C) 1125

(D) 1150

Q9. Find the missing term in the series:

$2,\ 5,\ 10,\ 17,\ 26,\ \_\_\_$

(A) 34

(B) 37

(C) 40

(D) 43

Q10. **T-square** : **Draughtsman** :: **Stethoscope** : ___

(A) Doctor

(B) Nurse

(C) Hospital

(D) Medicine

Q11. Which of the following is the **odd one out**?

(A) Sandstone

(B) Granite

(C) Marble

(D) Clay

Q12. **Foundation** : **Building** :: **Root** : ___

(A) Branch

(B) Soil

(C) Tree

(D) Leaf

Q13. **Architect** : **Plan** :: **Writer** : ___

(A) Novel

(B) Manuscript

(C) Pen

(D) Publisher

Q14. The Asian Games Village in New Delhi, built for the 1982 Asian Games and praised for its cluster-courtyard housing design inspired by traditional Indian settlements, was designed by which architect?

(A) Raj Rewal

(B) Charles Correa

(C) Achyut Kanvinde

(D) Hafiz Contractor

Q15. Which Indian architect was a pioneering figure of modernism in India and is particularly known for designing the IIT Kanpur campus in the 1960s?

(A) B.V. Doshi

(B) Raj Rewal

(C) Satish Gujral

(D) Achyut Kanvinde

Q16. The Great Stupa at Sanchi, one of the oldest stone structures in India and a UNESCO World Heritage Site, was originally commissioned by which Mauryan Emperor?

(A) Chandragupta Maurya

(B) Bindusara

(C) Ashoka

(D) Samudragupta

Q17. Red Fort (Lal Qila) in Delhi, a UNESCO World Heritage Site, was built as the main residence of which Mughal Emperor?

(A) Akbar

(B) Shah Jahan

(C) Aurangzeb

(D) Humayun

Q18. The Shard skyscraper in London, with its distinctive tapering glass form reaching 309 metres, was designed by which architect?

(A) Renzo Piano

(B) Norman Foster

(C) Zaha Hadid

(D) I.M. Pei

Q19. 30 St Mary Axe (popularly called the Gherkin) in London, an iconic energy-efficient glass tower completed in 2003, was designed by which architect?

(A) Renzo Piano

(B) Richard Rogers

(C) Tadao Ando

(D) Norman Foster

Q20. The glass pyramid added to the Louvre Museum in Paris in 1989, which became a beloved modern landmark within the historic courtyard, was designed by which architect?

(A) Richard Meier

(B) Frank Gehry

(C) I.M. Pei

(D) Philip Johnson

Q21. The biconditional statement $p \leftrightarrow q$ is TRUE when:

(A) p is true and q is false

(B) p and q have the same truth value

(C) p is false and q is true

(D) p and q are both false only

Q22. The contrapositive of $p \rightarrow q$ is:

(A) $\sim q \rightarrow \sim p$

(B) $\sim p \rightarrow \sim q$

(C) $q \rightarrow p$

(D) $\sim p \rightarrow q$

Q23. The converse of the statement “If it is a square, then it is a rectangle” is:

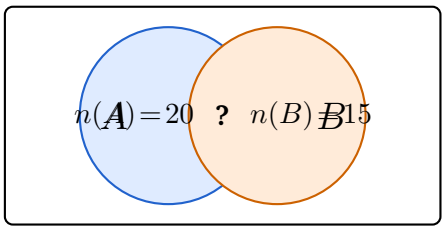
(A) If it is not a square, then it is not a rectangle

(B) If it is not a rectangle, then it is not a square

(C) If it is a square, then it is not a rectangle

(D) If it is a rectangle, then it is a square

Q24. If $n(A) = 20$, $n(B) = 15$, and $n(A \cup B) = 30$, find $n(A \cap B)$ using the Venn diagram below.



$n(A \cup B) = 30$

(A) 3

(B) 4

(C) 5

(D) 7

Q25. If sets A and B are disjoint (i.e., $A \cap B = \emptyset$), then $n(A \cup B)$ equals:

(A) $n(A) - n(B)$

(B) $n(A) + n(B)$

(C) $n(A) \times n(B)$

(D) $n(A)/n(B)$

Detailed Solutions

TANATA General Aptitude & Mental Ability — Sample Paper 2

Sol. 1.

Solution

Concept & Chapter: Water Image (Horizontal Reflection) — Visual Reasoning. Flip the figure top-to-bottom; the T's horizontal bar moves to the bottom, yielding an inverted T. Answer: **(B)**.

Concept — Water Image (Horizontal Reflection): A water image is the reflection of a figure about a *horizontal axis*, i.e., the figure is flipped top-to-bottom. Parts that were at the top move to the bottom, and vice versa.

Step 1 — Identify original: The original symbol is the letter "T" with a horizontal bar at the *top* and a vertical bar extending *downward*.

Step 2 — Apply horizontal flip: Reflecting about a horizontal axis inverts the figure vertically. The horizontal bar moves to the *bottom*, and the vertical bar now points *upward* — producing an inverted (upside-down) T shape.

Why other options are wrong:

- Option A: Identical to the original — no reflection applied.
- Option C: Shows a 90° left rotation, not a horizontal reflection.
- Option D: Same as the original — a symmetric T has the same lateral mirror image but not the same water image.

Final Answer: Inverted T with bar at the bottom $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B)

Go Back to Q 1

Sol. 2.

Solution

Concept & Chapter: Matrix Pattern (Checkerboard) — Visual Reasoning. In the alternating filled/empty circle grid, position (Row 3, Col 3) follows the pattern and must be an empty circle. Answer: **(D)**.

Concept — Matrix Pattern (Checkerboard): In a 3×3 matrix with a checkerboard arrangement, alternate cells carry opposite symbols (filled vs. empty circle).

Step 1 — Observe the pattern:

- Row 1: ○, ●, ○
- Row 2: ●, ○, ●
- Row 3: ○, ●, ?

Step 2 — Identify the missing cell: The cell at position (Row 3, Col 3) follows the checkerboard: since (Row 1, Col 3) = ○ and (Row 2, Col 3) = ●, the pattern returns to ○ (empty circle).

Why other options are wrong:

- Option A (●): A filled circle would break the alternating pattern in both the row and column.
- Option B (■): Squares do not appear anywhere in the matrix.
- Option C (□): Empty squares are also absent from the matrix pattern.

Final Answer: ○ (empty circle) ⇒ D

Answer: (D)

Go Back to Q 2

Sol. 3.

Solution

Concept & Chapter: Counting Triangles — Visual Reasoning. Triangle ABC with median CM yields exactly 3 triangles: ACM, BCM, and the whole ABC. Answer: **(A)**.

Concept — Counting Triangles: When counting triangles in a composite figure, list all smallest triangles first, then all combinations formed by merging adjacent ones.

Step 1 — Identify the figure: The figure shows triangle ABC with median CM drawn from apex C to midpoint M of base AB. This divides the large triangle into two smaller ones.

Step 2 — List all triangles:

(a) $\triangle ACM$ (left small triangle)
(b) $\triangle BCM$ (right small triangle)
(c) $\triangle ABC$ (the entire large triangle)

Total = 3 triangles.

Why other options are wrong:

- Options B, C, D (4, 5, 6): These would require additional internal lines (e.g., a horizontal bisector or multiple medians) which are not present in this figure.

Final Answer: 3 triangles $\Rightarrow$ A

Answer: (A)

Go Back to Q 3

Sol. 4.

Solution

Concept & Chapter: Standard Die Opposite Faces — Visual Reasoning. Opposite faces sum to 7; bottom is 2 so top is $7 - 2 = 5$, regardless of the front face. Answer: **(C)**.

Concept — Standard Die Opposite Faces: On a standard die, opposite faces always sum to 7:

$$1 \leftrightarrow 6, \quad 2 \leftrightarrow 5, \quad 3 \leftrightarrow 4.$$

Step 1 — Apply the given conditions:

- Bottom face = **2**, so top face = **5** (opposite of 2).
- Front face = 3 (given, used only to fix orientation; does not change the top face).

Why other options are wrong:

- Option A (4): 4 is opposite 3, not 2.
- Option B (6): 6 is opposite 1, not 2.
- Option D (3): 3 is the front-facing number, not the top.

Final Answer: Top face = 5 $\Rightarrow$ C

Answer: (C)

Go Back to Q 4

Sol. 5.

Solution

Concept & Chapter: Rotation of Paper — Visual Reasoning. A 90° clockwise rotation moves top-left to top-right, so 'R' appears at the top-right corner. Answer: **(B)**.

Concept — Rotation of Paper: When a square sheet is rotated 90° clockwise, each corner moves to the next corner in the clockwise direction.

Step 1 — Track corner positions under 90° clockwise rotation:

$$\text{Top-left} \to \text{Top-right}, \quad \text{Top-right} \to \text{Bottom-right}$$

$$\text{Bottom-right} \to \text{Bottom-left}, \quad \text{Bottom-left} \to \text{Top-left}$$

Step 2 — Apply to 'R': 'R' starts at the **top-left**. After 90° clockwise rotation it moves to the **top-right**.

Why other options are wrong:

- Option A: Top-left is the original position (no rotation).
- Option C: Bottom-right corresponds to a 180° rotation.
- Option D: Bottom-left corresponds to a 90° counter-clockwise rotation.

Final Answer: Top-right $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B)

Go Back to Q 5

Sol. 6.

Solution

Concept & Chapter: Alternating / Interleaved Series — Numerical Ability. Odd positions are perfect squares $(1, 4, 9, 16, \ldots)$; the 9th term is $5^2 = 25$. Answer: **(A)**.

Concept — Alternating / Interleaved Series: The given sequence is a mixture of two independent series placed alternately.

Step 1 — Separate the two series:

- Odd positions (1st, 3rd, 5th, 7th, ...): $1, 4, 9, 16, \ldots$ $(= 1^2, 2^2, 3^2, 4^2, \ldots$ perfect squares)

- Even positions (2nd, 4th, 6th, 8th, ...): $2, 3, 4, 5, \ldots$ (consecutive integers starting at 2)

Step 2 — Find the 9th term: The 9th term belongs to the odd-position series. The next perfect square after $4^2 = 16$ is $5^2 = \mathbf{25}$.

Why other options are wrong:

- Option B (17): $17 = 16 + 1$; adding 1 ignores the quadratic pattern.
- Option C (20): Not a perfect square.
- Option D (6): 6 would be the next term of the *even* series, not the odd one.

Final Answer: 25 $\Rightarrow$ A

Answer: (A)

Go Back to Q 6

Sol. 7.

Solution

Concept & Chapter: Least Common Multiple (LCM) — Numerical Ability. LCM$(12, 18) = 2^2 \times 3^2 = 36$ using prime factorisation with highest powers of each prime. Answer: **(C)**.

Concept — Least Common Multiple (LCM): The LCM is the smallest positive integer divisible by both numbers. Use prime factorisation and take the highest power of each prime factor.

Step 1 — Prime factorise each number:

$$12 = 2^2 \times 3^1, \qquad 18 = 2^1 \times 3^2.$$

Step 2 — Compute LCM:

$$\text{LCM}(12, 18) = 2^2 \times 3^2 = 4 \times 9 = \mathbf{36}.$$

Why other options are wrong:

- Option A (6): This is the GCD (Greatest Common Divisor), not the LCM.
- Option B (24): $24 = 2^3 \times 3$; 18 does not divide 24.
- Option D (72): $72 = 12 \times 18/2$; the LCM is smaller than the product when the numbers share factors.

Final Answer: LCM $= 36 \Rightarrow \boxed{C}$

Answer: (C)

Go Back to Q 7

Sol. 8.

Solution

Concept & Chapter: Simple Interest — Numerical Ability. SI $= \frac{1000\times5\times3}{100} = 150$; total amount $= 1000 + 150 =$ Rs. 1150. Answer: **(D)**.

Concept — Simple Interest (SI): Simple interest is calculated on the original principal only.

$$\text{SI} = \frac{P \times R \times T}{100}, \qquad \text{Amount} = P + \text{SI}.$$

Step 1 — Substitute values:

$$\text{SI} = \frac{1000 \times 5 \times 3}{100} = \frac{15000}{100} = \text{Rs. } 150.$$

Step 2 — Find total amount:

$$\text{Amount} = 1000 + 150 = \text{Rs. } \mathbf{1150}.$$

Why other options are wrong:

- Option A (1050): SI for only 1 year ($1000 \times 5\% = 50$).
- Option B (1100): SI for 2 years ($1000 \times 5\% \times 2 = 100$).
- Option C (1125): Corresponds to a different rate or period (e.g., compound interest or incorrect calculation).

Final Answer: Amount = Rs. 1150 $\Rightarrow \boxed{D}$

Answer: (D)

Go Back to Q 8

Sol. 9.

Solution

Concept & Chapter: Difference Series (Consecutive Odd Numbers) — Numerical Ability. Differences are $3, 5, 7, 9, \ldots$; next difference is 11, giving $26 + 11 = 37$. Answer: **(B)**.

Concept — Difference Series (Consecutive Odd Numbers): The differences between successive terms form an arithmetic progression of odd numbers.

Step 1 — Compute successive differences:

$$5 - 2 = 3, \quad 10 - 5 = 5, \quad 17 - 10 = 7, \quad 26 - 17 = 9.$$

The differences are $3, 5, 7, 9, \ldots$ (consecutive odd numbers).

Step 2 — Next difference = 11:

$$? = 26 + 11 = \mathbf{37}.$$

Why other options are wrong:

- Option A (34): Uses difference of 8 instead of 11.
- Option C (40): Uses difference of 14.
- Option D (43): Uses difference of 17.

Final Answer: $37 \Rightarrow \boxed{\text{B}}$

Answer: (B)

Go Back to Q 9

Sol. 10.

Solution

Concept & Chapter: Tool–User Analogy — Verbal Reasoning. T-square is the signature tool of a Draughtsman; Stethoscope is the signature diagnostic tool of a Doctor. Answer: **(A)**.

Concept — Tool–User Analogy: The relationship is: a specific professional tool is associated with its user/practitioner.

Step 1 — Identify the relationship: A *T-square* is the characteristic drawing instrument of a *Draughtsman*. Similarly, a *Stethoscope* is the characteristic diagnostic instrument of a *Doctor*.

Why other options are wrong:

- Option B (Nurse): Nurses use stethoscopes too, but the *primary* professional identified by this tool is the Doctor.
- Option C (Hospital): A hospital is a place, not a practitioner.
- Option D (Medicine): Medicine is a substance, not a person.

Final Answer: Doctor $\Rightarrow$ $\boxed{A}$

Answer: (A)

Go Back to Q 10

Sol. 11.

Solution

Concept & Chapter: Odd One Out (Classification) — Verbal Reasoning. Sandstone, Granite, and Marble are all rock types; Clay is a soil mineral, making it the odd one out. Answer: **(D)**.

Concept — Odd One Out (Classification): Identify the item that does not belong to the same category as the others.

Step 1 — Classify each option:

- Sandstone: *Sedimentary rock* (a rock type).
- Granite: *Igneous rock* (a rock type).
- Marble: *Metamorphic rock* (a rock type).
- **Clay**: A *fine-grained soil/mineral material* — not a rock in the geological rock-type classification.

Step 2 — Identify the odd one: Sandstone, Granite, and Marble are all types of *rock*. Clay is a *soil mineral*, used as a building material but not classified as a rock.

Why other options are wrong:

- Options A, B, C: All are recognised rock types (sedimentary, igneous, metamorphic respectively).

Final Answer: Clay $\Rightarrow$ $\boxed{D}$

Answer: (D)

Go Back to Q 11

Sol. 12.

Solution

Concept & Chapter: Part-to-Whole / Support Analogy — Verbal Reasoning. Foundation supports a Building; Root supports a Tree — same structural base-to-whole relationship. Answer: **(C)**.

Concept — Part-to-Whole / Support Analogy: The relationship is: one element provides the foundational support for a larger structure/organism.

Step 1 — Identify the relationship: A *Foundation* is the structural base that supports a *Building*. Similarly, a *Root* is the structural base that supports a *Tree*.

Why other options are wrong:

- Option A (Branch): A branch is a part of a tree but is not what the root supports directly; moreover, a branch is an extension, not the supported whole.
- Option B (Soil): Soil is the medium in which roots grow, not what the root supports.
- Option D (Leaf): A leaf is a part of a tree but not the whole entity supported by the root.

Final Answer: Tree $\Rightarrow$ C

Answer: (C)

Go Back to Q 12

Sol. 13.

Solution

Concept & Chapter: Professional Output Analogy — Verbal Reasoning. An Architect produces a Plan; a Writer produces a Manuscript (the raw formal document before publication). Answer: **(B)**.

Concept — Professional Output Analogy: The relationship is: a professional produces a specific type of formal work document.

Step 1 — Identify the relationship: An *Architect* produces a *Plan* (architectural drawing). A *Writer* produces a *Manuscript* (the formal written document before publication).

Why other options are wrong:

- Option A (Novel): A novel is the *published* product, not the raw professional output during creation. The manuscript is what the writer directly produces.
- Option C (Pen): A pen is a tool, not an output — the analogy asks for what the writer *produces*.
- Option D (Publisher): A publisher is a person/company, not the writer's direct product.

Final Answer: Manuscript $\Rightarrow$ B

Answer: (B)

Go Back to Q 13

Sol. 14.

Solution

Concept & Chapter: Indian Architectural Awareness — Architectural Awareness. The Asian Games Village, New Delhi (1982), with its cluster-courtyard housing inspired by traditional Indian settlements, was designed by Raj Rewal. Answer: **(A)**.

Concept — Indian Architectural Awareness: The Asian Games Village, New Delhi (1982) is a landmark Indian housing project.

Key Facts: The Asian Games Village was designed by **Raj Rewal** (born 1934). It is celebrated for its cluster-courtyard layout that draws from the spatial organisation of traditional Indian settlements (such as Rajasthani towns). The complex successfully integrates high-density urban housing with human-scale outdoor spaces and traditional architectural vocabulary.

Why other options are wrong:

- Option B (Charles Correa): Known for the Jawahar Kala Kendra, Jaipur and Kanchanjunga Apartments, Mumbai — not the Asian Games Village.
- Option C (Achyut Kanvinde): Known primarily for IIT Kanpur and scientific institutions.
- Option D (Hafiz Contractor): A prominent contemporary commercial architect; not associated with this project.

Final Answer: Raj Rewal $\Rightarrow$ A

Answer: (A)

Go Back to Q 14

Sol. 15.

Solution

Concept & Chapter: Indian Architectural Awareness (Modernism) — Architectural Awareness. Achyut Kanvinde, trained under Gropius at Harvard, designed the IIT Kanpur campus in the 1960s as a pioneer of Indian modernism. Answer: **(D)**.

Concept — Indian Architectural Awareness (Modernism): Identifying the pioneering modernist architect associated with IIT Kanpur.

Key Facts: Achyut Purushottam Kanvinde (1916–2002) was among the earliest Indian architects to embrace the International Modern style. He studied at Harvard under Walter Gropius and brought Bauhaus-influenced modernism to India. He designed the **IIT Kanpur campus** in the 1960s and several CSIR (Council of Scientific and Industrial Research) laboratory campuses across India.

Why other options are wrong:

- Option A (B.V. Doshi): A celebrated Indian modernist and Pritzker Prize laureate, but not primarily associated with IIT Kanpur.
- Option B (Raj Rewal): Known for Asian Games Village and National Institute of Immunology, not IIT Kanpur.
- Option C (Satish Gujral): An artist-architect known for the Belgian Embassy, New Delhi, not IIT Kanpur.

Final Answer: Achyut Kanvinde $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D)

Go Back to Q 15

Sol. 16.

Solution

Concept & Chapter: Indian Architectural Awareness (Ancient Monuments) — Architectural Awareness. The Great Stupa at Sanchi was originally commissioned by Mauryan Emperor Ashoka in the 3rd century BCE. Answer: **(C)**.

Concept — Indian Architectural Awareness (Ancient Monuments): The Great Stupa at Sanchi and its patron emperor.

Key Facts: The Great Stupa at Sanchi (Madhya Pradesh) was originally commissioned by **Emperor Ashoka** of the Mauryan dynasty in the 3rd century BCE. It is one of the oldest stone structures in India. The stupa was later enlarged during the Shunga and Satavahana periods. It was declared a UNESCO World Heritage Site in 1989.

Why other options are wrong:

- Option A (Chandragupta Maurya): Founder of the Mauryan Empire; the stupa at Sanchi was not his commission.
- Option B (Bindusara): Chandragupta's successor; no record of commissioning the Sanchi Stupa.
- Option D (Samudragupta): A Gupta emperor (4th century CE) — centuries after the stupa was built.

Final Answer: Ashoka $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C)

Go Back to Q 16

Sol. 17.

Solution

Concept & Chapter: Indian Architectural Awareness (Mughal Architecture) — Architectural Awareness. Red Fort, Delhi, was built by Shah Jahan (1639–1648) as the principal Mughal royal residence. Answer: **(B)**.

Concept — Indian Architectural Awareness (Mughal Architecture): Red Fort (Lal Qila), Delhi and its builder.

Key Facts: The Red Fort in Delhi was built by **Shah Jahan** (r. 1628–1658), the fifth Mughal Emperor, and served as the main royal residence for the Mughal dynasty. Construction began in 1639 and was completed in 1648. It is a UNESCO World Heritage Site and an enduring symbol of Mughal grandeur. The architect

was Ustad Ahmad Lahauri (who also designed the Taj Mahal).

Why other options are wrong:

- Option A (Akbar): Akbar built Agra Fort and Fatehpur Sikri, not Red Fort Delhi.
- Option C (Aurangzeb): Shah Jahan's successor; he did not build Red Fort.
- Option D (Humayun): Humayun preceded Akbar; he built Dinpanah (Purana Qila), not Red Fort.

Final Answer: Shah Jahan $\Rightarrow$ B

Answer: (B)

Go Back to Q 17

Sol. 18.

Solution

Concept & Chapter: International Architectural Awareness (The Shard) — Architectural Awareness. The Shard, London's 309 m tapering glass tower, was designed by Renzo Piano and completed in 2012. Answer: **(A)**.

Concept — International Architectural Awareness (The Shard, London): Identifying the architect of the Shard.

Key Facts: The Shard (officially "The Shard of Glass") at London Bridge Quarter was designed by **Renzo Piano** and completed in 2012. Rising to 309.6 m, it is the tallest building in the United Kingdom. The design features a tapering form of angled glass facades that reflect the sky and the city, inspired by the spires of London churches and the masts of sailing ships on the Thames.

Why other options are wrong:

- Option B (Norman Foster): Designed 30 St Mary Axe (Gherkin) and many other London landmarks, but not The Shard.
- Option C (Zaha Hadid): Known for fluid, parametric forms; not associated with The Shard.
- Option D (I.M. Pei): Designed the Louvre Pyramid in Paris, not The Shard.

Final Answer: Renzo Piano $\Rightarrow$ A

Answer: (A)

Go Back to Q 18

Sol. 19.

Solution

Concept & Chapter: International Architectural Awareness (Gherkin) — Architectural Awareness. 30 St Mary Axe, London's aerodynamic energy-efficient tower completed in 2003, was designed by Norman Foster. Answer: **(D)**.

Concept — International Architectural Awareness (30 St Mary Axe / Gherkin): Identifying the architect of this iconic London tower.

Key Facts: 30 St Mary Axe, popularly known as the *Gherkin*, was designed by **Norman Foster** (Foster + Partners) and completed in 2003. The building is celebrated for its aerodynamic cylindrical form with a spiralling pattern of glazed and opaque panels that channel natural ventilation, significantly reducing energy consumption compared to a conventional curtain-wall tower.

Why other options are wrong:

- Option A (Renzo Piano): Designed The Shard — a different London landmark.
- Option B (Richard Rogers): Known for Lloyd's Building and the Pompidou Centre; not the Gherkin.
- Option C (Tadao Ando): Japanese architect known for minimalist concrete architecture; no major London towers.

Final Answer: Norman Foster $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D)

Go Back to Q 19

Sol. 20.

Solution

Concept & Chapter: International Architectural Awareness (Louvre Pyramid) — Architectural Awareness. The glass pyramid entrance to the Louvre Museum, Paris (1989), was designed by I.M. Pei. Answer: **(C)**.

Concept — International Architectural Awareness (Louvre Pyramid, Paris): Identifying the architect of the glass pyramid.

Key Facts: The Louvre Pyramid was designed by **I.M. Pei** (Ieoh Ming Pei, 1917–2019) and opened in 1989. The 21.6 m tall glass-and-steel pyramid serves as the

main entrance to the Louvre Museum. Initially controversial for contrasting with the classical Louvre Palace, it became one of the most recognised and beloved modern landmarks in Paris.

Why other options are wrong:

- Option A (Richard Meier): Known for the Getty Center, Los Angeles; not associated with the Louvre Pyramid.
- Option B (Frank Gehry): Known for the Guggenheim Museum Bilbao; not the Louvre Pyramid.
- Option D (Philip Johnson): Known for the AT&T Building (New York); not the Louvre Pyramid.

Final Answer: I.M. Pei $\Rightarrow$ C

Answer: (C)

Go Back to Q 20

Sol. 21.

Solution

Concept & Chapter: Biconditional Statement ($p \leftrightarrow q$) — Mathematical Reasoning. A biconditional is true only when both components share the same truth value (both T or both F). Answer: **(B)**.

Concept — Biconditional Statement ($p \leftrightarrow q$): A biconditional is true if and only if both components have the *same* truth value.

Truth Table:

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

Conclusion: $p \leftrightarrow q$ is TRUE when both p and q are true, or both are false — i.e., when they have the **same truth value**.

Why other options are wrong:

- Option A: p true, q false $\Rightarrow$ biconditional is FALSE.
- Option C: p false, q true $\Rightarrow$ biconditional is FALSE.

- Option D: "Both false only" is incomplete — the biconditional is also true when both are true.

Final Answer: p and q have the same truth value $\Rightarrow$ B

Answer: (B)

Go Back to Q 21

Sol. 22.

Solution

Concept & Chapter: Contrapositive of a Conditional — Mathematical Reasoning. Negate both and swap: contrapositive of $p \to q$ is $\sim q \to \sim p$, logically equivalent to the original. Answer: **(A)**.

Concept — Contrapositive of a Conditional: The contrapositive of $p \to q$ is obtained by *negating both* the hypothesis and the conclusion and *swapping* their positions:

$$\text{Contrapositive of } (p \to q) = (\sim q \to \sim p).$$

The contrapositive is logically equivalent to the original statement.

Step 1 — Negate both: $\sim p$ and $\sim q$.

Step 2 — Swap: The consequent becomes the new antecedent (negated), giving $\sim q \to \sim p$.

Why other options are wrong:

- Option B ($\sim p \to \sim q$): This is the *inverse* of the original, not the contrapositive.
- Option C ($q \to p$): This is the *converse* of the original.
- Option D ($\sim p \to q$): Neither the contrapositive, inverse, nor converse.

Final Answer: $\sim q \to \sim p \Rightarrow$ A

Answer: (A)

Go Back to Q 22

Sol. 23.

Solution

Concept & Chapter: Converse of a Conditional — Mathematical Reasoning. Swap hypothesis and conclusion (no negation): converse of "square $\Rightarrow$ rectangle" is "rectangle $\Rightarrow$ square." Answer: **(D)**.

Concept — Converse of a Conditional: The converse of $p \to q$ is $q \to p$ (swap hypothesis and conclusion, keeping no negation).

Original statement: "If it is a square (p), then it is a rectangle (q)."

Step 1 — Form the converse ($q \to p$): Swap p and q:

"If it is a rectangle, then it is a square."

Why other options are wrong:

- Option A: Negates both without swapping — this is the *inverse* ($\sim p \to \sim q$).
- Option B: Negates both and swaps — this is the *contrapositive* ($\sim q \to \sim p$).
- Option C: Swaps but makes the conclusion negative — logically incorrect form.

Final Answer: "If it is a rectangle, then it is a square." $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D)

Go Back to Q 23

Sol. 24.

Solution

Concept & Chapter: Inclusion–Exclusion Principle — Sets & Relations. $n(A \cap B) = n(A) + n(B) - n(A \cup B) = 20 + 15 - 30 = 5$. Answer: **(C)**.

Concept — Inclusion–Exclusion Principle for Sets:

$$n(A \cup B) = n(A) + n(B) - n(A \cap B).$$

Rearranging to find $n(A \cap B)$:

$$n(A \cap B) = n(A) + n(B) - n(A \cup B).$$

Step 1 — Substitute given values:

$$n(A \cap B) = 20 + 15 - 30 = \mathbf{5}.$$

Verification using Venn diagram:

- Only in A (not in B): $20 - 5 = 15$.
- Only in B (not in A): $15 - 5 = 10$.
- In both ($A \cap B$): 5.
- Total in $A \cup B$: $15 + 10 + 5 = 30$. ✓

Why other options are wrong:

- Option A (3): $20 + 15 - 30 \neq 3$.
- Option B (4): $20 + 15 - 30 \neq 4$.
- Option D (7): $20 + 15 - 30 \neq 7$.

Final Answer: $n(A \cap B) = 5 \Rightarrow$ C

Answer: (C)

Go Back to Q 24

Sol. 25.

Solution

Concept & Chapter: Disjoint Sets and Union — Sets & Relations. When $A \cap B = \emptyset$, inclusion-exclusion reduces to $n(A \cup B) = n(A) + n(B)$. Answer: **(B)**.

Concept — Disjoint Sets and Union: Two sets are disjoint if they share no common elements, i.e., $A \cap B = \emptyset$.

Step 1 — Apply Inclusion–Exclusion:

$$n(A \cup B) = n(A) + n(B) - n(A \cap B).$$

Since $A \cap B = \emptyset$, we have $n(A \cap B) = 0$:

$$n(A \cup B) = n(A) + n(B) - 0 = n(A) + n(B).$$

Why other options are wrong:

- Option A ($n(A) - n(B)$): Subtraction would give a wrong (possibly nega-

tive) count.

- Option C ($n(A) \times n(B)$): Multiplication applies to the Cartesian product $A \times B$, not the union.
- Option D ($n(A)/n(B)$): Division has no meaning in set-cardinality for union.

Final Answer: $n(A \cup B) = n(A) + n(B) \Rightarrow$ B

Answer: (B)

Go Back to Q 25

Answer Key

Q.No	Ans		Q.No	Ans		Q.No	Ans		
1	B		10	A		19	D		
2	D		11	D		20	C		
3	A		12	C		21	B		
4	C		13	B		22	A		
5	B		14	A		23	D		
6	A		15	D		24	C		
7	C		16	C		25	B		
8	D		17	B					
9	B		18	A					