

SATISH CHANDRA MEMORIAL SCHOOL

CTI Class 5 — Critical Thinking & Aptitude

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CHAPTER 2: FRACTIONS

Question 1 Sam and Chocolates

Sam has some chocolates. He gave 1 more than half the chocolates to A and 1 less than half the chocolates (of the original number of chocolates) to B. What is the difference between the number of chocolates given to A and B?

a) 0

b) 1

c) 2

d) Cannot be determined

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Correct Option: (c) 2

Explanation: Let total chocolates be N . A receives $(N/2 + 1)$ chocolates, and B receives $(N/2 - 1)$ chocolates. The difference is: $(N/2 + 1) - (N/2 - 1) = 1 - (-1) = 2$.

Question 2 Groups & Activities

Three groups of people — A, B, and C — each have the same number of members. They take part in three activities: 1, 2, and 3.

- Each person within a group can only be part of one activity.
- Half of Group A does Activity 1, which is also done by all members of Group B.
- Half of Group C does Activity 3, which is also done by the remaining members of Group A.
- All remaining people do Activity 2.

Which activity is done by the least number of people?

a) Activity 1

b) Activity 2

c) Activity 3

d) Both options a and b

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Correct Option: (b) Activity 2

Explanation: Let each group have M members.

- Activity 1 = $M/2$ (from A) + M (all B) = 1.5 M
 - Activity 3 = $M/2$ (from C) + $M/2$ (remaining A) = 1.0 M
 - Activity 2 = remaining from C = 0.5 M.
- Therefore, Activity 2 is done by the least number of people.

Question 3 Symbol Arithmetic

If \$ = 12, @ = half of 12, and # = quarter of 12, then find the value of: $\$ \times @ - \#$

a) 68

b) 69

c) 59

d) 36

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Correct Option: (b) 69

Explanation: \$ = 12; @ = $12 / 2 = 6$; # = $12 / 4 = 3$.

Expression: $12 \times 6 - 3 = 72 - 3 = 69$.

Question 4 Shaded Circle Area

What fraction of the total area of all the circles is shaded grey? (There are 6 circles in total).

a) $10/24$ b) $5/6$ c) $5/24$ d) $14/24$

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Correct Option: (d) $14/24$

Explanation: 6 circles $\times$ 4 quadrants = 24 quadrants in total. Counting shaded sections: $2 + 2 + 2 + 4 + 4 + 0 = 14$ shaded parts out of 24, giving $14/24$.

Question 5 Land Distribution

A piece of land is distributed between Raj and Rahul. Raj receives $1/2$ of the total land, and Rahul receives land equal to $1/2$ of what Raj receives. What fraction of the land remains undistributed?

a) $1/2$ b) $1/8$ c) $1/4$

d) The land is distributed completely

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Correct Option: (c) $1/4$

Explanation: Raj = $1/2$. Rahul = $1/2$ of $1/2 = 1/4$. Total given away = $1/2 + 1/4 = 3/4$. Undistributed land = $1 - 3/4 = 1/4$.

Question 6 Number Matrix Pattern

If each row follows the same theme, what will come in place of A and B?

- Row 1: $\frac{1}{6}$, $\frac{2}{6}$, $\frac{3}{6} \rightarrow \frac{2}{3}$
- Row 2: $\frac{3}{4}$, $\frac{4}{4}$, $\frac{5}{4} \rightarrow \frac{3}{2}$
- Row 3: $\frac{2}{10}$, $\frac{3}{10}$, $\frac{4}{10} \rightarrow \frac{1}{2}$
- Row 4: $\frac{5}{12}$, $\frac{6}{12}$, $\frac{7}{12} \rightarrow A/B$

a) $A = 6$, $B = 12$ b) $A = 2$, $B = 3$ c) $A = 3$, $B = 2$ d) $A = 1$, $B = 6$

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Correct Option: (b) $A = 2$, $B = 3$

Explanation: In each row, the rightmost fraction is simplified from the sum/middle relation, reducing row 4 to simplest terms: $(5 + 7)/12$ or middle-pattern gives $8/12 = 2/3$. Thus $A = 2$, $B = 3$.

Question 7 Kiran's Coins

Which of these options can we conclude from the following statement?

"Three quarters of total coins that Kiran has are of denomination five rupees."

a) All coins that Kiran has are of more than 2 rupees

b) All coins that Kiran has are of less than 10 rupees

c) Only one-fourth of the coins with Kiran are not of five rupees

d) Kiran has 30 coins of denomination five rupees

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Correct Option: (c) Only one-fourth of the coins with Kiran are not of five rupees

Explanation: If $\frac{3}{4}$ are five-rupee coins, then remaining $= 1 - \frac{3}{4} = \frac{1}{4}$ are coins not of five rupees.

Question 8 Apple Cuts

Sam makes three cuts on the same apple, as shown by the dotted lines in the image (Cut 1: vertical, Cut 2: horizontal, Cut 3: frontal cross-cut). Altogether, how many pieces of apple will he have?

a) 6

b) 7

c) 8

d) 9

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Correct Option: (c) 8

Explanation: Three mutually perpendicular cuts through a solid sphere divide it into $2 \times 2 \times 2 = 8$ distinct pieces.

Question 9 Riddle of Fractions

If you take 6 times of me, you will get a whole and a half. If you take me out of a whole, you are left with three times of me. Who am I?

a) Half

b) Quarter

c) Whole

d) Zero

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Correct Option: (b) Quarter

Explanation: Let value be x .

- $6 \times x = 1.5 \rightarrow x = 1.5 / 6 = 1/4$ (Quarter).
- Check: $1 - 1/4 = 3/4 = 3 \times (1/4)$. Matches perfectly.

Question 10 Chocolate Buyers

In a chocolate shop, four buyers come in one by one to buy chocolates. Each buyer purchases half of the chocolates that are currently in the shop. This process continues until the fourth buyer, who buys only 1 chocolate. How many chocolates were there in the shop initially?

a) 8

b) 32

c) 16

d) 20

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Correct Option: (c) 16

Explanation: Working backwards:

- 4th buyer bought 1 chocolate, meaning there were 2 chocolates present.
- 3rd buyer faced 4 chocolates.
- 2nd buyer faced 8 chocolates.
- 1st buyer faced 16 chocolates initially.

Thinking Spot Cards Sum Challenge

A set of 8 cards each have a whole number on it. Cards A, B, C, and D represent numbers that are either one more or one less than the number on the card directly above them (Top cards: 1, 4, 6, 3). If all 8 numbers on these cards are different, what is the sum of B and C?

a) 12

b) 10

c) 11

d) Cannot be determined

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (a) 12

Explanation: Top row = {1, 4, 6, 3}. Cards {A, B, C, D} must be all different from each other and the top numbers:

- Card B (above 4): options are 3 or 5 (3 is already used → B must be 5).
- Card C (above 6): options are 5 or 7 (5 is used by B → C must be 7).
- Sum of B and C = $5 + 7 = 12$.

CHAPTER 3: ANGLES AS TURNS

Question 1 P and Q Facing Directions

P and Q are standing in a playground. P took a right-angle turn in the clockwise direction and Q took a right-angle turn in the anti-clockwise direction, and now both of them face the same direction. If P is currently facing North, which direction was Q initially facing?

a) East

b) West

c) South

d) Cannot be determined

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (a) East

Explanation: Both currently face North. Q reached North by turning 90° anti-clockwise. To reverse: North turned 90° clockwise = East. Thus, Q was initially facing East.

Question 2 Arrow Passing Through Blocks

Two arrows must pass through five blocks to reach the opposite side, making a right-angle clockwise turn each time they enter a block. Which option shows the correct positions of these arrows when they are present in the shaded block (Block 3)?

a) Left: ↑ | Right: ↓

b) Left: ↑ | Right: ←

c) Left: ↓ | Right: ↑

d) Left: ↑ | Right: →

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (a) Left arrow pointing UP (↑), Right arrow pointing DOWN (↓)

Explanation: Left arrow starts right (→), block 1 (↓), block 2 (←), block 3 (↑). Right arrow starts left (←), block 5 (↑), block 4 (→), block 3 (↓).

Question 3 Prachi's Clockwise Turns

Prachi is facing North. She takes a right-angle turn in the clockwise direction. She then takes a right-angle turn again in the clockwise direction. What direction is she facing now?

a) North

b) East

c) West

d) South

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (d) South**Explanation:** Two right-angle (90°) clockwise turns equal a 180° half-turn. $\text{North} + 180^\circ = \text{South}$.**Question 4** Pinwheel Rotation

The given question image could be rotated clockwise or anticlockwise multiple times. Which of the following options will you NOT get on rotating the given question image?

a) Option a

b) Option b

c) Option c

d) Option d

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (b)**Explanation:** Option (b) is a lateral reflection (mirror image) of the shape rather than a pure planar rotation. A 2D rotation cannot alter chirality.

Question 5 Overlaying Rotated Images

Sam rotates Image 2 by a right-angle clockwise turn. If Tom places the rotated Image 2 on Image 1, which of the following statements is NOT true?

☐ a) A and E overlap with each other

☐ b) 9 and 8 are opposite to each other

☐ c) F and B are diagonal to each other

☐ d) 9 and 1 overlap with each other

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (d) 9 and 1 overlap with each other

Explanation: Rotating Image 2 clockwise by 90° sends the bottom number '1' to the left vertical edge, whereas '9' in Image 1 is at the top horizontal edge. Hence, they do not overlap.

Question 6 Pratik's Net Turn

Pratik is facing North. He first makes a $\frac{1}{4}$ clockwise turn, followed by a $\frac{1}{2}$ anti-clockwise turn. In which direction was he facing at the end?

☐ a) North

☐ b) East

☐ c) West

☐ d) South

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (c) West

Explanation: North + $\frac{1}{4}$ CW (90°) = East. East + $\frac{1}{2}$ ACW (180°) = West.

Question 7 Seating Rearrangement

A, B, C, D, E, and F are seated around a table, facing the centre, with two chairs left empty. Two new members join the group. E, C, and B move one seat clockwise, while D and F move one seat anticlockwise. After these changes, the new members occupy the empty chairs. Who is sitting between the two new members?

a) A

b) B

c) E

d) F

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (a) A

Explanation: Member A does not move from their seat. The shifts leave the empty chairs flanking A, so the two new members occupy seats directly to the left and right of A.

Question 8 Rohan and Kamini Turns

Rohan and Kamini are facing East. Rohan takes 2 quarter turns in clockwise direction and Kamini takes 2 quarter turns in anti-clockwise direction and then Kamini takes 1 quarter turn in clockwise direction. Which of the following will lead Kamini and Rohan to face opposite directions?

a) Rohan taking 1 quarter turn in a clockwise direction

b) Kamini taking 1 quarter turn in a clockwise direction

c) Rohan taking 2 quarter turns in an anti-clockwise direction

d) Both options a and b

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (b) Kamini taking 1 quarter turn in a clockwise direction

Explanation: Currently: Rohan is facing West ($\text{East} + 180^\circ$). Kamini faced West ($\text{East} - 180^\circ$), then turned 90° CW $\rightarrow$ North. For Kamini to face East (opposite West), she needs 1 more 90° (quarter) clockwise turn.

Question 9 Rotating Bracket Series

What will come in place of "?" in the given series of rotating U-shaped elements?

a) Option a

b) Option b (Open towards Left)

c) Option c

d) Option d

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (b)

Explanation: The open end of the shape rotates 90° clockwise at each step: Up → Right → Down → Left (Option b).

Question 10 Moving Blue Boxes

If both the blue boxes shift to the next corner in clockwise direction, how will the image look after the shift?

a) Option a

b) Option b

c) Option c

d) Option d

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (c)

Explanation: The first blue box (bottom-left) shifts clockwise to the top-left corner. The second blue box (bottom-right) shifts clockwise to the bottom-left corner.

Thinking Spot Bird Grid Minimum Colouring

In the grid given, colour some of the empty blocks such that each bird has exactly one coloured block adjacent to it. What is the **MINIMUM** number of blocks that need to be coloured? (Note: Adjacent means sharing a common edge).

a) 2

b) 3

c) 4

d) 5

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (a) 2

Explanation: By strategically choosing 2 intersecting empty blocks adjacent to the clusters of birds, all 5 birds share exactly one common side with a coloured cell.

CHAPTER 4: WE THE TRAVELLERS - II

Question 1 Odd and Even Digits Sum

Which statement is **DEFINITELY** true about a five-digit number that consists of three odd digits and two even digits?

a) The sum of all the 5 digits is an odd number

b) The sum of all the 5 digits is an even number

c) The sum of all the 5 digits is a prime number

d) Cannot be determined

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (a) The sum of all the 5 digits is an odd number

Explanation: Sum of 3 odd numbers is always odd. Sum of 2 even numbers is even. Odd + Even = Odd.

Question 2 Coin Exchanges

A has 5 gold coins and B has 7 silver coins. B can exchange 2 silver coins for 1 gold coin with A. If B exchanges as many coins as possible, what will be the total number of coins (both gold and silver) with A at the end?

a) 8

b) 6

c) 5

d) 2

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (a) 8

Explanation: With 7 silver coins, B can do 3 trades (6 silver coins for 3 gold coins). A gives away 3 gold coins (leaving 2 gold) and receives 6 silver coins. Total with A = $2 + 6 = 8$ coins.

Question 3 Descending Column Combination

In how many different ways can you fill in all the shaded cells such that the numbers in the column are arranged in descending order and each cell has a unique number? (Top is 30, bottom is 25, with 3 shaded cells between them).

a) 2

b) 3

c) 4

d) 5

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (c) 4

Explanation: The available integers between 30 and 25 are {29, 28, 27, 26} (4 numbers). Selecting any 3 of them yields exactly 1 unique descending order: $4 \text{ choose } 3 = 4$ ways.

Question 4 Balloon & Ball Pricing

John has Rs. 12 with him. He went to a shop and bought 3 balls and 2 balloons. After buying these items, he still has Rs. 2 remaining, which is exactly the cost of 1 ball. What is the cost of 1 balloon?

a) Rs. 1

b) Rs. 2

c) Rs. 3

d) Rs. 4

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (b) Rs. 2

Explanation: Cost of 1 ball = Rs. 2. 3 balls = Rs. 6. Total spent = Rs. 12 – Rs. 2 = Rs. 10. Cost of 2 balloons = Rs. 10 – Rs. 6 = Rs. 4. Cost of 1 balloon = $4 / 2 = \text{Rs. } 2$.

Question 5 Parity Transformation

If you add 1 to the digit in the ones place and subtract 2 from the digit in the tens place in the numbers given below, how many of the new numbers will be even?

4434, 2655, 3561, 1636, 1253, 8094, 1371, 3038, 2335, 1045

a) 5

b) 6

c) 7

d) 8

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (b) 6

Explanation: A number becomes even when its new ones digit is even. Since we add 1 to the ones digit, the original ones digit must be odd. Counting numbers with odd ending digits: 2655, 3561, 1253, 1371, 2335, 1045 → exactly 6 numbers.

Question 6 Inequality Arrangements

You have to place 4 numbers from 1, 2, 3, 4, and 5 in the squares below to satisfy the given comparisons: $A > B < C < D$. How many different arrangements of numbers are possible if box B contains number 1? (Note: You cannot use the same number twice in the same arrangement).

a) 8

b) 9

c) 11

d) 12

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (d) 12

Explanation: $B = 1$. Remaining pool: {2, 3, 4, 5}.

- Choose 1 number for A: 4 possibilities.
- Choose 2 numbers from the remaining 3 for C and D: 3 choose 2 = 3 ways (automatically arranged as $C < D$).
- Total arrangements = $4 \times 3 = 12$.

Question 7 Coin Identification

Bob has 4 coins with different values: 2, 4, 6, and 8.

- Coin C is worth more than Coin A.
- The total value of Coins B and C is equal to the value of Coin D.

Which TWO coins can Bob use to buy a candy that costs Rs. 14?

a) Coins A and D

b) Coins B and D

c) Coins A and C

d) Coins C and D

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (d) Coins C and D

Explanation: From $B + C = D$, the only sum from {2,4,6,8} is $2 + 6 = 8$, so $D = 8$, and {B, C} are {2, 6}. Since $C > A$ and the remaining values are 2 and 4, Coin C must be 6, Coin B = 2, Coin A = 4. To make Rs. 14: $6 + 8 = 14 \rightarrow$ Coins C and D.

Question 8 3-Digit Even Numbers

How many different three-digit even numbers can you make using the digits given below?
(Note: You can use any one, any two, or all the digits, and you may repeat the digits): 5, 0, 9

a) 3

b) 4

c) 5

d) 6

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Correct Option: (d) 6

Explanation: For a 3-digit even number, hundreds place $\in \{5, 9\}$ (2 choices, since 0 cannot lead), tens place $\in \{5, 0, 9\}$ (3 choices), units place must be 0 (1 choice). Total = $2 \times 3 \times 1 = 6$ numbers (500, 550, 590, 900, 950, 990).

Question 9 Minimal Sum 4-Digit Number

X is a 4-digit number which has only even digits and only 2 unique digits. What could be the minimum value of the sum of the digits of the number X?

a) 2

b) 4

c) 8

d) 12

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (a) 2

Explanation: The smallest even digits available are 0 and 2. The smallest 4-digit number with exactly two unique digits using only even digits is 2000. Sum of digits = $2 + 0 + 0 + 0 = 2$.

Question 10 Travellers' Walking Distance

A, B, and C each walk a certain distance.

- The person who covered the least distance walks 25 km, and another person walks 6 times this distance.
- C walks 12 km more than B, while A did not cover the least distance.

If only two among A, B, and C are allowed to walk further, how many more kilometres must they walk so that their **COMBINED** distance (from the start) equals the distance walked by the third person?

a) 92 km

b) 78 km

c) 88 km

d) 62 km

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (c) 88 km

Explanation: Since A didn't walk the least, and $C = B + 12$ km, B must have covered the least distance = 25 km.

- $B = 25$ km
- $C = 25 + 12 = 37$ km
- $A = 6 \times 25 = 150$ km

Combined distance of B and C = $25 + 37 = 62$ km. Extra distance needed to match A = $150 - 62 = 88$ km.

Thinking Spot Rectangles Containing Black Circle

Count the number of rectangles which contain the black circle. (Note: Please count the squares also as rectangles for the purpose of this question).

a) 3

b) 4

c) 5

d) 6

↓ SCROLL DOWN ON SMARTBOARD TO REVEAL ANSWER ↓

Correct Option: (b) 4

Explanation: The black circle is bounded within: 1) the inner-most square, 2) the overlapping intermediate rectangle, 3) the outer large square, and 4) the enclosing composite boundary box = 4 rectangles in total.