TNPSC Group IV — Aptitude & Reasoning

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A. Quick Revision Notes

Number system & simplification

Numbers are classified as natural, whole, integers, rational and irrational, and as prime or composite. Divisibility: by 2 (even last digit), by 3 (digit sum divisible by 3), by 5 (ends in 0 or 5), by 9 (digit sum divisible by 9), by 11 (alternating digit-sum difference divisible by 11). For any two numbers, LCM times HCF = product of the numbers. Simplify using BODMAS order: Brackets, Of, Division, Multiplication, Addition, Subtraction. Useful sums: 1 + 2 + ... + n = n(n+1)/2; sum of first n squares = n(n+1)(2n+1)/6.

Percentage, ratio & average

A percentage is a fraction out of 100: x% of y = (x/100) times y. Convert a fraction to a percentage by multiplying by 100. Percentage increase = (increase/original) times 100. A ratio a:b compares quantities; to combine a:b and b:c, make b common to get a:b:c. In a proportion a:b = c:d, the product of extremes equals the product of means (a times d = b times c). Average = (sum of all values)/(number of values). For a weighted average, multiply each value by its weight, add, and divide by the total weight.

Time, speed & distance

Speed = distance/time; distance = speed times time; time = distance/speed. Convert km/hr to m/s by multiplying by 5/18, and m/s to km/hr by multiplying by 18/5. Average speed = total distance/total time; for equal distances covered at speeds x and y, average speed = 2xy/(x + y). Relative speed is the sum of speeds when objects move in opposite directions and the difference when in the same direction. A train crossing a pole takes (length/speed); two trains crossing take (sum of lengths)/(relative speed). Work problems use work = rate times time.

Profit, loss & interest

Profit = Selling Price minus Cost Price; Loss = Cost Price minus Selling Price. Profit% = (profit/CP) times 100 and Loss% = (loss/CP) times 100, always on cost price. SP = CP times (100 + gain%)/100. Discount is calculated on the Marked Price. Simple Interest SI = (P times R times T)/100, and Amount = P + SI. Compound Interest: Amount = P times (1 + R/100) raised to T; CI = Amount minus P. For 2 years, the difference between CI and SI = P times (R/100) squared.

Logical reasoning

Common types: analogy (find the relationship in a pair), classification (spot the odd one out), syllogisms (all/some/no statements — solve with Venn diagrams), blood relations (draw a family tree), directions (track turns using North-East-South-West), seating arrangement (linear or circular), ranking, and statement-and-conclusion or statement-and-assumption. General method: identify the underlying rule or pattern, apply it consistently, test each option, and eliminate those that do not fit. Read carefully — small words like 'only', 'all' or 'some' change the answer.

Series & coding-decoding

In a number series, find the pattern — addition, subtraction, multiplication, squares, cubes, alternating terms or primes — then supply the missing or wrong term. For letter series, use letter positions A = 1 to Z = 26 (and reverse, where A pairs with Z). In coding-decoding, work out how the code relates to the word: a fixed letter shift (for example +1 turns CAT into DBU), position numbering, or substitution. Compare the positions of matching letters between the word and its code to crack the rule, then apply it.

Data interpretation

Data interpretation asks you to read tables, bar graphs, line graphs and pie charts and compute answers. In a pie chart the whole circle is 360 degrees = 100%, so a sector's value = (its percentage/100) times the total, and its angle = (value/total) times 360 degrees. Percentage change = (new minus old)/old times 100. You may also be asked for averages and ratios from the data. Always check the units and the legend, read the correct row or bar, and approximate where possible to save time.

Geometry & mensuration

The angles of a triangle sum to 180 degrees and of a quadrilateral to 360 degrees. Pythagoras' theorem: in a right triangle, hypotenuse squared = base squared + height squared. Areas: rectangle = length times breadth; square = side squared; triangle = 1/2 times base times height; circle = pi times r squared, with circumference = 2 times pi times r. Perimeter of a rectangle = 2 times (length + breadth). Volumes: cube = side cubed; cuboid = l times b times h; cylinder = pi times r squared times h; sphere = 4/3 times pi times r cubed. Take pi as 22/7.

B. Practice MCQs (25)

1. If a train travels 60 miles in 1 hour, how far will it travel in 2.5 hours?

(A) 150 miles
(B) 120 miles
(C) 180 miles
(D) 200 miles

2. A rectangle has a length of 10 cm and a width of 5 cm. What is its area?

(A) 30 cm²
(B) 50 cm²
(C) 60 cm²
(D) 70 cm²

3. What comes next in the series: 2, 4, 8, 16?

(A) 18
(B) 20
(C) 24
(D) 32

4. What is the smallest prime number?

(A) 0
(B) 1
(C) 2
(D) 3

5. If the total cost of 3 pencils and 2 erasers is $1.50, and a pencil costs $0.50, what is the cost of one eraser?

(A) $0.50
(B) $0.75
(C) $1.00
(D) $1.25

6. Simplify: 2(3x + 4) - 5.

(A) 6x + 3
(B) 6x + 8
(C) 6x - 10
(D) 8x - 10

7. A bag contains 3 red balls and 2 blue balls. What is the probability of picking a blue ball?

(A) 1/5
(B) 1/3
(C) 2/5
(D) 1/2

8. If 5 workers can complete a job in 10 days, how many days will 10 workers take to complete the same job?

(A) 5 days
(B) 10 days
(C) 15 days
(D) 20 days

9. What is the next number in the series: 3, 6, 12, 24?

(A) 36
(B) 48
(C) 60
(D) 72

10. A car travels 300 km at a speed of 60 km/h. How long does the journey take?

(A) 4 hours
(B) 5 hours
(C) 6 hours
(D) 7 hours

11. If the ratio of boys to girls in a class is 4:5 and there are 27 students in total, how many boys are in the class?

(A) 12
(B) 15
(C) 18
(D) 21

12. Which of the following is the largest fraction?

(A) 3/4
(B) 2/3
(C) 5/6
(D) 1/2

13. If a cylinder has a radius of 3 cm and a height of 7 cm, what is the volume of the cylinder?

(A) 63π cm^3
(B) 30π cm^3
(C) 21π cm^3
(D) 27π cm^3

14. If a car travels 150 km in 2 hours, what is its average speed?

(A) 75 km/h
(B) 60 km/h
(C) 90 km/h
(D) 100 km/h

15. How many degrees are in a right angle?

(A) 90 degrees
(B) 45 degrees
(C) 180 degrees
(D) 360 degrees

16. What is the next number in the series: 7, 14, 21, ...?

(A) 27
(B) 28
(C) 30
(D) 35

17. If 8 workers can build a wall in 20 days, how many days will it take 4 workers?

(A) 40 days
(B) 30 days
(C) 50 days
(D) 60 days

18. A clock shows 3:15. What is the angle between the hour hand and the minute hand?

(A) 45 degrees
(B) 90 degrees
(C) 97.5 degrees
(D) 105 degrees

19. What is 20% of 250?

(A) 40
(B) 50
(C) 60
(D) 70

20. If the ratio of boys to girls in a class is 3:5 and there are 40 students in total, how many boys are there?

(A) 15
(B) 18
(C) 20
(D) 22

21. What is the HCF of 252, 378 and 630?

(A) 63
(B) 42
(C) 189
(D) 126

22. Simplify: 3/4 + (5/6 - 1/3) * 2.

(A) 11/6
(B) 5/4
(C) 7/4
(D) 13/8

23. What is the least positive integer by which 180 must be multiplied to make it a perfect square?

(A) 3
(B) 10
(C) 5
(D) 2

24. Evaluate: square root of 1296 + cube root of 343 - 11.

(A) 30
(B) 34
(C) 36
(D) 32

25. The average of 12 observations is 18; if one observation 24 is replaced by 36, what is the new average?

(A) 19
(B) 18.5
(C) 19.5
(D) 20

C. Answer Key & Explanations

1. (A) Speed = Distance/Time. Therefore, Distance = Speed x Time. Here, Distance = 60 miles/hour * 2.5 hours = 150 miles.
2. (B) Area of a rectangle = length x width = 10 cm x 5 cm = 50 cm².
3. (D) Each number in the series is double the previous number (2x2=4, 4x2=8, 8x2=16, 16x2=32).
4. (C) The smallest prime number is 2; it is the only even prime number.
5. (B) Let the cost of one eraser be x. Then, 3 * 0.50 + 2x = 1.50. Solving gives x = 0.75.
6. (C) Distributing gives: 6x + 8 - 5 = 6x - 10.
7. (C) Total balls = 3 + 2 = 5. Probability = Number of favorable outcomes / Total outcomes = 2/5.
8. (A) If 5 workers can finish a job in 10 days, then the total work can be expressed as 5 workers * 10 days = 50 worker-days. If we have 10 workers, we can find the days taken by dividing the total work by the number of workers: 50 worker-days...
9. (B) The pattern shows that each number is multiplied by 2 to get the next number: 3*2=6, 6*2=12, 12*2=24, therefore, 24*2=48.
10. (B) Time can be calculated using the formula: Time = Distance / Speed. Here, Distance = 300 km and Speed = 60 km/h. Thus, Time = 300 km / 60 km/h = 5 hours.
11. (A) Let the number of boys be 4x and girls be 5x. Then, 4x + 5x = 27. This simplifies to 9x = 27, hence x = 3. Therefore, number of boys = 4x = 4*3 = 12.

12. (C) To compare fractions, we can find a common denominator or convert them to decimals. 3/4 = 0.75, 2/3 ≈ 0.67, 5/6 ≈ 0.83, and 1/2 = 0.5. Thus, 5/6 is the largest.
13. (A) Volume of a cylinder is given by the formula $V = \pi r^2 h$. Here, r = 3 cm and h = 7 cm. Thus, $V = \pi(3)^2(7) = \pi(9)(7) = 63\pi$ cm^3.
14. (A) Average speed is calculated as total distance divided by total time. Here, it is 150 km / 2 hours = 75 km/h.
15. (A) A right angle measures exactly 90 degrees.
16. (B) The series increases by 7 each time. Therefore, the next number is 21 + 7 = 28.
17. (A) Work is inversely proportional to the number of workers. If fewer workers are used, it will take longer. So, 8 workers take 20 days, hence 4 workers will take 40 days.
18. (C) At 3:15, the hour hand is at 97.5 degrees (3 hours × 30 degrees/hour + 15 minutes × 0.5 degrees/minute), while the minute hand is at 90 degrees (15 minutes × 6 degrees/minute). The difference is 97.5 - 90 = 7.5 degrees.
19. (A) 20% of 250 is calculated as (20/100) * 250 = 50.
20. (B) The total parts in the ratio 3:5 is 3 + 5 = 8. Each part = Total Students / total parts = 40 / 8 = 5. Therefore, the number of boys is 3 parts = 3 * 5 = 15.
21. (D) Since 252 = 126 * 2, 378 = 126 * 3 and 630 = 126 * 5, the greatest common factor is 126.
22. (C) First 5/6 - 1/3 = 1/2, and 3/4 + 1/2 * 2 = 3/4 + 1 = 7/4.
23. (C) Since 180 = 2^2 * 3^2 * 5, multiplying by 5 pairs the unpaired factor and gives 900 = 30^2.
24. (D) The square root of 1296 is 36 and the cube root of 343 is 7, so 36 + 7 - 11 = 32.
25. (A) The total increases by 36 - 24 = 12, so the new total is 12 * 18 + 12 = 228 and the new average is 228/12 = 19.