National Analytical Brains Competition 2025

NAB Competition 2025 - Grade 07

Mathematical Ability

All questions are mandatory. Please note there is no negative marking:

1. A shopkeeper marks an article 60% above cost and offers two successive discounts of 20% and x%. The final selling price equals the cost price. Find x.
   (a) 25% (b) 20% (c) 33⅓% (d) 50%

2. Two machines in a workshop start a cycle together. The first machine completes a cycle every 170 minutes. It is known that both machines always meet after every 2550 minutes, and the longest time interval that divides both their cycle times exactly is 17 minutes. Find the cycle time of the second machine.
   (a) 127 minutes (b) 153 minutes (c) 187 minutes (d) 255 minutes

3. A tank can be filled by pipe A in 6 hours and pipe B in 12 hours. Due to a leak at the bottom, which can empty the tank in 12 hours, the tank fills more slowly. If all three are opened together when the tank is empty, in how many hours will the tank be completely filled?
   (a) 18 (b) 6 (c) 12 (d) 4

4. For integers a, b, c, the expression $(a-b)^2+(b-c)^2+(c-a)^2$ $(a-b)^2+(b-c)^2+(c-a)^2$ equals 0 only when:
   (a) a = b = c (b) a = b ≠ c (c) a ≠ b = c (d) a ≠ b ≠ c

5. A number when increased by 25% and then decreased by 20% becomes 720. The original number is:
   (a) 640 (b) 720 (c) 750 (d) 800

6. Are integers commutative for subtractions?
   (a) Yes (b) No (c) Can't Say (d) None of these

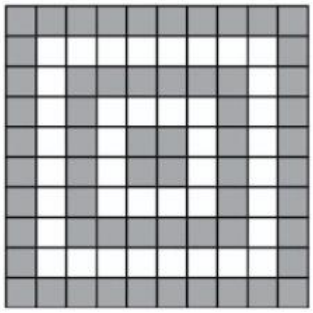
7. A rectangle and a triangle have the same base. The rectangle's area is 540 cm² and its height is 18 cm. The triangle's height is ⅔ of the rectangle's height. Find the area of the triangle.
   (a) 150 cm² (b) 180 cm² (c) 360 cm² (d) 270 cm²

8. Find the least positive integer n such that n^2 is divisible by 8 and 18.
   (a) 6 (b) 9 (c) 12 (d) 18

9. The average of 9 numbers is 41. If one number 59 is incorrectly taken as 95, the correct average is:
   (a) 37 (b) 39 (c) 41 (d) 43

10. Which of the following has the largest value?
    (a) 0.001 (b) $\frac{1}{10000}$ (c) $\frac{1}{10^6}$ (d) $\frac{1}{10^6} \div 0.1$

11. The percent that represents the unshaded region in the figure is:



    (a) 75% (b) 50% (c) 40% (d) 60%

12. A merchant invests a certain sum in a business at a compound annual growth rate of 20%. After 2 years, the investment grows to ₹1440. What was the original investment?
    (a) ₹1000 (b) ₹1100 (c) ₹1200 (d) ₹1300

13. A triangular park is in the shape of an isosceles right triangle. The park has an area of 98 m^2. A gardener wants to place a fence along the longest side of the park. Find the length of the fence.
    (a) 14 m (b) 14 √2 m (c) 7 √2 m (d) 28 m

14. The digits of a 2-digit number differ by 5. If we add 45 to the number, its digits swap places. What is the number?
    (a) 49 (b) 59 (c) 94 (d) 73

15. Simplify:

$$\left(\frac{5}{8} \div \frac{15}{16}\right) \times \left(\frac{7}{9} \div \frac{7}{12}\right)$$

    (a) 4/3 (b) 16/9 (c) 8/9 (d) 32/27

16. How many rational numbers are there between two rational numbers?
    (a) None (b) Only One (c) Finitely many (d) Infinitely many
17. A rectangular sheet of paper measures 14 cm in length and 11 cm in breadth. It is cut and reshaped into a perfect circular sheet without any wastage of area. Find the radius of the circular sheet.
    (a) 5 cm (b) 6 cm (c) 7 cm (d) 8 cm

18. On the number line, the value of (–3) × 3 lies on right hand side of
    (a) -10 (b) -4 (c) 0 (d) 9

19. 225% is equal to:
    (a) 9:4 (b) 4:9 (c) 3:2 (d) 2:3

20. (–43) × (–99) + 43 is equal to:
    (a) 4300 (b) -4300 (c) 4257 (d) -4214

Logical Reasoning

All questions are mandatory. Please note there is no negative marking:

21. In “QUADRATIC”, how many pairs of letters have the same gap between them as in the alphabet (both forward/backward)?
(a) 2 **(b) 3** (c) 4 (d) 5

22. Code: If “LAKE” → “NCMG” (each letter +2), then “SCHOOL” encodes to:
(a) UEJQNN (b) UEJQQN (c) UEFQNN (d) UEJQOO

23. Find the wrong term: 3, 5, 9, 17, 33, 65, 130
(a) 5 (b) 9 (c) 33 **(d) 130**

24. Which is in the middle when arranged dictionary-wise: **refract**, **refresh**, **referee**, **refine**, **refold**
(a) refract **(b) refresh** (c) referee (d) refold

25. A clock shows 3:20. The angle between the hands is:
(a) 20° (b) 35° (c) 40° (d) 50°

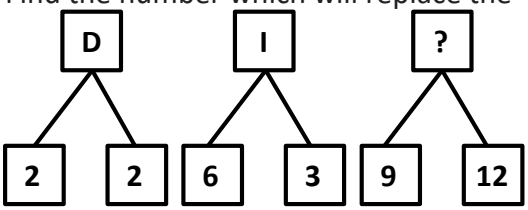
26. Choose the odd numeral pair/group :
(a) 34 - 43 (b) 55 - 62 (c) 62 - 71 (d) 83-92

27. A person walks 7 km west, then 5 km south, then 7 km east, then 5 km north. Distance from start?
(a) 0 (b) 2 km (c) 7 km (d) 10 km

28. A party consisted of a man, his wife, his three sons and their wives and three children in each son's family. How many were there in the party?
(a) 24 (b) 22 (c) 13 (d) 17

29. Ravish ranked ninth from the top and thirty-eighth from the bottom in a class. How many students are there in the class?
(a) 45 (b) 46 (c) 47 (d) 48

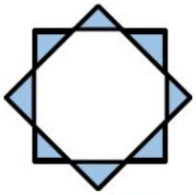
30. Find the number which will replace the '?' mark.

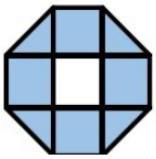
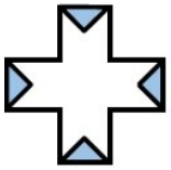


(a) L (b) M (c) T (d) U

31. If $4 \# 7 = 4^2 + 7^2 - 2 \times 4 \times 7$, then $9 \# 3$ equals:
(a) 36 (b) 12 (c) 18 (d) 24

32. Which of the following figures is obtained by folding the shaded part in the given figure?



(a)  (b)  (c)  (d) 

33. In a row of 60 cars, car A is 32nd from the right end. What is its position from the left end?
(a) 28 (b) 29 (c) 27 (d) None of These

34. Choose the water image of the figure X from the amongst the four alternative given along with it?

Fig.(x)

(a)  (b)  (c)  (d) 

35. A dice with six faces is marked with six numbers 1, 2, 3, 4, 5 and 6 respectively. This dice is rolled three times and three positions are shown below.
Find the number opposite to 1.

(a) 2 (b) 6 (c) 5 (d) 4

36. A cube is painted on all faces and cut into 64 equal smaller cubes. How many have exactly two faces painted?

(a) 24 (b) 12 (c) 16 (d) 18

37. If the word TERMINATION is coded as 12345671586, what should be the code for the word MOTION?
(a) 438586 (b) 481586 (c) 458586 (d) 485186

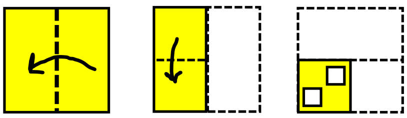
38. Choose the alternative which is closely resembles the mirror image of the given combination.

U T Z F Y 6 K H

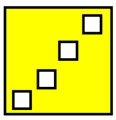
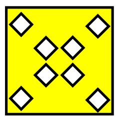
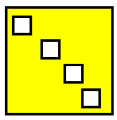
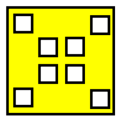
(a) 
(b) 
(c) 
(d) 

39. In the following letters series, some of the letters are missing which are given in that order as one of the alternatives below it. Choose the correct alternative.
m _ nm _ n _ an _ a _ ma _
(a) aamnan (b) ammanm (c) aammnn (d) amammn

40. Direction: There are three forms X, Y and Z of a sheet of paper. Figures X and Y respectively show the two consecutive folds of the sheet. And the figure Z shows punch on the folded sheet. Choose one figure from the four options [a], [b], [c] and [d] that is similar to the unfolded form of the sheet.



(X) **(Y)** **(Z)**

(a) 
(b) 
(c) 
(d) 

Daily Life Problems :

All questions are mandatory. Please note there is no negative marking:

Greenfield School held a Winter Fair on New Year's Day.

- Entry tickets were ₹150 each, and 320 visitors came.
- The fairground was rectangular, 72 m × 48 m, with a circular stage of radius 7 m at the center (stage area not available for stalls).
- The food court sold samosas at ₹20, juices at ₹25, and pastries at ₹30. The sales were in the ratio 2:3:5 by number of items. Total sales amounted to ₹23,850.
- A puzzle game was set up where each player flipped a fair coin until they got heads. On average, this required 2 flips per player. Exactly 200 players played.
- A fireworks show launched one rocket every 40 seconds for 40 minutes. Each rocket cost ₹300.

41. How much Total ticket collection was done from visitors?
    (a) ₹45,000 (b) ₹48,000 (c) ₹50,000 (d) ₹52,000

42. How much area is available for stalls?
    (a) 3456 m^2 (b) 3302 m^2 (c) 3610 m^2 (d) 2800 m^2

43. Calculate the total number of food items sold?
    (a) 800 (b) 900 (c) 960 (d) 1000

44. How many samosas were sold?
    (a) 160 (b) 180 (c) 200 (d) 220

45. How many pastries were sold?
    (a) 450 (b) 460 (c) 470 (d) 480

46. How many juices were sold?
    (a) 260 (b) 270 (c) 280 (d) 300

47. In the coin-flip game, how many total flips for 200 players are expected?
    (a) 350 (b) 400 (c) 450 (d) 500

48. How many rockets are launched in 40 minutes?
    (a) 40 (b) 80 (c) 60 (d) 120

49. Total how much expense was done on rockets?

(a) ₹12000 (b) ₹24000 (c) ₹18000 (d) Cannot be determined

50. What is the ratio of ticket collection to food sales (closest option)?

(a) 2:1 (b) 3:2 (c) 5:3 (d) 4:3

ANSWER KEY

1.	**B**	**2.**	**D**	**3.**	**B**	**4.**	**A**	**5.**	**B**
6.	**B**	**7.**	**B**	**8.**	**C**	**9.**	**A**	**10.**	**A**
11.	**C**	**12.**	**A**	**13.**	**B**	**14.**	**A**	**15.**	**C**
16.	**D**	**17.**	**C**	**18.**	**A**	**19.**	**A**	**20.**	**A**
21.	**A**	**22.**	**B**	**23.**	**D**	**24.**	**D**	**25.**	**A**
26.	**B**	**27.**	**A**	**28.**	**D**	**29.**	**B**	**30.**	**D**
31.	**A**	**32.**	**A**	**33.**	**B**	**34.**	**C**	**35.**	**C**
36.	**A**	**37.**	**B**	**38.**	**D**	**39.**	**C**	**40.**	**D**
41.	**B**	**42.**	**B**	**43.**	**B**	**44.**	**B**	**45.**	**A**
46.	**B**	**47.**	**B**	**48.**	**C**	**49.**	**C**	**50.**	**A**