

# MENTAL ABILITY

1. The six faces of a cube are painted in a manner that on two adjacent faces have the same colour. The three colours used in painting are red, blue and green. The cube is then cut into 36 smaller cubes in such a manner that 32 cubes are of one size and rest of a bigger size and each of the bigger cubes has no red side. How many cubes in all have a red side?

- (1) 16
- (2) 20
- (3) 8
- (4) 32

2. What is the number when its square is added to it, the result is 240?

- (1) 16
- (2) 15
- (3) 17
- (4) 17

3. If “(A + B) means A is the daughter of B”, “(A – B) means A is the husband of B”, “(A × B) means A is the brother of B, then for P + Q – R which of the following is true.

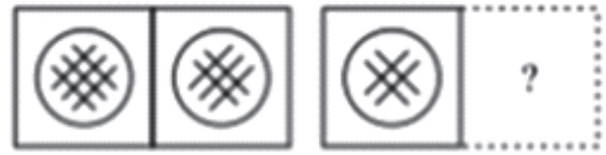
- (1) R, is the mother of P
- (2) R is the sister-in-law of P
- (3) R is the aunt of P
- (4) R is the mother-in-law of P

4. What is the missing number in the series:

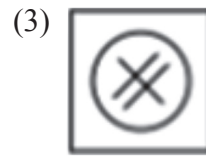
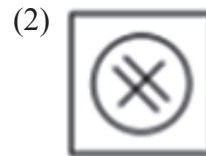
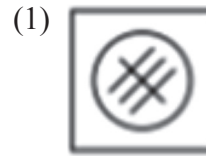
$$35:91 :: 189: ?$$

- (1) 343
- (2) 341
- (3) 280
- (4) 210

5. There is a certain relation between fig. (i) and (ii). Establish the same relationship between fig. (iii) and (iv) by selecting a suitable figure from the options which will replace the (?) in fig. (iv).



(i)                      (ii)                      (iii)                      (iv)



6. Rajan got married 8 years ago. His present age is  $\frac{6}{5}$  times his age at the time of his marriage. Rajan’s sister was 10 years younger to him at the time of his marriage. The present age of Rajan’s sister is

- (1) 38 years
- (2) 36 years
- (3) 32 years
- (4) 40 years

7. I am facing South. I turn  $90^\circ$  in the anticlockwise direction and walk 30 m and then turning North I walk 40 m and then turning west I go 60 m. Then turning left walk 80 m. How far am I from the starting point?

- (1) 30 m
- (2) 40 m
- (3) 210 m
- (4) 50 m

8. Find the missing number in the series: 4, 13, 31, 58,

- (1) 94 (2) 85  
(3) 40 (4) 49

9. In a code language 157 means mother is always lovable, 619 means always happy future and 952 means mother very happy then what does the word future stand for in the same language?

- (1) 9  
(2) 6  
(3) 1  
(4) Can not be determined.

10. In the following figure which pattern will come next?



- (1)
- (2)
- (3)
- (4)

## MATHEMATICS

11. A train travels 418 km at a uniform speed. If the speed as been 16 km/h less, it would have taken 8 hours more for the same journey. Find the speed of the train.

- (1) 28 km/h (2) 32 km/h  
(3) 48 km/h (4) 38 km/h

12. If  $X = \{8^n - 7^n - 1 ; n \in \mathbb{N}\}$  and  $Y = \{49(n - 1) : n \in \mathbb{N}\}$  then

- (1)  $X \subseteq Y$  (2)  $Y \subseteq X$   
(3)  $X = Y$  (4) None of these

13. If  $f(x) = ax + b$ , where  $a$  and  $b$  are integers,  $f(n - 1) = -5$  and  $f(3) = 3$ , then  $a$  and  $b$  are equal to

- (1)  $a = -3, b = -1$   
(2)  $a = 2, b = -3$   
(3)  $a = 0, b = 2$   
(4)  $a = 2, b = 3$

14. The value of the expression  $3(\sin\alpha - \cos\alpha)^4 + 6(\sin\alpha + \cos\alpha)^4 + 4(\sin^6\alpha - \cos^6\alpha)$  is

- (1) 13 (2) 1  
(3) -1 (4) 0

15. For all  $n \in \mathbb{N}$ ,  $3 \cdot 5^{2n+1} + 2^{3n+1}$  is divisible by

- (1) 19 (2) 17  
(3) 23 (4) 25

16. The value of  $\sqrt{i} + \sqrt{-i}$  is \_\_\_\_\_

- (1) 1 (2)  $\sqrt{2}$   
(3)  $-i$  (4)  $-3$

17. If  $x < 5$ ,

- (1)  $-x < -5$   
(2)  $-x \leq -5$   
(3)  $-x > -5$   
(4)  $-x \geq -5$

18. The number of possible outcomes when a coin is tossed 6 times is:

- (1) 36 (2) 32  
(3) 12 (4) 64

19. If  $A$  and  $B$  are coefficient of  $x^n$  in the expansions of  $(1 + x)^{2n}$  and  $(1 + x)^{2n-1}$  respectively, then  $A/B$  equals

- (1) 2 (2) 1  
(3)  $\frac{1}{2}$  (4)  $\frac{1}{n}$

20. The value of  $\lim_{x \rightarrow 1} \frac{x^m - 1}{x^n - 1}$  is:

- (1) 1 (2)  $\frac{m}{n}$   
(3)  $-\left(\frac{m}{n}\right)$  (4)  $\frac{m^2}{n^2}$

21. Which of the following is not a statement?

- (1) Smoking is injurious to health
- (2)  $2 + 2 = 4$
- (3) 2 is the only even prime number.
- (4) Come here.

22. The equation of the straight line passing through the point (3, 2) and perpendicular to the line  $y = x$  is

- (1)  $x - y = 5$
- (2)  $x + y = 5$
- (3)  $x + y = 1$
- (4)  $x - y = 1$

**Direction for (23 and 24):** Read the following and answer the questions that follows:

There are 70 clerks working with M/s. Jha Lal Khanna & Co. C.A. of which 30 are female.

- I. 30 clerks are married.
- II. 24 clerks are above 25 years of age.
- III. 19 Married clerks are above 25 years of age among them 7 are males.
- IV. 12 males are above 25 years of age.
- V. 15 males are married.

23. How many unmarried girls are there?

- (1) 12
- (2) 15
- (3) 18
- (4) 10

24. How many of these unmarried girls are above 25?

- (1) 12
- (2) 15
- (3) 4
- (4) 0

25. From the word 'ASSASSINATION' a letter is chosen at a random basis. Then, determine the probability of getting a consonant.

- (1)  $\left(\frac{8}{13}\right)$
- (2)  $\left(\frac{5}{13}\right)$
- (3)  $\left(\frac{7}{13}\right)$
- (4)  $\left(\frac{6}{13}\right)$

26. Two finite sets have  $m$  and  $n$  elements. The number of subsets of the first set is 112 more than that of the second set. The values of  $m$  and  $n$  are respectively,

- (1) 4, 7
- (2) 7, 4
- (3) 4, 4
- (4) 7, 7

27. If the set  $X$  has 4 elements and the set  $Y = \{2, 3, 4, 5\}$ , then find the number of elements in  $X \times Y$

- (1) 8
- (2) 10
- (3) 18
- (4) 16

28. The area of the circle centred at (1, 2) and passing through (4, 6) is

- (1)  $25\pi$
- (2)  $10\pi$
- (3)  $5\pi$
- (4) none of these

29. If  $\sin \theta + \operatorname{cosec} \theta = 2$ , then  $\sin^2 \theta + \operatorname{cosec}^2 \theta$  is equal to

- (1) 1
- (2) 4
- (3) 2
- (4) None of these

30. The value of  $\cos 1^\circ \cos 2^\circ \cos 3^\circ - \cos 79^\circ$  is

- (1)  $\frac{1}{\sqrt{2}}$
- (2) 0
- (3) 1
- (4) -1

31. If  $x^n - 1$  is divisible by  $x - k$ , then the least positive integral value of  $k$  is

- (1) 1
- (2) 2
- (3) 3
- (4) 4

32. The real value of  $\alpha$  for which the expression  $(1 - i \sin \alpha)$  is purely real is:

- (1)  $(n + 1)\frac{\pi}{2}$
- (2)  $(2n + 1)\frac{\pi}{2}$
- (3)  $n\pi$
- (4) None of these, where  $n \in \mathbb{N}$

33. If  $|x + 2| \leq 9$ , then

- (1)  $x \in (-7, 11)$
- (2)  $x \in [-11, 7]$
- (3)  $x \in (-\infty, -7) \cup (11, \infty)$
- (4)  $x \in (-\infty, -7) \cup [11, \infty)$

34.  $P(Q) = \frac{3}{5}$  and  $P(R) = \frac{1}{5}$ . Find the value of  $P(Q \text{ or } R)$  if  $Q$  and  $R$  are mutually exclusive events.

- (1)  $\frac{3}{5}$  (2)  $\frac{2}{5}$   
(3)  $\frac{1}{5}$  (4)  $\frac{4}{5}$

35. Between 3 and 81 insert two numbers such that the sequence is a G.P series:

- (1) 18, 27  
(2) 9, 27  
(3) 9, 30  
(4) 18, 36

36. The equation of a given circle is given as  $a^2 + b^2 - 4a - 4b + 3 = 0$ . Find the radius of the circle.

- (1) 1  
(2) 5  
(3)  $\sqrt{5}$   
(4)  $\sqrt{3}$

37. Find the derivative of  $(x-1)(x-2)$

- (1)  $2x-3$  (2)  $2x-1$   
(3)  $3x-1$  (4)  $3x-2$

38. The negation of the statement "A circle is an ellipse" is

- (1) An ellipse is a circle.  
(2) An ellipse is not a circle.  
(3) A circle is not an ellipse.  
(4) A circle is an ellipse.

39. Calculate the mean deviation about the mean for the given data 5, 8, 9, 10, 11, 13, 14, 18

- (1) 4 (2) 5  
(3) 7 (4) 3

40. If the sum of three distinct positive integers is 33, what is the maximum possible product of the numbers?

- (1) 1155 (2) 1320  
(3) 1411 (4) 1225

## INTERACTIVE SECTION

41. Which of the following is not correct?

- (1)  $\sin \theta = -(1/5)$   
(2)  $\cos \theta = 1$   
(3)  $\sec \theta = (1/2)$   
(4)  $\tan \theta = 20$

42. A five digit number is divisible by 3 is to be formed using the numbers 0, 1, 2, 3, 4 and 5 without repetitions. The total number of ways this can be done is

- (1) 216 (2) 600  
(3) 240 (4) 3125

43. If the coefficients of 2<sup>nd</sup>, 3<sup>rd</sup> and the 4<sup>th</sup> terms in the expansion of  $(1+x)^n$  are in A.P., then value of  $n$  is

- (1) 2 (2) 7  
(3) 11 (4) 14

44. If  $a = \frac{1}{(3-2\sqrt{2})}$ ,  $b = \frac{1}{(3+2\sqrt{2})}$  then the value of  $a^2 + b^2$  is:

- (1) 34 (2) 35  
(3) 36 (4) 37

45. In a minute, wheel makes 360 revolutions. Through how many radians does it turn in 1 second?

- (1)  $8\pi$  (2)  $12\pi$   
(3)  $11\pi$  (4)  $6\pi$

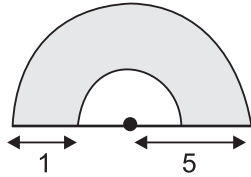
46. Find the angle between the  $x$ -axis and the line joining the points  $(3, -1)$  and  $(4, -2)$ .

- (1)  $45^\circ$   
(2)  $30^\circ$   
(3)  $135^\circ$   
(4)  $15^\circ$

47. A fair coin marked with 1 marked on one face and 6 on the other and a fair die both are tossed. Find the probability that the sum of the numbers that turn up is 12.

- (1)  $\frac{1}{12}$                       (2)  $\frac{1}{6}$   
 (3)  $\frac{1}{4}$                         (4)  $\frac{1}{3}$

48. The area of the shaded portion in the figure is



- (1)  $7.5\pi$                       (2)  $6.5\pi$   
 (3)  $5.5\pi$                       (4)  $4.5\pi$

49. A toothed wheel of diameter 50 cm is attached to a smaller wheel of diameter 30 cm. How many revolutions will the smaller wheel make when the larger one makes 15 revolutions?

- (1) 18  
 (2) 20  
 (3) 25  
 (4) 30

50. The owner of a milk store finds that, he can sell 980 litres of milk each week at ₹14/litre and 1220 litres of milk each week at ₹16/litre. Assuming a linear relationship between selling price and demand, how many litres could he sell weekly at ₹17/litre?

- (1) 1340  
 (2) 1430  
 (3) 1530  
 (4) 1350

51. In a group of 100 persons, 72 people can speak English and 43 can speak French. How many can speak both English and French?

- (1) 17  
 (2) 28  
 (3) 28  
 (4) 15

52. John covered a distance of 50 km on his first trip. On a later trip he traveled 300 km while going three times as fast. His new time compared with old time was:

- (1) three times as much  
 (2) twice as much  
 (3) the same  
 (4) a third as much.

53. The following is the record of goals scored by team A in a football session:

Number of goals scored	0	1	2	3	4
Number of matches	1	9	7	5	3

For the team B, mean number of goals scored per match was 2 with standard deviation 1.25 goals. Find which team may be considered more consistent?

- (1) Team A  
 (2) Team B  
 (3) Both team A and B are same.  
 (4) Both are inconsistent.

54. A path 5 m wide runs along inside a rectangular field. The length of the rectangular field is three times the breadth of the field. If the area of the path is  $500 \text{ m}^2$ , then find the length of the field.

- (1) 51  
 (2) 45  
 (3) 57  
 (4) 36

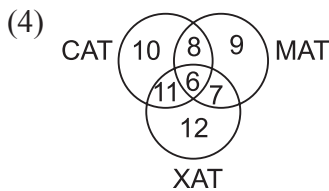
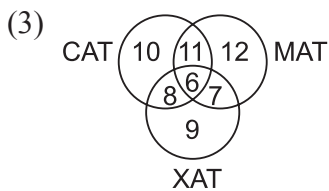
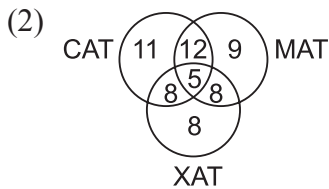
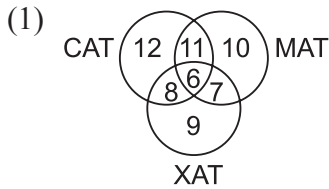
55. The diagram illustrates row of three squares formed by matches.



How many matches will it take to make a row of 33 squares?

- (1) 100                              (2) 101  
 (3) 99                                (4) 102

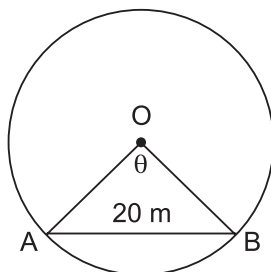
56. Which of the following Venn diagrams represent the given question? A survey was conducted at a coaching institute and it was found that there were 34 students who appeared in MAT. There were 37 students who appeared in CAT of which 17 students appeared in MAT. 30 students appeared in XAT applicants (i.e. appeared students) 14 appeared in CAT and 6 appeared in all three.



57. A city council consists of 4 men and 6 women. Find the probability of selecting a woman among the council members if the selection is on random basis.

- (1)  $\frac{4}{5}$                       (2)  $\frac{3}{5}$   
 (3)  $\frac{2}{5}$                       (4)  $\frac{2}{3}$

58. In a circle of diameter 40 m, the length of the chord is 20 m. Find the length of the minor arc of chord.



- (1)  $\frac{2\pi}{3}$                       (2)  $\frac{10\pi}{3}$   
 (3)  $\frac{15\pi}{3}$                       (4)  $\frac{20\pi}{3}$

59. This year Samantha has become very fussy about her birthday present. A square box must be wrapped in blue paper. A round box must be wrapped in red paper. An irregular box must be wrapped in green paper. The probability of her getting a round box is 50%. The probability of her getting a green box is  $\frac{1}{4}$ . What is the probability of that she receives a blue present?

- (1) at least 30%  
 (2) exactly 25%  
 (3) up to 25%  
 (4) up to 30%

60. A boy stacked cubes in a square pyramid like the one shown here. The top layer had 1 cube, the second layer had 4 cubes, and so on. If the pyramid were 16 layers high, how many cubes would be in the sixteenth layer?



- (1) 256                      (2) 225  
 (3) 512                      (4) 316



**END OF THE EXAM**