DATE : 04/11/2018

Test Booklet Code

05A

DELHI

Aakash
Medical | IIT-JEE | Foundations
(Divisions of Aakash Educational Services Limited)

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Answers & Solutions

for

NTSE (Stage-I) 2018-19

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you open the question booklet.

1. Use blue/black ballpoint pen only. There is no negative marking.
2. Part I : MAT : 1 - 100 questions

   Part II : SAT : 101 - 200 questions
3. This test booklet contains 200 questions of one mark each. All the questions are compulsory.
4. Answer each question by darkening the one correct alternative among the four choices on the OMR SHEET with blue/black ballpoint pen.

   Example :

	Q. No.	Alternatives
Correct way :	1	① ② ● ④
	Q. No.	Alternatives
Wrong way :	1	⊗ ② ③ ④

   Student must darkening the right oval only after ensuring correct answer on OMR Sheet.
5. Disparity in mentioning (OBC, SC, ST & PH) in application form and OMR Sheet can make your candidature invalid.
6. Students are not allowed to scratch / alter / change out an answer once marked on OMR Sheet, by using white fluid / eraser / blade / tearing / wearing or in any other form.
7. Separate sheet has been provided for rough work in this test booklet.
8. *Please handover the OMR Sheet to the invigilator before leaving the Examination Hall.
9. Darken completely the ovals of your answer on OMR Sheet in the time limit allotted for that particular paper.
10. Your OMR Sheet will be evaluated through electronic scanning process. Incomplete and incorrect entries may render your OMR Sheet invalid.
11. Use of electronic gadgets, calculator, mobile etc, is strictly prohibited.
12. Total 1 hour extra time will be allotted to visually challenged candidate only.

PART-I : MENTAL ABILITY TEST (MAT)

1. If $x+\frac{25}{x}=10$ then value of $x^2+\frac{50}{x^2}$ will be

(1) 29 (2) 25

(3) 24 (4) 27

Answer (4)

Sol. $x+\frac{25}{x}=10$

$\Rightarrow (x-5)^2=0$

$\Rightarrow x=5$

$\Rightarrow x^2+\frac{50}{x^2}=25+2=27$

2. If $x+y=3$ and $x^2+y^2=15$ then value of $(x-y)^2$ will be

(1) 21 (2) 36

(3) 25 (4) 16

Answer (1)

Sol. Given $x+y=3$, $x^2+y^2=15$

$\Rightarrow (x+y)^2=x^2+y^2+2xy=9$

$\Rightarrow 15+2xy=9$

$\Rightarrow 2xy=-6$

$\Rightarrow (x-y)^2=x^2+y^2-2xy=15-(-6)=21$

3. If $\frac{a}{3}=\frac{b}{5}=\frac{c}{7}$ then value of $\frac{a+b+c}{b}$ will be

(1) 7 (2) 3

(3) 10 (4) 5

Answer (2)

Sol. $\frac{a}{3}=\frac{b}{5}=\frac{c}{7}=\frac{a+b+c}{15}$

$\Rightarrow \frac{a+b+c}{b}=\frac{15}{5}=3$

4. If sum of two number is 25 and sum of their square is 425 then what will be their product?

(1) 200 (2) 300

(3) 100 (4) 400

Answer (3)

Sol. Given that

$x+y=25$ and $x^2+y^2=425$

$\Rightarrow (x+y)^2=x^2+y^2+2xy=625$

$\Rightarrow xy=100$

5. If $0.64 \div a^2 = 64$ then positive value of 'a' will be

(1) 0.1 (2) 0.01

(3) 1.0 (4) 10

Answer (1)

Sol. $a^2=\frac{.64}{64}=\frac{64}{64\times100}=\frac{1}{100}$

$a=0.1$

6. Divisor is 30 times of Quotient and 4 times of Remainder. If Quotient is 20 then Dividend will be

(1) 1,200 (2) 12,150

(3) 10,000 (4) 600

Answer (2)

Sol. Dividend = $20\times600+150=12150$

7. If $3^{a-2b}=27$ and $9^{a+b}=3$ then value of $-\frac{a}{b}$ will be

(1) $\frac{-4}{3}$ (2) $\frac{5}{8}$

(3) $\frac{5}{6}$ (4) $\frac{8}{5}$

Answer (4)

Sol. $3^{a-2b}=27 \Rightarrow a-2b=3$

$9^{a+b}=3 \Rightarrow 2a+2b=1$

$\Rightarrow a=\frac{4}{3}, b=-\frac{5}{6}$

$\Rightarrow -\frac{a}{b}=\frac{8}{5}$

8. If $\sqrt{17+x\sqrt{11}}=\sqrt{11}+\sqrt{6}$ then value of x^2 will be

(1) $\sqrt{11}$ (2) 23

(3) $\sqrt{6}$ (4) 24

Answer (4)

Sol. $\sqrt{(\sqrt{11}+\sqrt{6})^2}=\sqrt{17+2\sqrt{6}\times\sqrt{11}}$

$\Rightarrow x=2\sqrt{6}, x^2=24$

9. If $\sqrt{0.02\times0.2\times a}=0.2\times0.2\times\sqrt{b}$ then value of $\frac{a}{b}$ will be

(1) 0.4 (2) 0.2

(3) 0.04 (4) 0.02

Answer (1)

Sol. $\sqrt{0.02\times0.2\times a}=0.2\times0.2\times\sqrt{b}$

$$\sqrt{\frac{a}{b}}=\frac{0.04}{\sqrt{0.004}}$$

$$\frac{a}{b}=\frac{0.0016}{0.004}=0.4$$

10. If $7-\sqrt{3}$ and $7+\sqrt{3}$ are solution of a Quadratic Equation. The Quadratic Equation will be

(1) $x^2 - 14x + 46 = 0$ (2) $x^2 + 14x - 46 = 0$

(3) $x^2 - 14x - 46 = 0$ (4) $x^2 + 14x + 46 = 0$

Answer (1)

Sol. Required quadratic equation is

x^2 – (sum of roots) + product of roots = 0

$\Rightarrow$ $x^2 - 14x + 46 = 0$

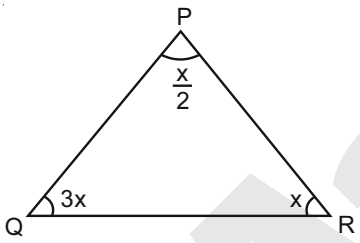
11. In a triangle PQR if $\angle Q = 3\angle R = 2(\angle P + \angle R)$ then value of $\angle Q$ will be

(1) 110° (2) 120°

(3) 40° (4) 102°

Answer (2)

Sol.



$$\Rightarrow 3x+\frac{x}{2}+x=180°$$

$x = 40°$

$\Rightarrow \angle Q = 120°$

12. If $\frac{p}{q}=\frac{x+3}{x-3}$ then value of $\frac{p^2-q^2}{p^2+q^2}$ will be

(1) $\frac{6x}{x^2-9}$ (2) $\frac{6x}{x^2+9}$

(3) $\frac{12x}{x^2+9}$ (4) $\frac{12x}{x^2-9}$

Answer (2)

Sol. $\frac{p}{q}=\frac{x+3}{x-3}$

$$\Rightarrow \frac{p^2}{q^2}=\frac{x^2+9+6x}{x^2+9-6x}$$

$$\Rightarrow \frac{p^2-q^2}{p^2+q^2}=\frac{12x}{2x^2+18}=\frac{6x}{x^2+9}$$

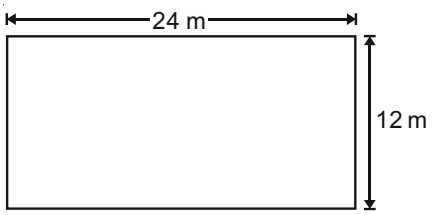
13. If perimeter of a square is same as that of a rectangle whose length is 24 m is double of its breadth then area of square will be

(1) 324 m^2 (2) 342 m^2

(3) 224 m^2 (4) 330 m^2

Answer (1)

Sol.



Perimeter of rectangle = 2 × (24 + 12) = 72 m

= Perimeter of square

$\Rightarrow$ Side of square = $\frac{72}{4}=18$ m

$\Rightarrow$ Area of square = $(18\text{ m})^2 = 324\text{ m}^2$

14. If volumes of two cones are in ratio of 2 : 3 and their base radii are in ratio of 1 : 2 then what will be ratio of their heights?

(1) 8 : 3 (2) 3 : 2

(3) 4 : 3 (4) 2 : 3

Answer (1)

Sol. $\frac{V_1}{V_2}=\frac{\frac{1}{3}\pi r_1^2 h_1}{\frac{1}{3}\pi r_2^2 h_2}=\frac{2}{3}$

$$\Rightarrow \left(\frac{r_1}{r_2}\right)^2\times\frac{h_1}{h_2}=\frac{2}{3}$$

$$\Rightarrow \frac{h_1}{h_2}=\frac{8}{3}$$

15. If $2^x = 8^{y-1}$ and $9^y = 3^{x-6}$ then value of x + y

(1) 34 (2) 25

(3) 33 (4) 24

Answer (3)

Sol. $2^x = 8^{y-1} \Rightarrow x = 3y - 3$

$3^{2y} = 3^{x-6} \Rightarrow 2y = x - 6$

$\Rightarrow y = 9 \quad x = 24$

$\Rightarrow x + y = 33$

16. If two numbers are such that their difference, their sum and their product are in ratio 1 : 7 : 24 then product of the two number is

(1) 48 (2) 44

(3) 54 (4) 38

Answer (1)

Sol. Let numbers be x and y.

$\Rightarrow$ x – y : x + y : xy = 1 : 7 : 24

$\Rightarrow$ x – y = k | xy = 24k

x + y = 7k | $12k^2 = 24k$

$\Rightarrow$ x = 4k, y = 3k | k = 2

$\Rightarrow$ xy = 48

17. The mean of the median mode and range of the observations 7, 6, 7, 9, 14, 9, 7, 15 is

(1) 8 (2) 9

(3) 10 (4) 7

Answer (1)

Sol. On arranging data, we get

6, 7, 7, 7, 9, 9,14, 15

median – 8

mode – 7

range – 9

$\Rightarrow \frac{\text{Median} + \text{Mode} + \text{Range}}{3} = \frac{8+7+9}{3} = 8$

18. A person spends 80% of his income. With increase in the cost of living, his expenditure increased by $37\frac{1}{2}\%$ and his income increases by $16\frac{2}{3}\%$. His present percent saving is

(1) $10\frac{1}{5}\%$ (2) $12\frac{1}{3}\%$

(3) $5\frac{1}{3}\%$ (4) $5\frac{5}{7}\%$

Answer (4)

Sol. Let income be ₹ 100.

Expenditure be ₹ 80.

Income after increase = $₹\left(100+\frac{50}{3}\right) = ₹\frac{350}{3}$

Expenditure after increase = $₹\left(80+80\times\frac{75}{2}\%\right) = 110$

Net saving = $₹\left(\frac{350}{3}-110\right) = ₹\frac{20}{3}$

$\therefore$ % saving = $\frac{\frac{20}{3}\times 100}{\frac{350}{3}} = 5\frac{5}{7}\%$

19. The cost of five chairs and three tables is ₹3110. If cost of one chair is ₹210 less than cost of one table, what is the cost of two tables and two chairs?

(1) ₹ 1760 (2) ₹ 1000

(3) ₹ 1660 (4) ₹ 1800

Answer (3)

Sol. 5c + 3t = 3110

t – c = 210

On solving above equation, we get

t = 520 and c = 310

$\Rightarrow$ 2t + 2c = 1660

20. If $5 = a + \cfrac{1}{1+\cfrac{1}{6+\frac{1}{2}}}$ then value of 'a' will be

(1) $\frac{15}{62}$ (2) $\frac{62}{15}$

(3) $\frac{14}{61}$ (4) $\frac{61}{14}$

Answer (2)

Sol. $5 = a + \frac{13}{15}$

$\Rightarrow a = \frac{62}{15}$

21. If $\frac{7}{8}$ of a number is 5 more than its $\frac{5}{7}$. Then Nine times of Number will be

(1) 380 (2) 208

(3) 308 (4) 280

Answer (4)

Sol. $\frac{7}{8}x - 5 = \frac{5}{7}x$

$\Rightarrow x = \frac{280}{9}$

$\Rightarrow$ 9x = 280

22. If a cone of height 24 cm and base 6 cm melted and reshape into a sphere, then what will be the total surface area of sphere?

(1) 36π sq. cm (2) 16π sq. cm

(3) 144π sq. cm (4) 142π sq. cm

Answer (3)

Sol. $\frac{1}{3}\pi\times 36\times 24 = \frac{4}{3}\pi r^3$

$\Rightarrow$ r = 6

$\Rightarrow 4\pi r^2 = 4 \times \pi \times 36 = 144\pi$

23. P and Q can do a piece of work in 10 days, Q and R can do same work in 15 days, R and P can do the same work in 20 days. Then in how many days R will complete it alone?

(1) 115 days (2) 110 days

(3) 130 days (4) 120 days

Answer (4)

Sol. $\frac{1}{P}+\frac{1}{Q}=\frac{1}{10}$

$\frac{1}{Q}+\frac{1}{R}=\frac{1}{15}$

$\frac{1}{P}+\frac{1}{R}=\frac{1}{20}$

$\Rightarrow \frac{1}{P}+\frac{1}{Q}+\frac{1}{R}=\frac{13}{120}$

$\Rightarrow \frac{1}{R}=\frac{1}{120}$

24. In the following which one is the smallest?

$\sqrt{3}, \sqrt[3]{2}, \sqrt{2}, \sqrt[3]{4}$

(1) $\sqrt{3}$ (2) $\sqrt[3]{4}$

(3) $\sqrt[3]{2}$ (4) $\sqrt{2}$

Answer (3)

Sol. $3^{\frac{1}{2}}, 2^{\frac{1}{3}}, 2^{\frac{1}{2}}, 4^{\frac{1}{3}}$

$(27)^{\frac{1}{6}}, (4)^{\frac{1}{6}}, (8)^{\frac{1}{6}}, (16)^{\frac{1}{6}}$

$\Rightarrow 2^{\frac{1}{3}}$ is smallest

25. If P denotes +, Q denotes –, R denotes × and S denotes ÷, which of the following statement is correct?

(1) 36 R 4 S 8 Q 7 P 4 = 10

(2) 16 R 12 P 49 S 7 Q 9 = 200

(3) 32 S 8 R 9 = 160 Q 12 R 12

(4) 8 R 8 P 8 S 8 Q 8 = 57

Answer (4)

Sol. On putting sign, we get

$8 \times 8 + 8 \div 8 - 8$

$= 64 + 1 - 8 = 57$

26. A vessel contains 60 Liters of milk, 12 liters of milk is taken out of it and is replaced by water. Then again from the mixture 12 liters are taken out and replaced by water.

Find the amount of milk left after the operation.

(1) 28.4 Ltrs. (2) 21.6 Ltrs.

(3) 36 Ltrs. (4) 38.4 Ltrs.

Answer (4)

Sol. Milk remain after removing 12 litre = 48 litre

Now ratio of Milk : Water = 4 : 1

After removing 12 litre milk

Remaining milk = $48 - 4 \times \frac{12}{5}$

$= 38.4$ litre

27. Select the one which is different from the other three responses.

(1) 15 : 46 (2) 12 : 37

(3) 9 : 28 (4) 8 : 33

Answer (4)

Sol. Pattern is a : 3a + 1

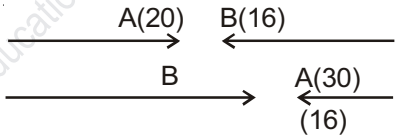
28. In a row of boys, A is 20^{th} from left and B is 16^{th} from right, interchange their position, then A becomes 30^{th} from left. How many boys are there in the row?

(1) 46 (2) 44

(3) 45 (4) 48

Answer (3)

Sol.



Total boys in row = (30 + 16) – 1

$= 45$

29. A 15 cm coloured cube is cut into 3 cm small cubes then how many cubes are formed which have only one face painted.

(1) 54 (2) 64

(3) 44 (4) 84

Answer (1)

Sol. Total cubes obtained = 125

Number of one face painted = $(5-2)^2 \times 6 = 54$

30. A father tells his son "I was three times of your present age when you were born". If the father's present age is 48 years, how old was the boy 4 years ago.

(1) 24 years (2) 8 years

(3) 12 years (4) 16 years

Answer (2)

Sol. Let present age of son = x year

$\therefore$ x year ago age of father = 3x

$\Rightarrow$ 48 – x = 3x

x = 12

$\therefore$ Present age of boy = x

4 years ago age of boy = 8 years

Directions (Q.31 to 35) : *Find the missing term in the series given below.*

31. 2, 12, 30, ?, 90, 120

(1) 48 (2) 56

(3) 63 (4) 72

Answer (No option is correct)

32. 10, 100, 200, 310, ?

(1) 400 (2) 410

(3) 420 (4) 430

Answer (4)

Sol. 10, 100, 200, 310, _____

90, 100, 110, 120

= 430

33. 0.5, 2, 4.5, 8, 12.5, ?

(1) 16 (2) 17

(3) 16.5 (4) 18

Answer (4)

Sol. 0.5, 2, 4.5, 8, 12.5, _____

+1.5 +2.5 +3.5 +4.5 +5.5

= 18

34. 109, 74, 46, 25, 11, ?

(1) 3 (2) 0

(3) 11 (4) 4

Answer (4)

Sol. 109, 74, 46, 25, 11, _____

–35 –28 –21 –14 –7

= 4

35. $\frac{2}{3}, \frac{4}{7}, \frac{?}{?}, \frac{11}{21}, \frac{16}{31}$

(1) $\frac{6}{11}$ (2) $\frac{5}{9}$

(3) $\frac{9}{11}$ (4) $\frac{7}{13}$

Answer (4)

Sol. $\frac{2}{3}, \frac{4}{7}, \text{——}, \frac{11}{21}, \frac{16}{31}$

$\frac{+2}{+4}\ \frac{+3}{+6}\quad \frac{+4}{+8}\ \frac{+5}{+10}$

$\frac{7}{13}$

36. There are twelve dozen of apples in a basket. Two dozen are added later. Ten apples got spoil and are removed. The remaining are transferred equally into two baskets, how many are there in each?

(1) 168 (2) 158

(3) 79 (4) 89

Answer (3)

Sol. Total Apples = (12 + 2) × 12 = 168

Number of Apples removed = 10

Remaining Apple = 158

$\Rightarrow \frac{158}{2} = 79$

37. At what time between 8 and 9 will the hands of a clock be together.

(1) 40 minutes past 8

(2) $43\frac{7}{11}$ minutes past 8

(3) $43\frac{8}{11}$ minutes past 8

(4) $44\frac{10}{11}$ minutes past 8

Answer (2)

Sol. $0° = 30 \times 8 - \frac{11}{2}M$

$\frac{11}{2}M = 240°$

$M = \frac{480}{11} = 43\frac{7}{11}$

$\Rightarrow 43\frac{7}{11}$ minutes past 8

38. What is the value of A, B and C in the given matrix?

9	A	12
B	10	7
8	C	11

(1) A = 13, B= 11, C = 9

(2) A = 13, B = 9, C = 11

(3) A = 9, B = 11, C = 13

(4) A = 9, B = 13, C = 11

Answer (4)

Sol. Sum of row and column is 30.

39. Simplified value of $\frac{7^{n+3}+14\times7^{n+4}}{7^{n+3}}$ is

(1) 98 (2) 100

(3) 99 (4) 97

Answer (3)

Sol. $\frac{7^{n+3}+14\times7^{n+4}}{7^{n+3}}$

$= 1 + 14 \times 7 = 99$

40. It $\tan x = 5-\sqrt{3}$ then $22\tan(90 - x)$ is equal to

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

(3) $\frac{5+\sqrt{3}}{22}$ (4) $13+\sqrt{3}$

Answer (1)

Sol. $\tan x = 5-\sqrt{3}, \cot x = \frac{1}{5-\sqrt{3}}$

$\Rightarrow$ $22\tan(90 - x) = 22\cot x$

$= 22\times\frac{1}{5-\sqrt{3}}$

$= 22\times\frac{5+\sqrt{3}}{5^2-\left(\sqrt{3}\right)^2}$

$= 5+\sqrt{3}$

41. If $a = \frac{1}{2-\sqrt{3}}$ and $b = \frac{1}{2+\sqrt{3}}$, then find the value of $7a^2 + 11ab - 7b^2$.

(1) $\sqrt{11}+3\sqrt{56}$ (2) $13+11\sqrt{56}$

(3) $11+5\sqrt{3}$ (4) $11+56\sqrt{3}$

Answer (4)

Sol. $a = 2+\sqrt{3}$

$b = 2-\sqrt{3}$

$= 7(a^2 - b^2) + 11$

$= 7(a + b)(a - b) + 11$

$= 11+56\sqrt{3}$

Hence, option (4) is correct.

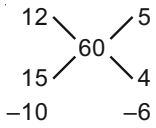
42. Two pipes A and B can fill a tank in 12 and 15 minutes respectively. A third pipe C can empty it in 10 minutes. How long will it take to fill the tank if all pipes are opened simultaneously?

(1) 20 minutes (2) 30 minutes

(3) 40 minutes (4) 25 minutes

Answer (1)

Sol.



$\therefore$ Required time $= \frac{60}{3} = 20$

Hence, option (1) is correct.

43. A sum amounts to ₹ 800 at 3% per annum in a certain time but amount to ₹ 1000 at 5% per annum in the same time. Total sum and time are

(1) ₹ 500, 20 years (2) ₹ 400, 20 years

(3) ₹ 550, 20 years (4) ₹ 600, 10 years

Answer (1)

Sol. $\frac{x\left(1+\frac{3t}{100}\right)}{x\left(1+\frac{5t}{100}\right)} = \frac{800}{1000}$

$\Rightarrow$ $5+\frac{15t}{100} = 4+\frac{20t}{100}$

$\Rightarrow$ t = 20 years

$\frac{8}{5}x = 800$

$\Rightarrow$ x = 500

Hence, option (1) is correct.

44. If a and b are the roots of $x^2 - 2x - 1 = 0$, then value of $a^2b + ab^2$ is

(1) –2 (2) 2

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

Answer (1)

Sol. $x^2 - 2x - 1 = 0$

$\therefore$ a + b = 2

ab = –1

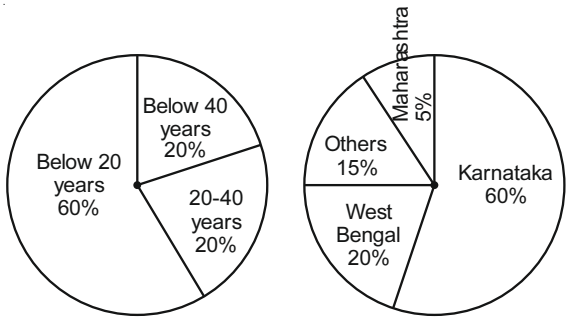
$a^2b + ab^2 = ab(a + b)$

$= 2(-1)$

$= -2$

Hence, option (1) is correct.

Directions (Q.45 to Q.49) :



The pie chart above describes the characteristics of Indian visiting UK from various states during a given year.

Answer the following questions given below. Assume that the age wise distribution data applies to all states and that in the given year 1,00,000 Indian visited UK.

45. Number of visitors from Karnataka in the age group of 20-40 years
(1) 20000 (2) 18000
(3) 12000 (4) None of these

46. Number of visitors from Maharashtra below the age of 20 years.
(1) 3000 (2) 5000
(3) 60000 (4) 8000

47. How many visitors were below 20 years of age but were neither from Karnataka, nor Maharashtra or West Bengal?
(1) 7000 (2) 15000
(3) 9000 (4) 6000

48. The ratio of visitors from West Bengal below 20 years to visitors from Maharashtra above 40 years in
(1) 1 : 3 (2) 12 : 1
(3) 3 : 4 (4) 3 : 1

49. Find the difference between visitors from West Bengal and Maharashtra in the age group of 20-40 years.
(1) 4000 (2) 6000
(3) 3000 (4) 8000

Solutions for Q.45 to Q.49 :

In given pie chart, one section should be "above 40 years" instead of "below 40 years".

45. Answer (3)
46. Answer (1)
47. Answer (3)
48. Answer (2)
49. Answer (3)

50. The number of ways in which 6 students can be seated at a round table is
(1) 720 (2) 120
(3) 410 (4) 350

Answer (2)

Sol. Number of ways = 5!
= 120

51. What letter will come next in the following series?
A B C D E F G Z Y X W U V T B C D E F Y X W V U C D E X W V R
(1) A (2) V
(3) B (4) Z

Answer (Data is incorrect)

52. Among P, Q, R, S and T each secured different marks, Q scored higher than T only and P scored higher than S but lower than R. Who among them scored highest marks?
(1) P (2) S
(3) R (4) T

Answer (3)

Sol. Q > T

R > P > S Q > T

$\Rightarrow$ R > P > S > Q > T

$\therefore$ Answer is R.

Directions (Q.53 to Q.55) : *Study the Following series carefully and answer the questions given below:*

7 M 4 P % J V 1 K 3 @ E W 2 Q © 6 T A * 8 Z I 5 $ F U # 9 H N

53. Which of the following is the sixth to the left of nineteenth from the left end of the above arrangement?
(1) $ (2) T
(3) W (4) 2

Answer (3)

54. How many such consonants are there in the arrangement, each of which is immediately preceeded by a symbol and immediately followed by 2 numbers?
(1) Four (2) One
(3) Two (4) Three

Answer (No option is correct)

55. If all the symbols are dropped from the above arrangement, then which of the following will be twelfth from the right end?
(1) Q (2) 6
(3) 2 (4) T

Answer (2)

Directions (Q.56 to Q.60) : *Study the following information carefully to answer these questions.*

Seven friends A, B, C, D, E, F and G perform in stage shows on a different day from Monday to Sunday not necessarily in the same order. Each one performs a different item viz., music, speed dance, mimicry, play, debate and monologue, not necessarily in the same order. B performs play on Thursday and E performs music on Sunday. G performs mimicry but not on Tuesday or Saturday. C's performance is on the next day of G's performance. D performs on Monday but not the next day of G's performance. D performs on Monday but not dance or debate. A performs monologue which is on the next day of speech. Dance is not performed on Saturday.

56. Who performs dance?
(1) C (2) F
(3) D (4) A

57. Which item is performed by D and on what day?
(1) Mimicry – Monday
(2) Music – Tuesday
(3) Play – Wednesday
(4) Speech – Monday

58. A performs on which day of the week?
(1) Tuesday (2) Wednesday
(3) Friday (4) Saturday

59. G performs on which day of the week?
(1) Wednesday (2) Saturday
(3) Tuesday (4) Friday

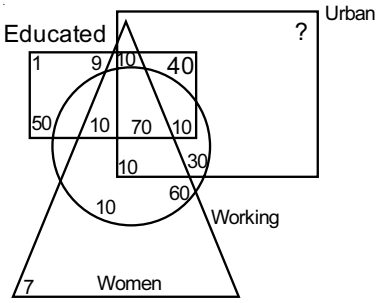
60. Who performs in debate?
(1) B (2) D
(3) F (4) C

Solutions for Q.56 to Q.60 :

	Day	Performance
A	Tuesday	Monologue
B	Thursday	Play
C	Saturday	Debate
D	Monday	Speech
E	Sunday	Music
F	Wednesday	Dance
G	Friday	Mimicry

56. Answer (2)
57. Answer (4)
58. Answer (1)
59. Answer (4)
60. Answer (4)

Directions (Q.61 to Q.63) : The venn diagram given below is about a small town having population of 500 persons. The square represents persons from urban area, the circle represents working persons, the triangle represents women and the rectangle represents educated persons. Number written are number of persons.

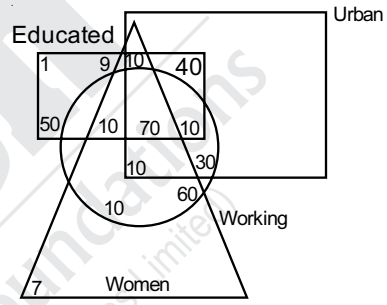


61. What is the number of non-working females?
(1) 167 (2) 57
(3) 17 (4) 80

62. If urban population in 350, what is the number of non-educated non-working urban women?
(1) 0 (2) 9
(3) 10 (4) 20

63. What is the number of urban male who are educated but not working?
(1) 30 (2) 40
(3) 50 (4) 110

Solutions for Q.61 to Q.63 :



61. Answer (3)
62. Answer (1)
63. Answer (2)

64. In the matrix below, the numbers in the cells follow some rules. Identify the number which when substituted for (?) maintains the same rule.

7	12	?
21	27	35
7	14	23

(1) 18
(2) 19
(3) 17
(4) 16

Answer (2)

Sol.

7	12	
21	27	35
7	14	23

3rd Row $7 \xrightarrow{+7} 14 \xrightarrow{+9} 23$

2nd Row $21 \xrightarrow{+6} 27 \xrightarrow{+8} 35$

1st Row $7 \xrightarrow{+5} 12 \xrightarrow{+7} 19$

Directions (Q.65 to Q.67) : In the table given below, there are two columns, column I and column II. Four words are written in column I. In column II, equivalent codes are used for these words. For each of the four words, four different patterns are used. Identify the pattern in the questions given below and choose the correct options.

Column – I		Column – II
Sr. No.	Word	Code Equivalent
A.	CHAIR	YDWEN
B.	PHONE	SKRQH
C.	TROUPE	GILFKV
D.	TOURIST	WLXOLPW

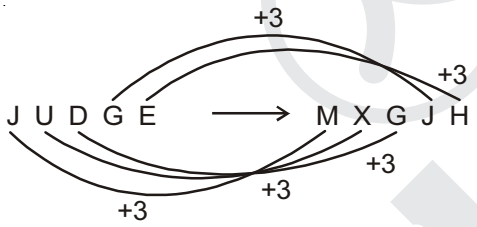
65. If 'JUDGE' is coded as "MXGJH" the code pattern followed is serial number –

(1) A (2) B

(3) C (4) D

Answer (2)

Sol. J U D G E ⟶ M X G J H



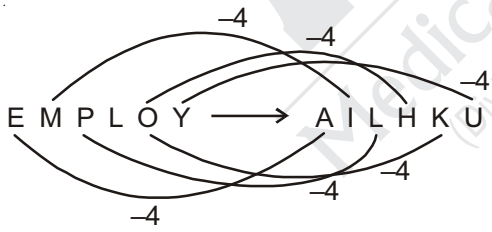
66. If 'EMPLOY' is coded as "AILHKU" the code pattern followed is serial number –

(1) A (2) B

(3) C (4) D

Answer (1)

Sol. E M P L O Y ⟶ A I L H K U



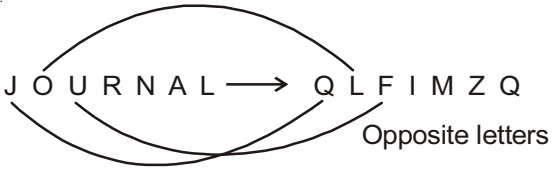
67. If 'JOURNAL' is coded as "QLFIMZQ" the code pattern followed is serial number –

(1) A (2) B

(3) C (4) D

Answer (3)

Sol. J O U R N A L ⟶ Q L F I M Z Q



Directions (Q.68 to Q.70) : Eight persons A, B, C, D, E, F, G, H are sitting around a circular table facing the centre. B is sitting second to the left of G, who is sitting third to the right of F. Only E is sitting between A & C, C is sitting third to the left of B. Only one person is sitting between E & H. Now answer the following questions.

68. Which of the following is the correct order of sitting of persons to the right of A?

(1) ECHDGBF

(2) ECHFBDG

(3) EBHDCFG

(4) CHBEDGF

69. Who is sitting third to A on its left side?

(1) B (2) H

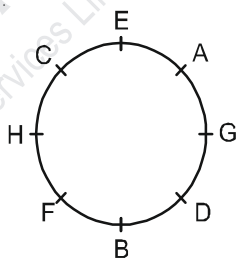
(3) D (4) F

70. Who is sitting exactly in front of A?

(1) B (2) C

(3) H (4) F

Solutions for Q.68 to Q.70 :



68. Answer (2)

69. Answer (1)

70. Answer (4)

71. If % means +

@ means –

$\wedge$ means ×

$\vee$ means ÷

Then the value of

42 $\wedge$ 7 $\vee$ 8 @ 25% 63 $\wedge$ 9 is-

(1) – 10 (2) 14

(3) – 20 (4) 30

Answer (Option not available)

Sol. 42 × 7 ÷ 8 – 25 + 63 × 9

$$\frac{147}{4} - 25 + 567$$

$$\frac{147 - 100 + 2268}{4} = \frac{2315}{4} = 578.75$$

72. Arrange the following words in the sequence in which they occur in the dictionary, then choose the correct option

i. BHAGWAN ii. BHAGWAT

iii. BHAGIRATH iv. BHAGAT

(1) iv, i, iii, ii (2) iv, ii, i, iii

(3) iv, iii, ii, i (4) iv, iii, i, ii

Answer (4)

73. R is the brother of S and M is the father of R, J is brother of P & P is daughter of S.

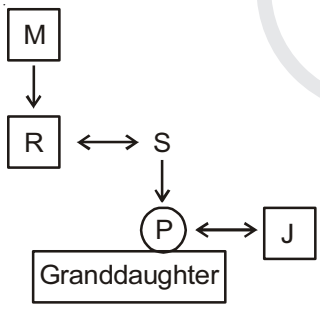
What is the relation of P with M?

(1) Grand-daughter (2) Niece

(3) Aunty (4) Sister

Answer (1)

Sol.



74. If Z = 52 and ACT = 48, then BAT is equal to

(1) 39

(2) 44

(3) 46

(4) 50

Answer (3)

Sol. Z = 52, ACT = 48

BAT = (2 + 1 + 20) × 2 = 46

75. If 20 * 3 = 180 and 4 * 5 = 100 then value of 7 * 7 is

(1) 21

(2) 49

(3) 343

(4) 7

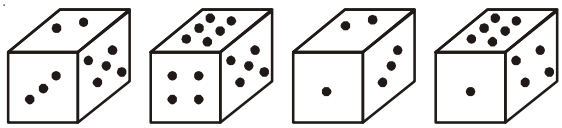
Answer (3)

Sol. 20 * 3 = 180 $\Rightarrow$ 20 × 3 × 3 = 180

4 * 5 = 100 $\Rightarrow$ 4 × 5 × 5 = 100

7 * 7 = $\Rightarrow$ 7 × 7 × 7 = 343

76. How many points will be on the face opposite to the face which contains two points?



(1) 1 (2) 4

(3) 5 (4) 6

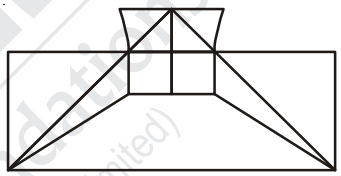
Answer (4)

Sol. 1 $\leftrightarrow$ 5

6 $\leftrightarrow$ 2

4 $\leftrightarrow$ 3

77. How many minimum line segment required to draw the given figure?



(1) 16

(2) 17

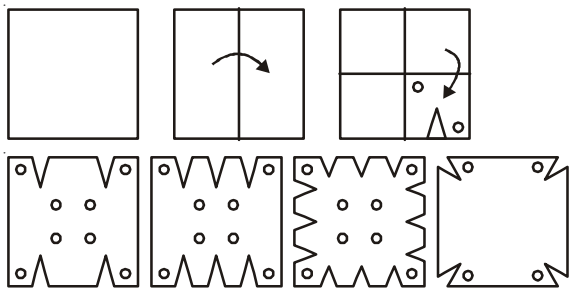
(3) 18

(4) 19

Answer (Option not available)

Sol. 15 line segments are required to draw the given figure.

78. A piece of paper is folded as shown in the figure and then punched:



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

Choose the correct option from the answer figure which appears the same when unfolded.

(1) 1

(2) 2

(3) 3

(4) 4

Answer (1)

79. A mirror is placed vertically as shown in the figure. Choose the correct option for mirror image.

(1) 906-RЭdUS
(2) 609-RЭdUS
(3) 609-RЭdUS
(4) RЭdUS-609

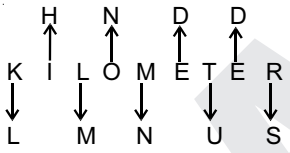
Answer (3)

80. Each vowel in the word KILOMETER is replaced by the previous letter in the English alphabet and each consonant is replaced by the next letter in the English alphabet, then the substituted letters are arranged in alphabetical order, which will be the fifth from the left end?

(1) D
(2) L
(3) M
(4) N

Answer (3)

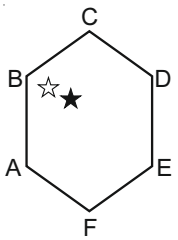
Sol.



LHMNNDUDS

Required Pattern DDHLMNNSU

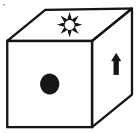
81. The black star moves one position at a time anti-clockwise. The white star moves two positions at a time clockwise. In how many moves will they be together again?

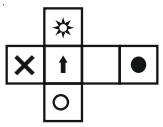
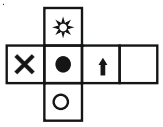
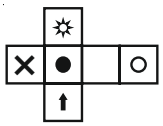
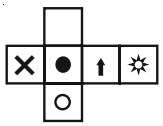


(1) 4^{th}
(2) 6^{th}
(3) 8^{th}
(4) 10^{th}

Answer (Option not correct)

82. Which of the given Net from the answer options when folded will results in the given cube?



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

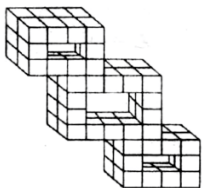
Answer (2)

83. Which of the alternatives will complete the figure?

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

Answer (1)

Directions (Q.84 & Q.85) : *Count the number of cubes in the given figure of each question and choose correct answer out of the four alternative.*

84. 

(1) 64
(2) 68
(3) 66
(4) 70

Answer (2)

85. The number of squares on a chess board is

(1) 203
(2) 204
(3) 205
(4) 206

Answer (2)

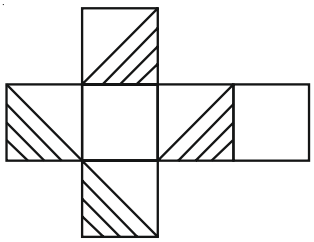
Sol. $\frac{n(2n+1)(n+1)}{6}$

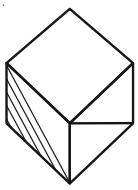
$= \frac{8\times9\times17}{6}$

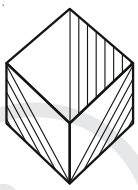
$= 204$

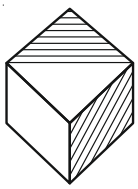
Directions (Q.86 & Q.87) : *A net is given which can be folded into a figure. Choose the correct alternative which can be made from the net.*

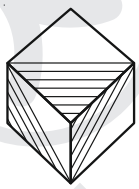
86. Question figure



(1) 

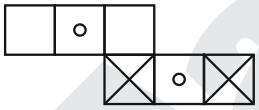
(2) 

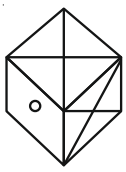
(3) 

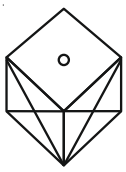
(4) 

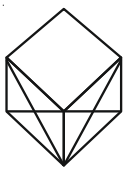
Answer (Option not Correct)

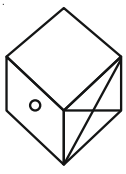
87. Question Figure



(1) 

(2) 

(3) 

(4) 

Answer (4)

Directions (Q.88 & Q.89) : *In each of the following questions figure (X) is embedded in any one of the four alternative figures (1) (2) (3) and (4). Find the alternative which contains figure (X) as its part.*

88. 

(X)

(1) 

(2) 

(3) 

(4) 

Answer (4)

89. 

(X)

(1) 

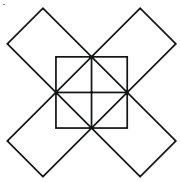
(2) 

(3) 

(4) 

Answer (2)

90. How many rectangles does the following figure have?

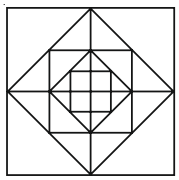


(1) 10 (2) 12

(3) 13 (4) 14

Answer (4)

91. How many squares are there in the given figure?



(1) 11 (2) 17

(3) 13 (4) 16

Answer (2)

Directions (Q.92 & Q.93) : In each of the following questions, figures A and B are related. Find the figure from figure (1), (2), (3) and (4). Which has same relationship with figure C.

92. Question figures

(A)  (B) 

(C)  (D) 

Answer figures

(1)  (2) 

(3)  (4) 

Answer (Option not available)

93. Question figures

(A)  (B) 

(C)  (D) 

Answer figures

(1) 

(2) 

(3) 

(4) 

Answer (4)

Directions (Q.94 to Q.96) : In each of the following questions choose the correct water image of figure (X) from the four alternatives (1), (2), (3) and (4).

94. 

(X)

(1)  (2) 

(3)  (4) 

Answer (Option not available)

95. 

(X)

(1)  (2) 

(3)  (4) 

Answer (3)

96. 

(X)

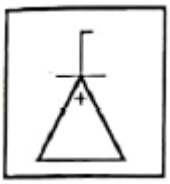
(1)  (2) 

(3)  (4) 

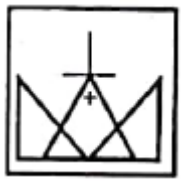
Answer (Option not correct)

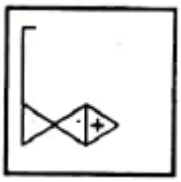
Directions (Q.97 & Q.98) : *In each of the following questions, you have figure (X) followed by four alternative figures (1), (2), (3) and (4) such that figure (X) is embedded in one of them. Trace out the alternative figure, which contains figure (X) as its part.*

97.



(X)

(1) 

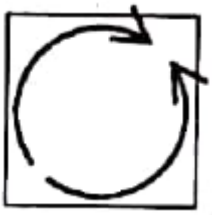
(2) 

(3) 

(4) 

Answer (4)

98.



(X)

(1) 

(2) 

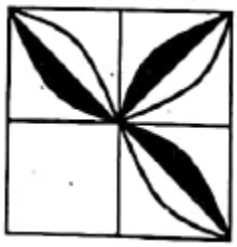
(3) 

(4) 

Answer (1) Or (4)

Directions (Q.99 & Q.100) : *Select a figure from the four alternatives, which when placed in the blank space of figure (X) would complete the pattern.*

99.



(X)

(1) 

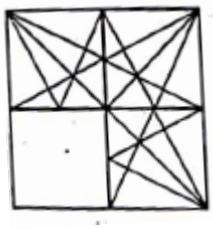
(2) 

(3) 

(4) 

Answer (2)

100.



(X)

(1) 

(2) 

(3) 

(4) 

Answer (4)

PAPER-II : SCHOLASTIC APTITUDE TEST (SAT)

101. A body starts from rest is accelerated uniformly for 30 s. If x_1, x_2, x_3 are the distances travelled in first 10 s, next 10 s and last 10 s respectively, then $x_1 : x_2 : x_3$ is

(1) 1 : 2 : 3 (2) 1 : 1 : 1

(3) 1 : 3 : 5 (4) 1 : 3 : 9

Answer (3)

Sol. From equation of motion

$$\therefore S = ut + \frac{1}{2}at^2$$

$$x_1 = \frac{1}{2}a(10)^2 = 50a$$

$$x_2 = \frac{1}{2}a\left[(20)^2 - (10)^2\right] = 150a$$

$$x_3 = \frac{1}{2}a\left[(30)^2 - (20)^2\right] = 250a$$

$x_1 : x_2 : x_3 = 1 : 3 : 5$

102. A bomb of mass $3m$ kg explodes into two pieces of mass m kg and $2m$ kg. If the velocity of m kg mass is 16 ms^{-1}, the total kinetic energy released in the explosion is

(1) $192m$ J (2) $96m$ J

(3) $384m$ J (4) $768m$ J

Answer (1)

Sol. From law of conservation of momentum

$0 = m \times 16 + 2m \times V$

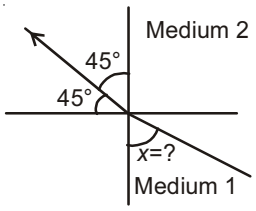
$V = -8$ ms^{-1}

Total K.E. $= \frac{1}{2}m_1v_1^2 + \frac{1}{2}m_2v_2^2$

$$= \frac{1}{2}\times m\times(16)^2 + \frac{1}{2}\times 2m\times(8)^2$$

$$= \frac{1}{2}[256+128]\times m = 192m \text{ J}$$

103. Figure shows a ray of light as it travels from medium 1 to medium 2. If refractive index of medium 1 with respect to medium 2 is $\frac{\sqrt{2}}{\sqrt{3}}$, then the value of angle x is



(1) 30° (2) 60°

(3) 15° (4) 45°

Answer (2)

Sol. From Snell's law,

$$\mu_1 \sin x = \mu_2 \sin 45°$$

$$\frac{\sin x}{\sin 45°} = \frac{\sqrt{3}}{\sqrt{2}}$$

$$\sin x = \frac{\sqrt{3}}{\sqrt{2}} \times \frac{1}{\sqrt{2}} = \frac{\sqrt{3}}{2}$$

$x = 60°$

104. Which of the following statements is true?

(1) A convex lens with power +4 D has a focal length –0.25 m

(2) A convex lens with power –4 D has a focal length +0.25 m

(3) A concave lens with power +4 D has a focal length –0.25 m

(4) A concave lens with power –4 D has a focal length –0.25 m

Answer (4)

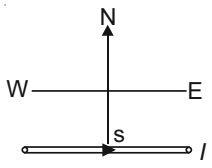
Sol. $P = \frac{1}{f_{(m)}} = \frac{100}{f_{(cm)}}$

$$-4 = \frac{100}{f}$$

$f = -25$ cm

$f = -0.25$ m

105. A constant current I flows in a horizontal wire in the plane of the paper from West to East as shown in the figure. The direction of magnetic field at a point will be South to North



(1) Directly above the wire

(2) Directly below the wire

(3) At a point located in the plane of the paper, on the north side of the wire

(4) At a point located in the plane of the paper, on the south side of the wire

Answer (2)

Sol. According to right hand thumb rule direction of magnetic field below the wire lie along the South to North.

106. If the current through a resistor is increased by 50%, the increase in power dissipated will be (assume the temperature remains constant)

(1) 225% (2) 200%

(3) 250% (4) 125%

Answer (4)

Sol. $i_1 = i$

$P_1 = i_1^2 R$

$= i^2 R$

$P_2 = (1.5\ i)^2\ R$

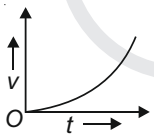
$= 2.25\ i^2 R$

$= 2.25\ P_1$

$$\frac{\Delta P}{P} \times 100 = \frac{2.25P_1 - P_1}{P_1} \times 100$$

$= 125\%$

107. The velocity-time graph of a moving body is shown in the figure.



Which of the following statements is true?

(1) The acceleration is constant and positive

(2) The acceleration is constant and negative

(3) The acceleration is increasing and positive

(4) The acceleration is decreasing and negative

Answer (3)

Sol. Slope of velocity-time curve is increasing with time

108. Which of the following eye defects can be rectified using cylindrical lens?

(1) Myopia (2) Presbyopia

(3) Astigmatism (4) Hypermetropia

Answer (3)

Sol. Astigmatism is corrected by cylindrical lens.

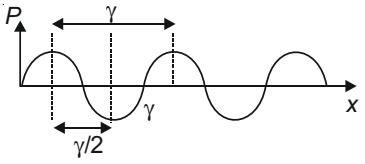
109. The linear distance between a consecutive compression and a rarefaction in longitudinal wave is

(1) γ (2) $\frac{\gamma}{2}$

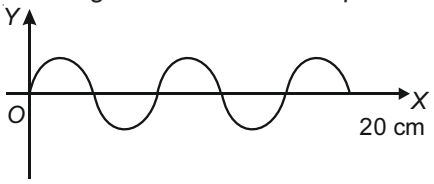
(3) $\frac{\gamma}{4}$ (4) $\frac{3\gamma}{4}$

Answer (2)

Sol.



110. For the wave shown in figure, calculate the frequency and wavelength of the wave if its speed is 320 ms^{-1}.



(1) 80 cm, 4000 Hz (2) 8 cm, 400 Hz

(3) 80 cm, 400 Hz (4) 80 cm, 40 Hz

Answer (*)

Answer not available in given options

Sol. $\frac{5\lambda}{2} = 20$ cm

$\lambda = 8$ cm

$\therefore \quad \nu = \frac{v}{\lambda}$

$$\nu = \frac{320}{8} \times 100 = 4000\ \text{Hz}$$

111. If x calories of heat are supplied to 15 g of water, its temperature rises from 20°C to 24°C. If specific heat for water is 1 cal g^{-1} $°C^{-1}$, then the value of x is

(1) 30 (2) 120

(3) 15 (4) 60

Answer (4)

Sol. $\therefore \quad Q = mc\Delta t$

$x = 15 \times 1 \times (24 - 20) = 60$ cal

112. In a hydro-power plant

(1) Kinetic energy possessed by the stored water is converted into potential energy

(2) Potential energy possessed by the stored water is converted into electricity

(3) Water is converted into steam to produce electricity

(4) Heat is extracted from water to produce electricity

Answer (2)

Sol. Fact

113. The mass of a planet is twice and its radius is three times that of the earth. The weight of a body which has a mass of 5 kg on that planet will be

(1) 11.95 N (2) 10.88 N

(3) 9.88 N (4) 20. 99 N

Answer (2)

Sol. $M_p = 2M_e$

$r_p = 3r_e$

$$\therefore \quad g_p = \frac{GM_p}{r_p^2}$$

$$g_p = \frac{G(2M_e)}{(3r_e)^2} = \frac{2}{9} g_e$$

$$W_p = 5 \times \frac{2}{9} \times 9.8 = \frac{98}{9} = 10.88\ \text{N}$$

114. Which of these can be used as olfactory indicator?
(1) Vanila (2) Onion
(3) Clove (4) All the above three

Answer (4)

Sol. Vanilla, onion and clove are olfactory indicators.

115. What will be the products when acid reacts with metals?
(1) Water and hydrogen gas
(2) Acid and hydrogen gas
(3) Salt and hydrogen gas
(4) Base and hydrogen gas

Answer (3)

Sol. Acid + Metal $\rightarrow$ Salt + Hydrogen gas

116. What happen, when methyl orange solution mixed with HCl?
(1) Solution becomes Yellow
(2) Solution becomes Red
(3) Solution becomes Blue
(4) Solution becomes Pink

Answer (2)

Sol. Methyl orange solution gives red colour in acidic medium.

117. Which of these salts will give acidic solution?
(1) Na_2CO_3 (2) NaCl
(3) NH_4Cl (4) COONa

Answer (3)

Sol.

Salt	Nature of salt
NaCl	Neutral
Na_2CO_3	Basic
RCOONa	Basic
NH_4Cl	Acidic

[NH_4Cl is a salt of strong acid and weak base].

118. Name the metal which offers higher resistance to the passage of electricity than copper.
(1) Gold (2) Silver
(3) Mercury (4) None of these

Answer (3)

Sol. Mercury is a poor conductor of electricity.

119. Name two metals both of which are very ductile as well as malleable.
(1) Gold and copper (2) Gold and silver
(3) Silver and copper (4) None of these

Answer (2)

Sol. Gold and silver are very ductile as well as malleable.

120. Tick the arrangement of metals Fe, Cu, Zn, Ag in the order of decreasing reactivity.
(1) Fe > Cu > Zn > Ag (2) Cu > Fe > Zn > Ag
(3) Ag > Zn > Fe > Cu (4) Zn > Cu > Fe > Ag

Answer (*)

Sol. None of the given options is correct.

The correct decreasing order of reactivity of metals is

Zn > Fe > Cu > Ag

121. Which metal does not corrode easily?
(1) Gold (2) Silver
(3) Platinum (4) All the above

Answer (4)

Sol. Gold, silver and platinum, all are least reactive or almost unreactive metals. So they do not corrode easily.

122. pH is defined as:
(1) $-\log [H_3O^+]$ (2) $-\log [H_2O]$
(3) $-\log [OH^-]$ (4) $-\log [H^+] [OH^-]$

Answer (1)

Sol. $pH = -\log [H_3O^+]$

123. A solution turns methyl orange into yellow, the approximate pH of solution is
(1) 1.2 – 2.8 (2) 3.1 – 4.4
(3) 6.0 – 7.6 (4) 8.3 – 10.0

Answer (4)

Sol. Methyl orange gives yellow colour in basic medium and bases have pH value more than 7.

124. Zinc reacts with NaOH solution to produce.
(1) O_2 (2) H_2
(3) NH_3 (4) NO_2

Answer (2)

Sol. Zinc metal reacts with NaOH to give off hydrogen gas.

$$2NaOH(aq) + Zn(s) \rightarrow \underset{\text{(Sodium zincate)}}{Na_2ZnO_2(s)} + H_2(g)$$

125. Aqueous solution of SO_2 is
(1) Acidic (2) Basic
(3) Neutral (4) Amphoteric

Answer (1)

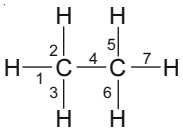
Sol. $SO_2 + H_2O \rightarrow \underset{\text{(Sulphurous acid)}}{H_2SO_3}$

126. Ethane with the molecular formula C_2H_6 has

(1) 6 Covalent Bond (2) 7 Covalent Bond

(3) 8 Covalent Bond (4) 9 Covalent Bond

Answer (2)

Sol. 

Ethane molecule has 7 covalent bonds.

127. A flagellum is present at one end of a protozoan. It is

(1) Planaria (2) Paramecium

(3) Hydra (4) Leishmania

Answer (4)

Sol. *Leishmania* and *Paramecium* are protozoans. *Leishmania* has a flagellum present at one end whereas *Paramecium* has many cilia. *Planaria* is a platyhelminth and *Hydra* is a coelenterate.

128. DNA is not present in :

(1) Chloroplast (2) Mitochondria

(3) Nucleus (4) Ribosome

Answer (4)

Sol. Ribosome is made up of proteins and rRNA. DNA is absent in ribosome.

129. The wings of house fly and the wings of a sparrow are an example of :

(1) Analogous organs (2) Vestigial organs

(3) Respiratory organs (4) Homologous organs

Answer (1)

Sol. Wings of housefly and wings of a sparrow look similar and have a common function *i.e.*, flying but their origins are not common, so, these are analogous organs.

130. Which of the following is NOT the purpose of transpiration:

(1) Help in absorption and transportation in plants.

(2) Prevents loss of water

(3) Maintains the shape and structure of plants by keeping the cell turgid

(4) Supplies water for photosynthesis

Answer (2)

Sol. Transpiration helps in absorption and upward movement of water and minerals dissolved in it. It maintains the shape and structure of plants and causes loss of water.

131. Pulmonary vein carries :

(1) Deoxygenated blood (2) Oxygenated blood

(3) Mixed blood (4) None of these

Answer (2)

Sol. Pulmonary vein supplies oxygenated blood from lungs to the left atrium.

132. Cell division in plants is promoted by :

(1) Abscisic acid (2) Gibberellin

(3) Ethylene (4) Cytokinin

Answer (4)

Sol. Cytokinin promotes cell division and is present in greater concentration in areas of rapid cell division such as in fruits and seeds.

133. Loop of Henle is found in :

(1) Lungs (2) Liver

(3) Nephron (4) Neuron

Answer (3)

Sol. Loop of Henle is a part of nephron.

134. Flight and fight hormone is :

(1) Adrenalin (2) Thyroxine

(3) Oxytocin (4) Insulin

Answer (1)

Sol. Adrenal glands located on the top of the kidneys secrete two hormones *i.e*, adrenaline and noradrenaline. These hormones are released during stress of any kind or emergency and are called emergency hormones. These hormones prepare body during the flight, fright and fight.

135. In the food chain given below, if the amount of energy available at fourth trophic level is 5 kJ, what was the energy available at the producer level?

Grass→Grasshopper→Frog→Snake→Hawk

(1) 5000 kJ (2) 500 kJ

(3) 50 kJ (4) 5 kJ

Answer (1)

Sol. When the plants are eaten by an animal about 10% of the energy stored in the food is fixed into animal flesh. Similarly, only 10% energy is transferred at each trophic level. Therefore, the energy available at the producer level is 5000 kJ.

136. Jaya and Ratna are varieties of :

(1) Maize (2) Rice

(3) Wheat (4) Bajra

Answer (2)

Sol. Jaya and Ratna are hybrid varieties of rice.

137. Which of the following is **NOT** an ancient water harvesting structure?

(1) Kattas (2) Sargam

(3) Kulhs (4) Surangam

Answer (2)

Sol. Sargam is not an ancient water harvesting structure while Kattas, Kulhs and Surangams are ancient water harvesting structures found in Karnataka, Himachal Pradesh and Kerala, respectively.

138. ATP is formed by photosynthesizing plant cell by:

(1) Photophosphorylation

(2) Oxidative phosphorylation

(3) Substrate level phosphorylation

(4) All of the above

Answer (4)

Sol. All the three processes, viz., photophosphorylation, oxidative phosphorylation and substrate level phosphorylation produces ATP in a photosynthesizing plant cell.

139. Breathing rate in human is controlled by :

(1) Thalamus

(2) Hypothalamus

(3) Cerebellum

(4) Medulla oblongata

Answer (4)

Sol. Medulla oblongata is the respiratory control centre that regulates the rate of breathing.

140. The number of pairs of nerves which arise from spinal cord is

(1) 21

(2) 31

(3) 41

(4) 51

Answer (2)

Sol. Nerves that arise from spinal cord are called spinal nerves. Humans have 31 pairs of spinal nerves.

141. If $a : b = 2 : 3$ and $x : y = 3 : 4$ then

$\frac{2ax - 25by}{3ay + 4bx}$ is

(1) $\frac{24}{5}$ (2) $\frac{5}{24}$

(3) $-\frac{24}{5}$ (4) $\frac{12}{13}$

Answer (3)

Sol. $\frac{2ax - 25by}{3ay + 4bx}$ ...(i)

$\frac{a}{b} = \frac{2}{3}$ and $\frac{x}{y} = \frac{3}{4}$

$\Rightarrow \quad a = \frac{2}{3}b \Rightarrow x = \frac{3}{4}y$

On putting values of a and x in (i), we get

$\frac{by - 25by}{2by + 3by} = \frac{-24}{5}$

Option, (3) is correct.

142. A square is inscribed in a circle of radius 'a'. Another circle is inscribed in that square and again a square is inscribed in this circle. The side of this square is

(1) $2a$

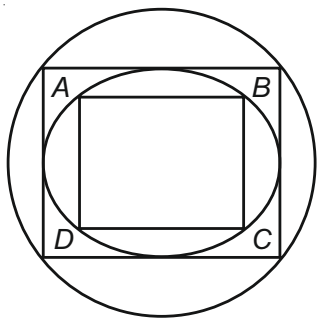
(2) $\frac{a}{2}$

(3) $\frac{a}{\sqrt{2}}$

(4) a

Answer (4)

Sol. Let side of square $ABCD$ be x.



$\therefore \sqrt{2}x \times \sqrt{2} = 2a$

$\Rightarrow \quad x = a$

Hence option (4) is correct.

143. If $a\cos\theta - b\sin\theta = c$, then $a\sin\theta + b\cos\theta$ = ?

(1) $\pm\sqrt{a^2 + b^2 + c^2}$

(2) $\pm\sqrt{a^2 + b^2 - c^2}$

(3) $\pm\sqrt{a^2 - b^2 + c^2}$

(4) $\pm\sqrt{a^2 - b^2 - c^2}$

Answer (2)

Sol. $a\cos\theta - b\sin\theta = c$ ...(i)

$a\sin\theta + b\cos\theta = k$ ...(ii)

On squaring (i) and (ii), then adding, we get

$a^2 + b^2 = c^2 + k^2$

$\Rightarrow \quad k^2 = a^2 + b^2 - c^2$

$\Rightarrow \quad k = \pm\sqrt{a^2 + b^2 - c^2}$

Hence, option (2) is correct

144. If $x^2 - 3x + 2$ is a factor of $x^4 - px^2 + q$, then the values of p and q respectively are

(1) –5, 4 (2) –5, –5

(3) 5, 4 (4) 5, –4

Answer (3)

Sol. $x^2 - 3x + 2 = 0$

$\Rightarrow \quad x = 1, 2$

$P(x) = x^4 - px^2 + q$

$P(1) = 1 - p + q = 0$ ...(i)

$P(2) = 16 - 4p + q = 0$ ...(ii)

From (i) and (ii), we get

$p = 5, q = 4$

Hence, option (3) is correct.

145. If $x_1, x_2, x_3, ..., x_n$ are in A.P., then the value of $\frac{1}{x_1x_2} + \frac{1}{x_2x_3} + \frac{1}{x_3x_4} + ... + \frac{1}{x_{n-1}x_n}$ is

(1) $\frac{n-1}{x_1x_n}$ (2) $\frac{n-1}{x_2x_{n-1}}$

(3) $\frac{n}{x_1x_n}$ (4) $\frac{n+1}{x_1x_n}$

Answer (1)

Sol. Let d be the common difference of the given A.P.

$$\therefore \frac{1}{d}\left[\frac{x_2 - x_1}{x_1x_2} + \frac{x_3 - x_2}{x_2x_3} + \frac{x_4 - x_3}{x_3x_4} + ... + \frac{x_n - x_{n-1}}{x_nx_{n-1}}\right]$$

$$= \frac{1}{d}\left[\frac{1}{x_1} - \frac{1}{x_2} + \frac{1}{x_2} - \frac{1}{x_3} + ... + \frac{1}{x_{n-1}} - \frac{1}{x_n}\right]$$

$$= \frac{1}{d}\left[\frac{1}{x_1} - \frac{1}{x_n}\right]$$

$$= \frac{1}{d}\left[\frac{x_1 + (n-1)d - x_1}{x_1x_n}\right]$$

$$= \frac{n-1}{x_1x_n}$$

Option (1) is correct.

146. If $x^2 + y^2 + \frac{1}{x^2} + \frac{1}{y^2} = 4$, then the value of $x^2 + y^2$ is

(1) 2 (2) 4

(3) 3 (4) 16

Answer (1)

Sol. $x^2 + y^2 + \frac{1}{x^2} + \frac{1}{y^2} = 4$

$$\Rightarrow \left(x - \frac{1}{x}\right)^2 + \left(y - \frac{1}{y}\right)^2 = 0$$

Since, sum of two positive numbers is zero.

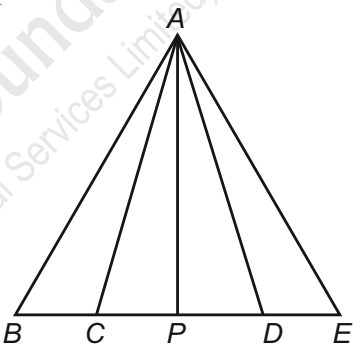
$\Rightarrow \quad x - \frac{1}{x} = 0, \qquad y - \frac{1}{y} = 0$

$\Rightarrow \quad x = \frac{1}{x} \qquad \Rightarrow \qquad y = \frac{1}{y}$

$x^2 + y^2 = 2$

Hence, option (1) is correct.

147. In the figure, $BC = CD = DE$ and P is mid-point of CD. The area of ΔAPC is



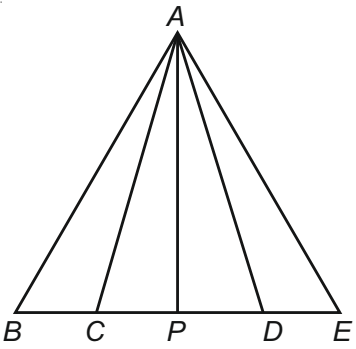
(1) $\frac{1}{3}\text{ar}(\Delta ABC)$ (2) $\frac{1}{2}\text{ar}(\Delta ABD)$

(3) $\frac{1}{6}\text{ar}(\Delta ABC)$ (4) $\frac{1}{4}\text{ar}(\Delta ABD)$

Answer (4)

Sol. According to question

$BC : CP : PD : DE = 2 : 1 : 1 : 2$



$\Rightarrow \quad \text{ar}(\Delta APC) = \frac{1}{4}\text{ar}(\Delta ABD)$

Hence, option (4) is correct.

148. If x, y and z are positive real numbers and a, b and c are rational numbers, then value of

$$\frac{1}{1+x^{b-a}+x^{c-a}}+\frac{1}{1+x^{a-b}+x^{c-b}}+\frac{1}{1+x^{b-c}+x^{a-c}}$$

is

(1) –1 (2) 1

(3) 0 (4) 2

Answer (2)

Sol. $\frac{1}{1+\frac{x^b}{x^a}+\frac{x^c}{x^a}}+\frac{1}{1+\frac{x^a}{x^b}+\frac{x^c}{x^b}}+\frac{1}{1+\frac{x^b}{x^c}+\frac{x^a}{x^c}}$

$\Rightarrow \frac{x^a}{x^a+x^b+x^c}+\frac{x^b}{x^b+x^a+x^c}+\frac{x^c}{x^c+x^b+x^a}$

$\Rightarrow \frac{x^a+x^b+x^c}{x^a+x^b+x^c}=1$

Hence, option (2) is correct.

149. If the height of right circular cylinder is increased by 10% while radius of base is decreased by 10% then curved surface area of cylinder

(1) Remains same

(2) Decreases by 1%

(3) Increases by 1%

(4) Increases by 0.1%

Answer (2)

Sol. Let Height = $10h$ and radius = $10r$

Curved surface area = $200\pi rh$

Height of new cylinder = $11h$

Radius of new cylinder = $9r$

Curved surface area of new cylinder = $198\pi rh$

% decrease = $\frac{2}{200}\times 100$

= 1%

Hence, option (2) is correct.

150. If a_1, a_2, a_3,..., a_n are in A.P. and $a_1 = 0$, then the value of $\left(\frac{a_3}{a_2}+\frac{a_4}{a_3}+\ldots+\frac{a_n}{a_{n-1}}\right)-a_2\left(\frac{1}{a_2}+\frac{1}{a_3}+\ldots+\frac{1}{a_{n-2}}\right)$ is equal to

(1) $n+\frac{1}{n}$ (2) $n+\frac{1}{n-1}$

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

Answer (4)

Sol. $a_1 = 0$, $a_2 = d$, $a_3 = 2d$

$\frac{a_3}{a_2}+\frac{a_4}{a_3}+\ldots+\frac{a_{n-1}}{a_{n-2}}+\frac{a_n}{a_{n-1}}$

$-\frac{a_2}{a_2}-\frac{a_2}{a_3}+\ldots-\frac{a_2}{a_{n-2}}$

$=\frac{a_3-a_2}{a_2}+\frac{a_4-a_2}{a_3}+\frac{a_5-a_2}{a_4}+\ldots+\frac{a_{n-1}-a_2}{a_{n-2}}+\frac{a_n}{a_{n-1}}$

$= 1 + 1 + 1\ldots(n-3)$ times $+\frac{n-1}{n-2}$

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

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

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

$=n-2+\frac{1}{n-2}$

Hence, option (4) is correct.

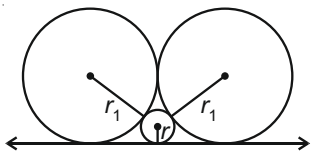
151. Three circles touch each other externally and all the three touch a line. If two of them are equal and radius of third circle is 4 cm then radius of equal circles is

(1) 12 cm (2) 8 cm

(3) 16 cm (4) 20 cm

Answer (3)

Sol. Let radius be r_1, r_1 and r

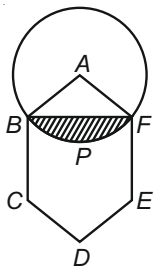


$\therefore \frac{1}{\sqrt{r_1}}+\frac{1}{\sqrt{r_1}}=\frac{1}{\sqrt{4}}$

r_1 = 16 cm

Hence, option (3) is correct.

152. In the given figure, the centre of the circle is A and $ABCDEF$ is a regular hexagon of side 6 cm. The approximate area of segment BPF is (Take $\pi = 3.14$).

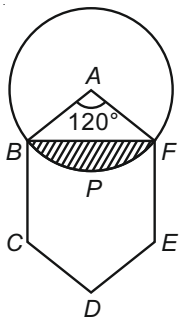


(1) 25 cm^2 (2) 22 cm^2

(3) 32 cm^2 (4) 30 cm^2

Answer (2)

Sol. Area of segment



$$BPF = \frac{\pi r^2\theta}{360°} - \frac{36}{2}\sin 60°$$

$$= 12\pi - 18\sin 60°$$

$$= 37.68 - 18\times\frac{\sqrt{3}}{2}$$

$$= 22 \text{ cm}^2 \text{ (approx)}$$

Hence, option (2) is correct.

153. If $\frac{1}{y+z}+\frac{1}{z+x}=\frac{2}{x+y}$, then what is the value of $x^2 + y^2$?

(1) 1

(2) $-2z^2$

(3) $2z^2$

(4) $y^2 + z^2$

Answer (3)

Sol. $\frac{1}{y+z}+\frac{1}{z+x}=\frac{2}{x+y}$

$$\frac{1}{(y+z)}-\frac{1}{(x+y)}=\frac{1}{(x+y)}-\frac{1}{(z+x)}$$

$$\Rightarrow \frac{x+y-y-z}{(x+y)(y+z)}=\frac{(z+x)-(x+y)}{(x+y)(z+x)}$$

$$\Rightarrow x^2 - z^2 = z^2 - y^2$$

$$\Rightarrow x^2 + y^2 = 2z^2$$

Hence, option (3) is correct.

154. If $x^2 = y + z$, $y^2 = z + x$ and $z^2 = x + y$ then what is the value of $\frac{1}{x+1}+\frac{1}{y+1}+\frac{1}{z+1}$?

(1) 1 (2) 0

(3) –1 (4) 2

Answer (1)

Sol. $x^2 = y + z$, $y^2 = z + x$, $z^2 = x + y$

$x(1 + x) = x + y + z$

$$\Rightarrow \frac{1}{(1+x)}=\frac{x}{x+y+z}$$

Similarly, $\frac{1}{(y+1)}=\frac{y}{(x+y+z)}$

and $\frac{1}{(z+1)}=\frac{z}{(x+y+z)}$

$$\therefore \frac{1}{(x+1)}+\frac{1}{(y+1)}+\frac{1}{(z+1)}=\frac{x+y+z}{x+y+z}=1$$

Hence, option (1) is correct.

155. If α, β, γ are the roots of the equation $x^3 + 4x + 1 = 0$, then $(\alpha + \beta)^{-1} + (\beta + \gamma)^{-1} + (\gamma + \alpha)^{-1}$ is equal to

(1) 2 (2) 4

(3) 3 (4) 5

Answer (2)

Sol. $x^3 + 4x + 1 = 0$

$\Rightarrow \alpha + \beta + \gamma = 0$

$\Rightarrow \alpha + \beta = -\gamma$

Similarly, $\beta + \gamma = -\alpha$ and $\alpha + \gamma = -\beta$

$(\alpha + \beta)^{-1} + (\beta + \gamma)^{-1} + (\gamma + \alpha)^{-1}$

$$= \frac{1}{(\alpha+\beta)}+\frac{1}{(\beta+\gamma)}+\frac{1}{(\gamma+\alpha)}$$

$$= \frac{(-1)}{\gamma}+\frac{(-1)}{\alpha}+\frac{(-1)}{\beta} = 4$$

Hence, option (2) is correct

156. If x, y, z are three positive numbers then the minimum value of $\frac{y+z}{x}+\frac{z+x}{y}+\frac{x+y}{z}$ is

(1) 1 (2) 2

(3) 3 (4) 6

Answer (4)

Sol. $\frac{y}{x}+\frac{z}{x}+\frac{z}{y}+\frac{x}{y}+\frac{x}{z}+\frac{y}{z}$

$$= \left(\frac{y}{x}+\frac{x}{y}\right)+\left(\frac{z}{x}+\frac{x}{z}\right)+\left(\frac{z}{y}+\frac{y}{z}\right)$$

$$\because \frac{\frac{y}{x}+\frac{x}{y}}{2} \geq \sqrt{\frac{x}{y}\times\frac{y}{x}} \qquad [\because \text{AM} \geq \text{GM}]$$

$$\frac{y}{x}+\frac{x}{y} \geq 2$$

$\therefore$ Minimum value = 2 + 2 + 2 = 6

Hence, option (4) is correct.

157. The minimum value of the expression

$\frac{3b+4c}{a}+\frac{4c+a}{3b}+\frac{a+3b}{4c}$, ($a$, b, c are +ve)

(1) 1 (2) 4

(3) 6 (4) 8

Answer (3)

Sol. $\left(\frac{3b}{a}+\frac{a}{3b}\right)+\left(\frac{4c}{a}+\frac{a}{4c}\right)+\left(\frac{4c}{3b}+\frac{3b}{4c}\right)$

$$\frac{\frac{3b}{a}+\frac{a}{3b}}{2} \geq \sqrt{\frac{3b}{a}\times\frac{a}{3b}} \qquad [\because \text{AM} \geq \text{GM}]$$

$$\frac{3b}{a}+\frac{a}{3b} \geq 2$$

$\therefore$ Minimum value = 2 + 2 + 2 = 6

Hence, option (3) is correct

158. The volume of a cube is numerically equal to sum of the length of its edges. The total surface area of cube in square units is

(1) 12 (2) 36

(3) 72 (4) 144

Answer (3)

Sol. Let side of cube be a.

Volume of cube = Sum of edges

$\Rightarrow \quad a^3 = 12a$

Either $a = 0$ or $a^2 = 12$

$a = 0$ is not possible

Total surface area = $6a^2$

$= 6 \times 12 = 72$

Hence, option (3) is correct

159. The expression $14^m - 6^m$ will always divisible by

(1) 8 (2) 20

(3) 14 (4) 6

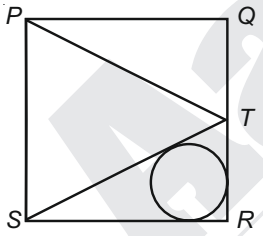
Answer (1)

Sol. $a^n - b^n$ is always divisible by $a - b$

$\therefore \quad 14 - 6 = 8$

Hence, option (1) is correct

160. $PQRS$ is a square of side 6 cm each and T is mid. point of QR. What is the radius of circle inscribed in ΔTSR.



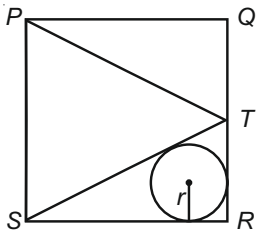
(1) $\frac{3}{3-\sqrt{5}}$ (2) $\frac{6}{3+\sqrt{5}}$

(3) $\frac{2}{3+\sqrt{5}}$ (4) $3+\sqrt{5}$

Answer (2)

Sol. Let r be the radius of circle.

ΔSTR is right angled triangle



$\therefore \quad r = \frac{6+3-3\sqrt{5}}{2} = \frac{6}{3+\sqrt{5}}$

Hence, option (2) is correct.

161. When was the democracy restored in Chile?

(1) 1973 (2) 1988

(3) 1957 (4) 1991

Answer (2)

162. Which of the following country is not a operational member of security council?

(1) Russia (2) China

(3) Germany (4) America

Answer (3)

163. Who among the following was not a member of the constituent assembly?

(1) Mahatma Gandhi

(2) Jawahar Lal Nehru

(3) Dr. Rajendra Prasad

(4) Dr. B. R. Ambedkar

Answer (1)

164. Which of the following Secretary General said that "US war on Iraq was not legal"

(1) Kofi A Anan (2) B.B. Ghali

(3) U Thant (4) Ban Ki Moon

Answer (1)

165. President can declare emergency when -

(1) Prime minister advises him to do so

(2) Parliament advises

(3) The council of ministers, in writing, advises him to do so

(4) Home minister ask him to do so

Answer (3)

166. "KOSOVO" was a province of try before the spilit

(1) Vietnam (2) Zimbabve

(3) Sri Lanka (4) Yogoslavia

Answer (4)

167. Which of the following state was born out of culture, ethnicity and geography

(1) Kerala

(2) Nagaland

(3) Mizoram

(4) Assam

Answer (2)

168. 'End of Racial Discrimination' is a part of which fundamental right?
(1) Right of Freedom
(2) Right of equality
(3) Right against exploitation
(4) Right to education and culture

Answer (2)

169. The movement for the individual and family right of women is known as -
(1) Mahila Adhikar Aandolan
(2) Mahila Shakti Aandolan
(3) Narivadi Aandolan
(4) Nari Shasktikaran Aandolan

Answer (4)

170. What is the meaning of 'Transparency'?
(1) When decision is taken by the ruler
(2) When decision are make through leader's conclusion
(3) When decision are made for individual greeds
(4) When decision are taken with honesty and proper follow of rules

Answer (4)

171. The international organisation that works for human rights is-
(1) Amety International
(2) Amnesty International
(3) Asnesty International
(4) Afnesty International

Answer (2)

172. What was 'Livre'?
(1) Currency of France
(2) Newspaper of France
(3) Magazine of France
(4) Flag of France

Answer (1)

173. Who granted sole right to trade with East to East India Company?
(1) James I (2) James II
(3) Elizabeth I (4) Elizabeth II

Answer (3)

174. In which congress session, Non cooperation programme was adopted?
(1) Ahmedabad 1921 (2) Kolkata 1917
(3) Amritsar 1919 (4) Nagpur 1920

Answer (4)

175. The first Modern Novel published in Malayalam in the year 1889 was
(1) Indulekha (2) Rajasekhara Caritamu
(3) Manju Ghose (4) Pariksha Guru

Answer (1)

176. The painting 'Damayanti' was made by
(1) Abindranath Tagore (2) William Jones
(3) Raja Ravi Verma (4) Ravindra Nath Tagore

Answer (3)

177. Where was Simon Commission arrived in India?
(1) 1928 (2) 1930
(3) 1931 (4) 1932

Answer (1)

178. 'Rinderpest' is a term used for
(1) A cattle disease
(2) Missing of cattle
(3) Indentured Labourer
(4) Mass production in a factory

Answer (1)

179. Giuseppe Garibaldi was a famous freedom fighter of
(1) Germany (2) Poland
(3) Ireland (4) Italy

Answer (4)

180. Gudem Rebellion was led by
(1) Baba Ramchandra (2) Jawahar Lal Nehru
(3) Alluri Sitaram Raju (4) Mahatma Gandhi

Answer (3)

181. "The Social Contract" book was written by
(1) Dantey (2) Rousseau
(3) Petrarch (4) Napoleon

Answer (2)

182. The principle of the 'Garden City' was developed by
(1) Raymond Unwin (2) Barry Parker
(3) Ebenezer Howard (4) Herbert Baker

Answer (3)

183. Which of the following organisation looks after the credit needs of agriculture and rural development in India?
(1) FCI (2) IDBI
(3) NABARD (4) SBI

Answer (3)

184. How many phases are there in circular flow of income?
(1) 2 (2) 3
(3) 6 (4) 5

Answer (2)

185. Which of the following is considered as social infrastructure?
(1) Transport (2) Education
(3) Energy (4) Communication

Answer (2)

186. Multiple cropping refers to
(1) Cultivation of Wheat and Rice
(2) Cultivation of two crops in alternate rows
(3) Cultivating more than one crop on the same field in a year
(4) Cultivating crops & rearing animals simultaneously.

Answer (3)

187. Infant mortality rate refers to the death of child under the age of
(1) 1 year (2) 2 year
(3) 3 year (4) 4 year

Answer (1)

188. In which year was the Integrated Child Development Service (ICDS) introduced
(1) 1965 (2) 1975
(3) 1985 (4) 1995

Answer (2)

189. The first chairman of Planning commission was?
(1) Indira Gandhi
(2) Dr. Rajendra Prashad
(3) Jawahar Lal Nehru
(4) Vallabh Bhai Patel

Answer (3)

190. What percent of the total surface area of India is covered by mountains?
(1) 33% (2) 35%
(3) 30% (4) 25%

Answer (3)

191. Which mineral has excellent dielectric strength, insulating properties, low power loss factor and resistance to high voltage?
(1) Aluminium (2) Lime stone
(3) Copper (4) Mica

Answer (4)

192. Which of the following is an example of joint sector industry?
(1) BHEL (2) OIL
(3) SAIL (4) TISCO

Answer (2)

193. Which mode of transport reduces trans-shipment losses and delays?
(1) Railways (2) Road ways
(3) Water ways (4) Pipelines

Answer (4)

194. Which of the following lake lies on the Equator?
(1) Lake Victoria (2) Lake Malavi
(3) Lake Nasser (4) None of these

Answer (1)

195. The longitudinal velleys lying between Lesser Himalayas and Shivaliks are known as
(1) Valleys (2) Coast
(3) Passes (4) Duns

Answer (4)

196. In winters, the western cyclonic disturbances originate from which sea?
(1) Caspian sea (2) Black sea
(3) Mediterranean sea (4) Baltic sea

Answer (3)

197. Balancing the need to use resources and also conserve them for future is called
(1) Resource development
(2) Resource conservation
(3) Sustainable development
(4) Human Resource Development

Answer (3)

198. Which among the following has the maximum number of National Parks?

(1) Andaman and Nicobar Island

(2) Arunachal Pradesh

(3) Assam

(4) Meghalaya

Answer (1)

199. According to the "Theory of Plate Tectonics" when some plates come towards each other which one of the following is formed?

(1) Convergent boundary

(2) Divergent boundary

(3) Transform boundary

(4) None of the above

Answer (1)

200. The largest producer of cotton in the world is

(1) India (2) China

(3) Brazil (4) U.S.A

Answer (2)

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