Answers & Solutions

for

NTSE (Stage-I) 2019-20

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you answer the questions.

1. Answer are to be bubbled only on the separate carbonless answer-sheet provided to you. After examination detach the carbonless copy from original OMR & keep carbonless copy with you till the declaration of result.

2. Please write your Centre Code & Seat No. very clearly (only one digit in one block) on question paper, Before writing your seat no. ascertained it with Hall ticket. Please see that no block is left blank or unfilled.

    Example :

CENTRE CODE		2	1	0	2	

SEAT NO.			3	9	2	0	2	1	0	2	1	2	3

3. Please ensure that you have received Mental Ability Test answer sheet.

4. Total number of questions are 200 (100 Q. MAT & 100 Q. SAT) for this paper. All questions carry one mark each.

5. All questions are compulsory.

6. For each question there are four options given in question paper. Check for the correct answer and bubble correct option from four circles given in answer sheet by Black/Blue pen. Please do not write any answers on question papers.

7. Start answering from first question one after the other till last question.

8. If you do not know the answer of any question, do not spend much time on it and pass on to the next one. Time permitting you can come back to the questions which you have left in the first instance and try them again.

9. Utilize the allotted time for solving the questions in best possible way. The rough work is to be done in the box given under each page.

10. Do not write anything except Centre Code, Seat No. and rough work anywhere in this booklet.

PART-I : MENTAL ABILITY TEST (MAT)

Q.1 to 3 : Direction In the following questions a specific group of numbers is given. From the given alternatives. Find out the correct alternative that matches the given group.

1. 150 576 252

    (1) 393   (2) 466

    (3) 80   (4) 182

Answer (1)

Sol. The sum of the digits are in multiple of 3

2. 132 736 350

    (1) 223   (2) 72

    (3) 505   (4) 993

Answer (3)

Sol. The sum of the digits are even

3. 193 454 265

    (1) 572   (2) 823

    (3) 734   (4) 367

Answer (2)

Sol. Sum of digits are equal to 13.

Q.4 and 5 : Direction Find the odd term.

4. (1) DUFW   (2) HQJS

    (3) JOLQ   (4) AWCZ

Answer (4)

Sol. Sum of their place value is equal to 54.

5. (1) AEVZ   (2) FJQU

    (3) CQTX   (4) JMOS

Answer (3)

**Sol.** Sum of place value are perfect square remaining are net.

6. ABCDEFGHIJKLMNOPQRSTUVWXYZ

    From the above alphabets which word will be formed from the given alternatives if the meaningful word formed by the 5th and 10th letter from the right and 1st and 5th letter from the left is written in the reverse order.
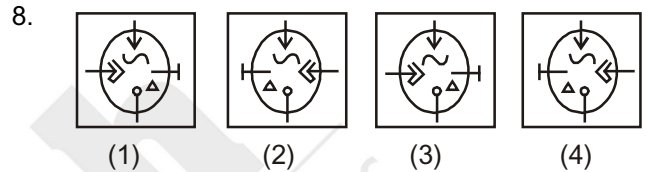
    (1) VEAS   (2) SAEV

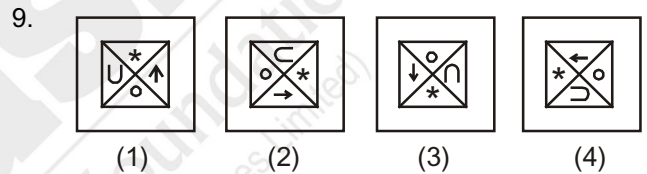   (3) AVES   (4) EVAS

Answer (No option is correct)

Q. 7 to 9 : Direction Find the odd figure.

7.

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

Answer (1)

8.

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

Answer (3)

9.

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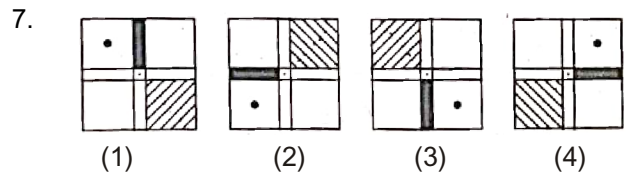
Answer (3)

10. In the following question there is a specific relation between first and second term. The same relationship exists between third and the fourth term. Considering the same relationship choose the correct alternative that will replace the question mark.
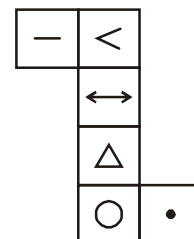
    11529 : 72135 :: 152943 : ?

    (1) 213549   (2) 223649

    (3) 224194   (4) 215049

Answer (1)

Sol. Sum of digit is equal to 24

Q.11 to 13 : Direction The adjacent figure is folded to form a cube. Observe the figure and answer the following questions.

11. Which symbol will not be adjacent to the symbol '.' ?

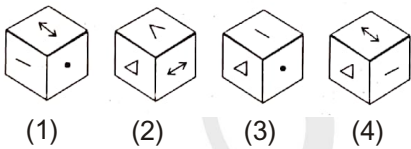(1) <   (2) –

(3) ↔   (4) Δ

Answer (2)

12. Which symbol will not be opposite to the symbol Δ ?

(1) ↔   (2) •

(3) <   (4) –

Answer (3)

13. Which of the following figure is the figure obtained by folding the paper to form a cube?

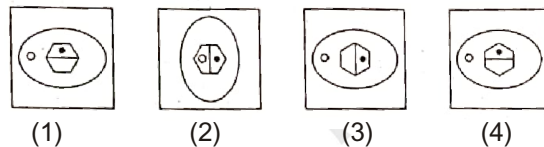(1)   (2)   (3)   (4)

Answer (4)

Q.14 to 16 : Direction In each of the following questions, there is a specific relationship between the first and the second figure. The same relationship exists between the third and the fourth figure. Find the relation and choose the correct answer to replace the question mark.
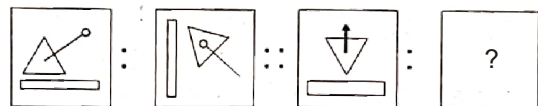
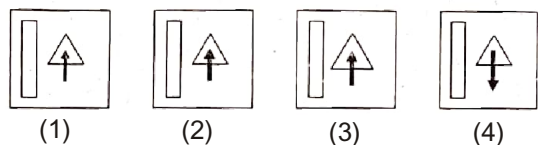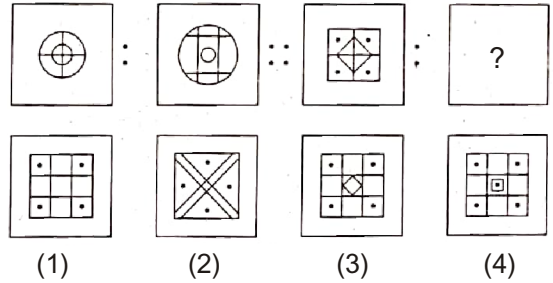14. Question Figure

Answer Figure

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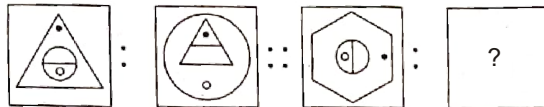
Answer (3)

15. Question Figure

Answer Figure

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

Answer (No option is correct)

16.

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

Answer (3)

Q.17 to 20 : Direction In each of the following questions, choose the correct alternative that will replace the question mark in the given sequence.

17. 4, 6, 16, 62, 308, ?

(1) 990   (2) 1721

(3) 698   (4) 1846

Answer (4)

Sol. $4 \times 2 - 2 = 6$, $6 \times 3 - 2 = 16$, $16 \times 4 - 2 = 62$, $62 \times 5 - 2 = 308$, $308 \times 6 - 2 = 1846$

18. 6, 9, 18, 21, 42, 45.? , ?

(1) 90, 91   (2) 90, 92

(3) 90, 93   (4) 90, 94

Answer (3)

Sol.

$$\underset{6\ ,\ \ \ 9,\ \ \ 18,\ \ \ 21,\ \ \ 42,\ \ \ 45,\ \ \ 90,\ \ \ 93,}{\overset{+3\ \ \ +9\ \ \ +3\ \ \ +21\ \ \ +3\ \ \ +45\ \ \ +3}{}}$$

19. 7, 13 ,25 ,43 ,67 ?

(1) 97   (2) 98

(3) 99   (4) 100

Answer (1)

Sol.

$$\underset{7,\ \ \ 13,\ \ \ 25,\ \ \ 43,\ \ \ 67,\ \ \ 97,}{\overset{+6\ \ \ +12\ \ \ +18\ \ \ +24\ \ \ +30}{}}$$

20. 3624, 4363, 3644, 4563, 3664, ?

(1) 4263   (2) 4363

(3) 4536   (4) 4763

Answer (4)

Sol. 3624, 4363, 3644, 4563, 3664, 4763

$$+20 \quad +200 \quad +20 \quad +200$$

Q.21 to 23 : Direction Atul, Tushar, Nishant and Amar are four players. Except Nishant all play cricket. Atul plays only cricket and football. Only three players play football. Tushar plays all the games except kho-kho. Only one player does not play kabaddi. Only Nishant does not play football. Nishant and Amar are expert in kho-kho.

Sol. Atul → Kricket & Football

Tushar → Cricket, Football, Kabaddi

Nishant → Khokho, Kabaddi

Amar → Kricket, Football, Khokho, Kabaddi

21. Which game Tushar, Nishant and Amar play?

    (1) Kabaddi

    (2) Kho-Kho

    (3) Cricket

    (4) Football

Answer (1)

22. Who plays all the games ?

    (1) Atul   (2) Tushar

    (3) Nishant   (4) Amar

Answer (4)

23. Which game is played by only two players ?

    (1) Cricket

    (2) Kabaddi

    (3) Football

    (4) Kho-Kho

Answer (4)

Q.24 and 25 : Direction A rhythmic arrangement of letters is given. The missing letters appear in the same order in one of the alternative answer. Choose the correct alternative.

24. ab bc c ba c

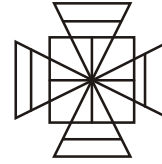   (1) baac   (2) aabb

    (3) caab   (4) aaab

Answer (3)

25. abb baa bb b ab

    (1) bbaba   (2) abaaa

    (3) abbba   (4) ababa

Answer (2)

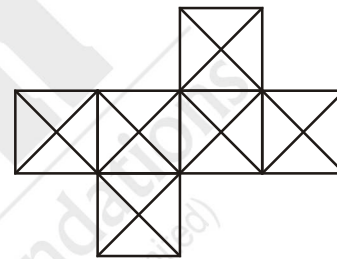26. Find the number of triangles in the adjacent figure:

    (1) 12   (2) 16

    (3) 20   (4) 24

Answer (3)

27. Find the number of Squares from the adjacent figure :

    (1) 6   (2) 11

    (3) 13   (4) 10

Answer (2)

Q.28 to 31 : Direction Choose the correct alternative that will replace the question mark.

28. JDP, NGR, RJT, VMV, ?

    (1) ZPW   (2) ZQY

    (3) ZPX   (4) ZRY

Answer (3)

Sol.

29. $V_{422}D$, $S_{719}G$, $P_{1016}J$, $M_{1313}M$, ?

    (1) $K_{1711}P$

    (2) $J_{1610}P$

    (3) $J_{1611}P$

    (4) $I_{1512}O$

Answer (2)

Sol.

J   P
16 10

30. 29AYC, EUG33, IQ37K, ?

   (1) MMO_{41} (2) MZB_{41}

   (3) MNP_{43} (4) MPO_{44}

Answer (1)

Sol. MMO_{41} Sum of their place value

31. ZAB, WDE, SHI, NMA, ?

   (1) VEF (2) UFG

   (3) FUG (4) HSG

Answer (4)

Q.32 to 34 : Direction The bottom and the top surface of a cube, having each side 5 units, is painted black. The opposite surface of the cube are red. Then the cube is cut into smaller cubes having each side 1 unit. On the basis of this information choose the correct alternative to answer the questions.
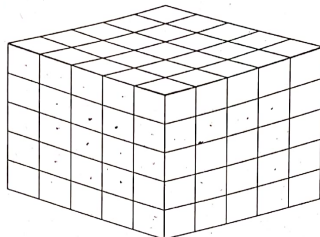
32. How many cubes have at least one surface painted?

   (1) 125 (2) 116

   (3) 100 (4) 98

Answer (4)

33. How many cubes have only red surface ?

   (1) 18 (2) 30

   (3) 48 (4) 60

Answer (4)

34. How many cubes have surfaces in both the colours, black and red ?

   (1) 25 (2) 50

   (3) 8 (4) 20

Answer (Wrong)

35. If in a mathematical code language

   $\Delta + \nabla = 9$, $\triangleleft + \triangleright = 13$, $\triangleright + \Delta = 11$ and $\nabla + \odot = 12$

   then find the value of $\odot$ from the following alternatives.

   (1) 5 (2) 7

   (3) 6 (4) 8

Answer (4)

36. In a certain code language if

   $\$ \times ₹ = 35$, $E \times \$ = 30$, $₹ \times U = 63$ and $U \times \# = 36$

   then find the value of $\#$.

   (1) 6 (2) 4

   (3) 5 (4) 9

Answer (2)

Sol.

$\$ \times K = 35$ $E \times \$ = 30$
$\downarrow \quad \downarrow$ $\downarrow \quad \downarrow$
$5 \quad 7$ $6 \quad 5$

$K \times U = 63$, $U \times \# = 36$
$\downarrow \quad \downarrow$ $\downarrow \quad \downarrow$
$7 \quad 9$ $9 \quad 4$

Q.37 and 38 : Direction In the following table the digits are assigned with certain symbols. Observe them carefully and choose the correct alternative to answer the questions.

Digit	9	0	8	1	7	2	6	3	5	4
Symbol	✳	⌒	⋇	♀	⌣	⌣̇	⌣	⚹	⊕	⊠

37. ⋇ ⌣ ⌣̇ † ⌣ ⚹ ⊠ = ?

   (1) ⊕ ⌒ ⌣

   (2) ♀ ⊕ ⌣ ⌒

   (3) ♀ ⊕ ⌒ ⌣

   (4) ⊕ ⌣ ⌒

Answer (3)

Sol. The given figure represents

   872 + 634 = 1506

38. ⌣̇ ⌣⋇ − ♀ ✳ ⌣ = ?

   (1) ⌒ ⚹ ⌣̇

   (2) ⋇ ⌣̇

   (3) ⌒ ⋇ ✳

   (4) ⚹ ⌒

Answer (2)

Sol. The given figure represents

   278 − 196 = 82

Q.39 and 40 : Direction In the following sequence. Choose the correct term that will replace the question mark.

39. ◺○▱⊖, ◺○◰⊖◿, ◺○⊖▱▽, ◺⊖○◰▽?

(1) ⊖◺▱○▽

(2) ⊖◺○▱▽

(3) ⊖◺▱▽○

(4) ⊖◺○◰▽

Answer (2)

40. αβθρδ, βαθρδ, βθαρδ, βθρδα, ?

(1) βθραδ

(2) βθδαρ

(3) βθδρα

(4) βθρδα

Answer (1)

Q.41 and 43 : Direction In the adjacent figure the numbers represent the number of artists in different arts. Observe the diagram carefully and choose the correct alternative to answer the questions.
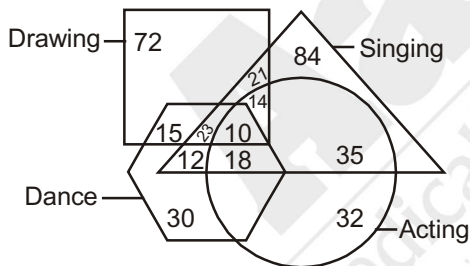
41. How many artist are expert in all the arts ?

(1) 23   (2) 10

(3) 14   (4) 33

Answer (2)

Sol. From the given figure, clearly we can conclude 10 artist are expert in all the arts.

42. How many artists are good in 'acting' ?

(1) 35   (2) 77

(3) 67   (4) 32

Answer (4)

Sol. From the given figure.

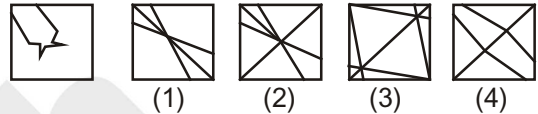43. How many artists are good in only two arts ?

(1) 65   (2) 97

(3) 83   (4) 71

Answer (3)
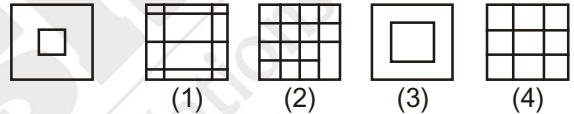
Sol. From the given figure.

Q.44 and 45 : Direction After folding a square piece of paper it appears as shown in the question figure. The paper when unfolded will look like as shown in one of the alternatives. Select the correct alternative.
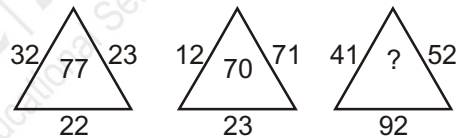
44. Question Figure

Answer (4)

45.

Answer (4)

Q.46 and 47 : Direction Identify the rule in the following arrangement of numbers. Choose the correct alternative that will replace the question mark.
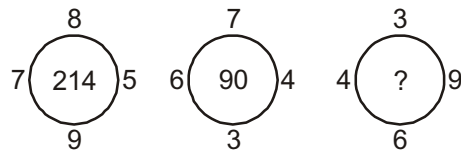
46.

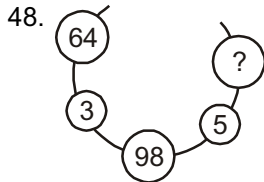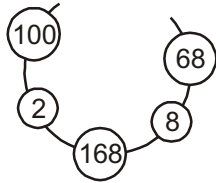(1) 185   (2) 68

(3) 78   (4) 93

Answer (2)

47.

(1) 54   (2) 73

(3) 92   (4) 108

Answer (4)

Sol. $7 \bigcirc 214 \, 5$ $2 (8 \times 9 + 7 \times 5) = 2 \times 107 = 214$

(with 8 on top, 9 on bottom)

Similarly, $4 \, ? \, 9 = 2 (3 \times 6 + 49) = 108$

(with 3 on top, 6 on bottom)

Q.48 and 50 : Direction There is a specific rule in the following arrangement of numbers. Study that rule carefully. According to that rule choose the correct alternative for the questions that follows

48.

(1) 30   (2) 32

(3) 34   (4) 52

Answer (3)
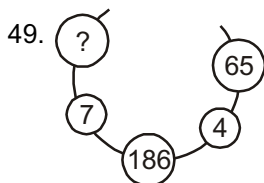
Sol.
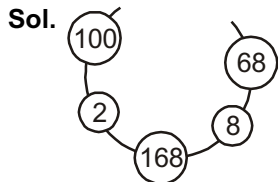
From the given arrangement

$(8 + 2)^2 = 100$

and $168 = 100 + 68$

From the figure

$98 = 64 + ?$
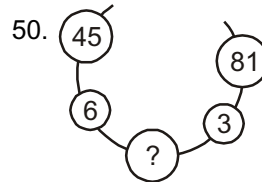
$34 = ?$

49.

(1) 57   (2) 84

(3) 98   (4) 121

Answer (4)

Sol. $? = (7 + 4)^2 = (11)^2$

$? = (2)$
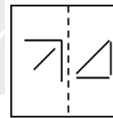
50.

(1) 216   (2) 126

(3) 113   (4) 93

Answer (2)

Sol. $? = 45 + 81$
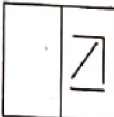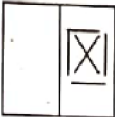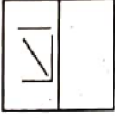
$? = 126$

Q. 51 and 52 : Direction in the figure given below, a transparent square shaped paper is folded along the dotted lines, which figure will be obtained? Choose the correct figure from the given alternatives.
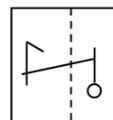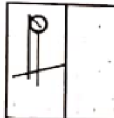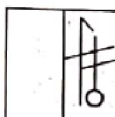
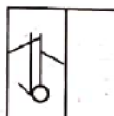51. Question Figure

Answer Figure

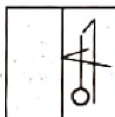
(1)   (2)

(3)   (4)

Answer (2)

52. Question Figure

Answer Figure

(1)   (2)

(3)   (4)

Answer (4)

Q. 53 and 55 : Direction In each of the following questions there is a specific relationship between the first and the second term. The same relationship exists between the third and the fourth term. Find the relation and Choose the correct answer to replace the question mark.

53. KMF : LLH : : RMS : ?

    (1) SLR   (2) SLU

    (3) SSU   (4) SUS

Answer (2)

54. ADE : FGJ : : KNO : ?

    (1) PQR   (2) PQT

    (3) RQP   (4) TPR

Answer (2)

55. ? : ALKLO : : WOULD : TLRIA

    (1) BLOCK   (2) BARGE

    (3) CONES   (4) DONOR

Answer (4)

56. **Direction :** In the following question the numbers and letters in each horizontal line are related to each other by a specific rule. Identify the rule and choose the correct alternative to replace the question mark.

FJ	25	16	NS
LZ	25	196	SX
NQ	?	?	WY

    (1) 4, 9   (2) 9, 4

    (3) 18, 169   (4) 31, 256

Answer (1)

Sol. Square of difference of letters

57. Choose the correct alternative to replace the Question mark.

A	M	Q
C	U	E
G	E	?
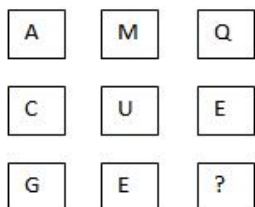
    (1) F   (2) T

    (3) U   (4) S

Answer (3)

Sol. A + 2 C + 4 G + 6 M + 8 U + 10 E + 12 Q + 14 E + 16 U

Q. 58 and 59 : Direction Choose the water image from the alternatives given for the questions figure.

58. Question Figure
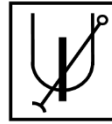
Answer Figure
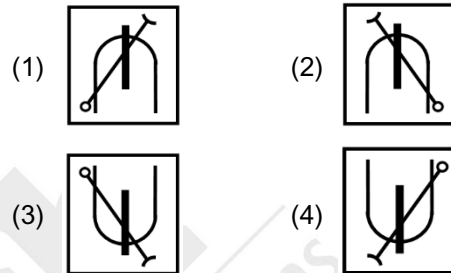
Answer (2)

59. Question Figure
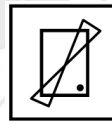
Answer Figure
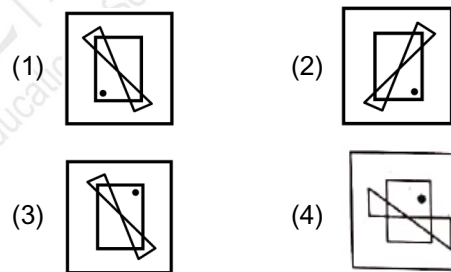
Answer (3)

Q. 60 and 61 : Direction Pradyumna walked 12 km west. Then he turned right and walked 5 km. Again he turned right and walked 4 km. Finally he again turned right and walked 11 km. Then

60. At the end, which direction Pradyumna is facing?

    (1) North   (2) East

    (3) South   (4) West

Answer (3)

61. At what distance is Pradyumna now from the original place?

    (1) 8 km   (2) 6 km

    (3) 12 km   (4) 10 km

Answer (4)

Sol. Distance $= \sqrt{6^2 + 8^2}$

$= 10$
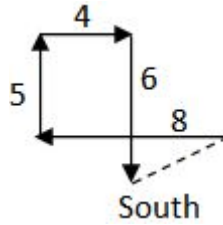
Q. 62 to 64 : Direction Observe the following pyramid of letters and decide which alternative will replace the question mark.

```
                    b
                 z     a
              w     x     y
           s     t     u     v
        n     o     p     q     r
     h     i     j     k     l     m
  a     b     c     d     e     f     g
```
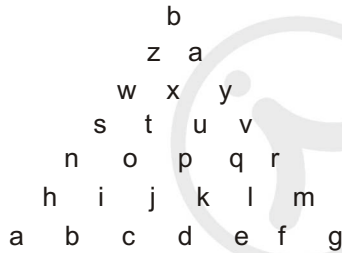
62. hab :mgf :: jicd : ?

   (1) kled   (2) kdel

   (3) ldek   (4) delk

Answer (1)

63. bza : bwy :: bsv : ?

   (1) bnr   (2) bvs

   (3) bhm   (4) bag

Answer (1)

64. wsop : yvqp :: ptw : ?

   (1) pqr   (2) puy

   (3) pos   (4) pxb

Answer (2)

Q. 65 to 67 : Direction A, B, C, D, E and F are sitting at each corner of a hexagonal table A and D are facing opposite direction. B is sitting to the left of D. D is sitting next to C and E is sitting to the other side of C.

65. Who is sitting opposite to F ?

   (1) C   (2) E

   (3) D   (4) B

Answer (1)

Sol.
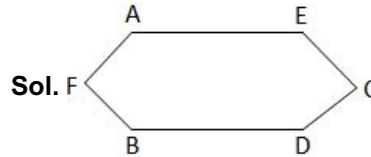
66. If the persons sitting in opposite direction interchange their places, then who will be sitting in between D and F.

   (1) E   (2) A

   (3) B   (4) C

Answer (3)

Sol.
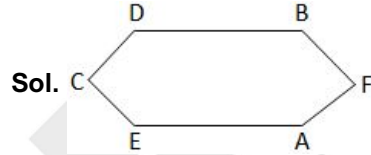
67. If only A and D interchange their places who will be in between B and C ?

   (1) A   (2) F

   (3) E   (4) D

Answer (1)

Q. 68 to 69 : Direction The following question figure is incomplete. Select the correct alternative that will complete the figure.

68. Question figure
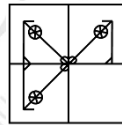
   (1)   (2)

   (3)   (4)

Answer (2)

69. Question figure
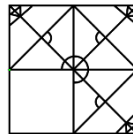
   (1)   (2)

   (3)   (4)

Answer (1)

Q. 70 to 71 : Direction Ten years ago the ratio of ages of Sunil and Anil Was 1 : 7. Ten years hence the ratio of their ages will be 1 : 2. Then

70. Find Sunil's present age.

(1) 14 years   (2) 40 years

(3) 70 years   (4) 28 years

Answer (1)

Sol. Let present age of Sunil be X present age of Anil be

y.

10 year before

$$\frac{x-10}{x-10} = \frac{1}{7}$$

7x – 70 = y – 10

7x – y = 60

10 year after

$$\frac{x+10}{x+10} = \frac{1}{2}$$

2x + 20 = y +10

2x – y = -10

$$\begin{array}{rcl} 7x - y &=& 60 \\ \underline{2x - y} &=& \underline{-10} \\ 5x &=& 70 \end{array}$$

X = 14 year (age of Sunil)

Y = 28 + 10 = 38 years.

38 – 10 = 28 years.

71. What was Anil's age ten years before?

(1) 4 years   (2) 28 years

(3) 24 years   (4) 32 years

Answer (2)

Q. 72 and 73 : Direction In a queue, Amruta is at the 11th place from front. Suneeta is at 26th place from behind. Sapna is at the central place between Amruta and Suneeta. If there are 60 persons in the queue, then

72. At which place Sapna is standing from the front?

(1) 12   (2) 24

(3) 23   (4) 26

Answer (3)

73. At which place Sapna is standing from behind ?

(1) 37   (2) 38

(3) 23   (4) 39

Answer (2)

Q.74 and 75 : Direction In each of the following questions the question figures are given in specific order. Select the correct alternative from the answer figures that will replace the question mark.

74. Question Figure
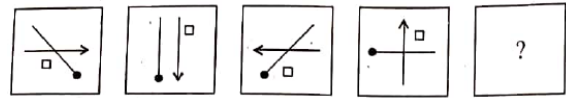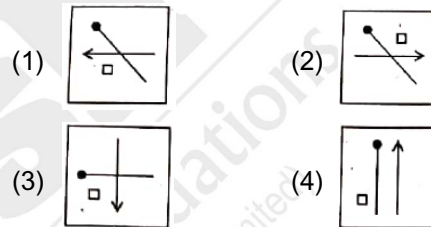
Answer Figure:
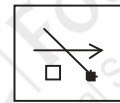
Answer (2)

Sol. Rotating Clock wise by 45º
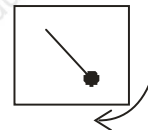
Rotating Clock wise by 90º
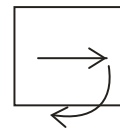
75. Question Figure
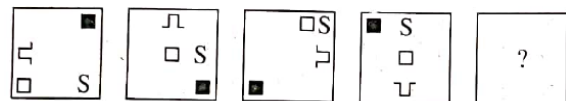
Answer Figure:
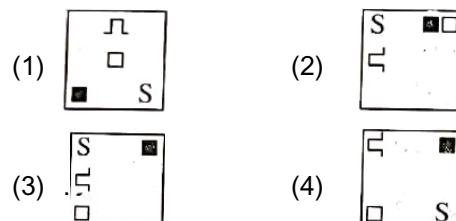
Answer (3)

Sol. Rotating Clock wise by 90º
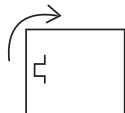
Rotating Clock wise at every corner.
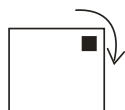
Moving diagonal
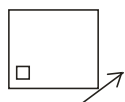
Rotating anti clock wise by 45º

Q. 76 and 77 : **Direction** In the following question in every row the numbers outside the bracket and inside the bracket are related to each other in a specific manner. From the given alternative choose the correct alternative that will replace the question mark.

76. 17 (68) 28

    11 (22) 14

    49 (?)   9

    (1) 56   (2) 105

    (3) 147   (4) 63

Answer (4)

Sol. 17 (68) 28

    11 (22) 14

    49 (?)   9

$$\frac{17 \times 28}{68} = 7$$

$$\frac{11 \times 14}{22} = 7$$

$$\frac{49 \times 9}{7} = 63$$

77. 24 (7) 67

    53 (6) 25

    82 (?) 35

    (1) 11   (2) 10

    (3) 9   (4) 8

Answer (3)

Sol. $\dfrac{24 + 67}{7} = 13$

$$\frac{53 + 25}{6} = 13$$

$$\frac{82 + 35}{9} = 13$$

Q 78 to 80 : **Direction** In each of the following questions find out the group of letters that matches the given group.

78. AUEFG   EOVWX   IAPQR

    (1) OQRST   (2) UEJKL

    (3) OKEFG   (4) UGHIJ

Answer (2)

Sol.

79. ZXAVT   WUESQ   TRUPN

    (1) VTRPN   (2) JHFDB

    (3) LJOHF   (4) QOMKI

Answer (3)

Sol.

80. BYMN   DWJZ   GTKP

    (1) AZFV   (2) CXHS

    (3) HSOX   (4) EVJP

Answer (2)

Sol.

B Y M N
2 25 13 14
Sum = 54

D W J Z
4 23 10 26
Sum = 63

G T K P
7 20 11 16
Sum = 54

C X H S
3 24 8 19

Sum = 54

Multiple of 9.

Q. 81 to 83 : Direction The word ACTIVE is written in four different code languages. Understanding the code find out the correct code language for the word given in each of the following questions:

ACTIVE = (1) CEVKXG

(2) EFVKYI

(3) XZQFSB

(4) CFXNBL

81. GOLDEN = KRNFHR.

Answer (2)

Sol.

82. ORANGE = LOXKDB

Answer (3)

Sol.

83. PURPLE = RWTRNG

Answer (1)

Sol.

Q. 84 and 85 : Direction In the given question a complex figure is given. Find out which of the figure given in the alternatives is hidden in the complex figure.

84. Question Figure

Answer Figure

(1)   (2)

(3)   (4)
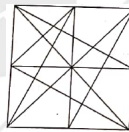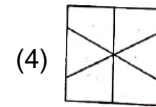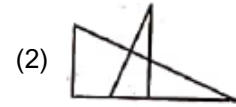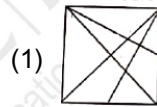
Answer (1)

85. Question figure

Answer figure

(1)   (2)

(3)   (4)
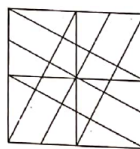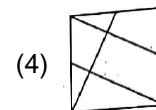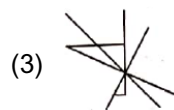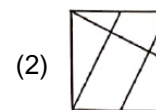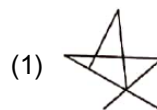
Answer (2) or (4)

Q. 86 and 87 : Direction In the following questions numbers are given in Column I and are coded in Column II. But they are not arranged according to the order of digits in the number. Identify the code language and choose the correct alternative to answer the questions:

Column I	Column II
972	
463	
876	
931	
582	

86. Which of the following numbers will be coded as ?

(1) 2165   (2) 2856

(3) 2356   (4) 2534

Answer (3)

87. Which of the following code will be used to indicate the number 9135?

(1)   (2)

(3)   (4)

Answer (4)

Q88. **Direction :** Observe the following code and answer the questions that follow:

Letters →	A	T	M	G	O	D	N	R	S
Digits →	9	8	7	6	5	4	3	2	1

88. Choose the correct code from the following alternatives for the word 'DONAR'.

(1) 48391   (2) 54872

(3) 45392   (4) 53971

Answer (3)

Q. 89 to 90. Direction Choose the correct mirror image from the alternatives given for the question figure.

89. Question Figure   Answer Figure
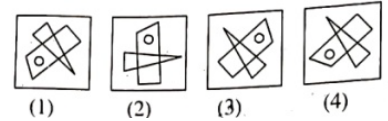
Answer (3)

90. Question Figure   Answer Figure
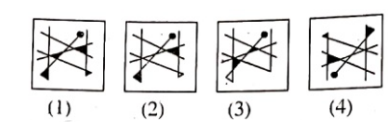
Answer (1)

91. In a mathematical code language

88 – 7 = 39, 77 – 6 = 41,

99 – 5 = 74, then 55 – 4 = ?

(1) 31   (2) 39

(3) 49   (4) 34

Answer (2)

Sol. 88 –7 = 39,   77 – 6 = 41,

99 – 5 = 74   55 – 4 = ?

$(88 – 7) = (81 – 42) = 39$

     – 12 ↕

$(77 – 6) = (71 – 30) = 41$

     – 10 ↕

$(99 – 5) = (94 – 20) = 74$

     – 8 ↕

$(55 – 4) = (51 – 12) = 39$

92. In a mathematical code language

8 + 6 = 42, 7 + 5 = 30,

9 + 3 = 24, then 6 + 4 = ?

(1) 27   (2) 20

(3) 22   (4) 24

Answer (2)

Sol. 8 + 6 = 42,   7 + 5 = 30,

9 + 3 = 24,   6 + 4 = ?

$(8 × 6) – 6 = 42,$ $(7 × 5) – 5 = 30,$

$(9 × 3) – 3 = 24,$ $(6 × 4) – 4 = 20$

Q. 93 to 95 : Direction The following figure is made by arranging some cubes having each side 1 unit. The figure is painted from all the outside surfaces. Observe the figure and choose the correct alternative to answer the questions.
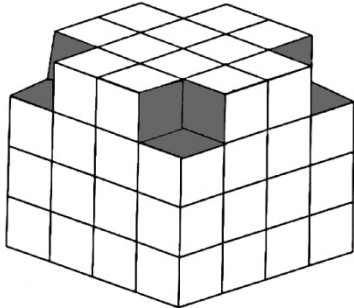
93. Maximum how many faces of a cube are painted?

    (1) 5   (2) 3
    (3) 4   (4) 2

Answer (2)

94. How many cubes have at least two faces coloured?

    (1) 12   (2) 20
    (3) 28   (4) 48

Answer (3)

	Two Faces	Three Faces	Total
Top Line 1	0	8	
Line 2	0	4	
Line 3	4	-	
Line 4 Base Line	8	4	
Total	12	16	28

95. How many cubes have only one face painted?

    (1) 4   (2) 16
    (3) 24   (4) 64

Answer (3)

Sol. Only one face painted.

6 faces × (4) = 24

Q. 96 and 97 : Direction A square piece of paper is folded and cut at specific spots as shown in the figure. The paper when unfolded will look like as one of the alternative given. Choose the correct alternative.

96. Question Figure   Answer Figure
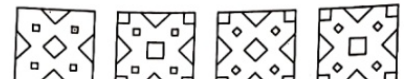
(1)   (2)   (3)   (4)

Answer (2)
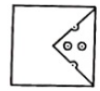
97. Question Figure   Answer Figure
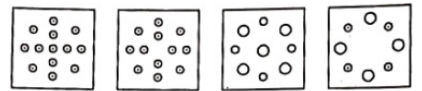
(1)   (2)   (3)   (4)

Answer (2)

Q. 98 to 100: Direction Observe the following pyramid and choose the correct alternative to answer the questions.

```
                    1
                  2   3
                6   5   4
              7   8   9   10
           15  14  13  12  11
         16  17  18  19  20  21
       28  27  26  25  24  23  22
     29  30  31  32  33  34  35  36
   45  44  43  42  41  40  39  38  37
```
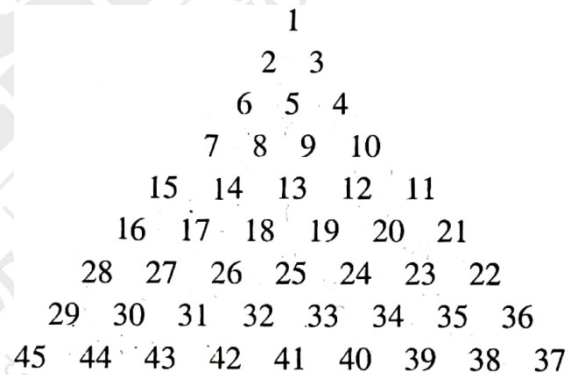
98. 1352 : 13192518 : : 59138 : ?

    (1) 25334132   (2) 25324133
    (3) 25413332   (4) 33253241

Answer (1)

Sol.
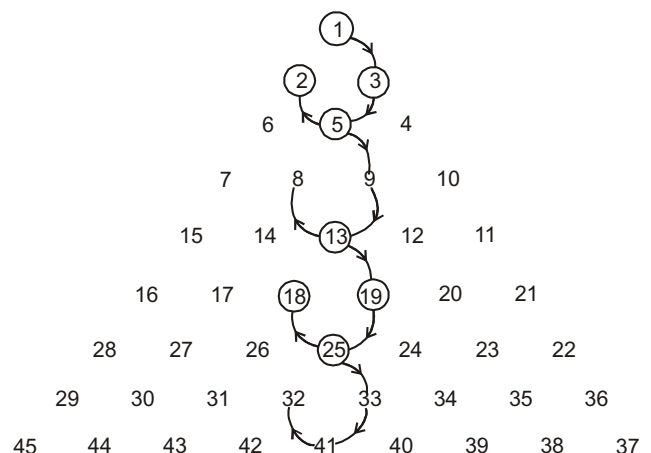
99. 163044 : 213538 : : 173143 : ?

(1) 393420

(2) 203439

(3) 183241

(4) 203440

Answer (2)

Sol.

```
                    1
               2         3
          6        5        4
      7       8       9        10
  15      14      13      12      11
 (16)    (17)   18      19     (20)    (21)
  28  27    26   25    24   23    22
 29   (30)  (31)  32   33   (34)  (35)  36
45  (44) (43)  42   41   40  (39)  (38)  37
```
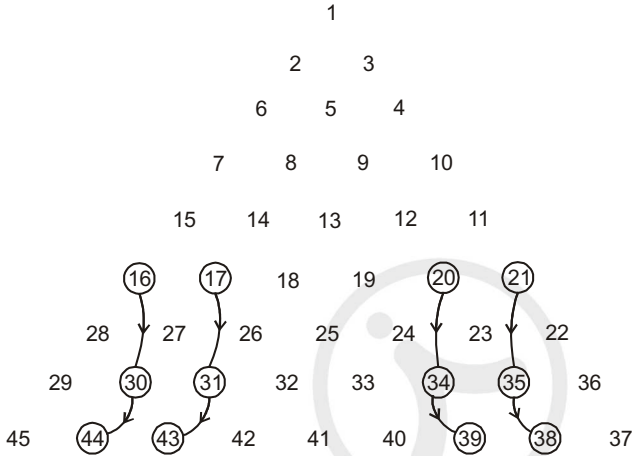
100. 281627 : 222123 : : 292830 : ?

(1) 352236

(2) 353622

(3) 362235

(4) 363522

Answer (3)

Sol.
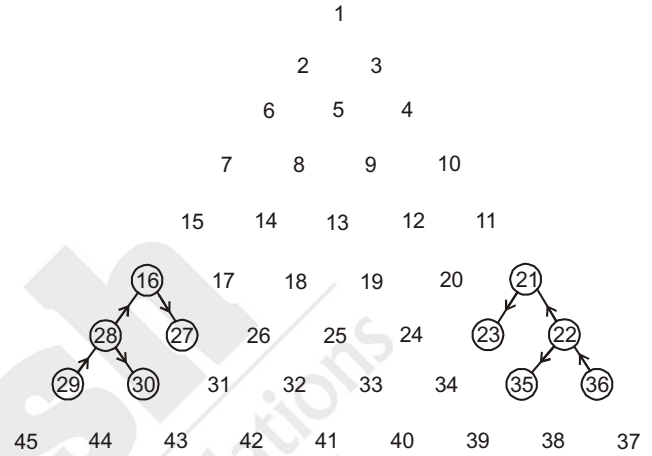
```
                    1
               2         3
          6        5        4
      7       8       9        10
  15      14      13      12      11
 (16)   17      18      19     20    (21)
 (28)  (27)   26     25    24    (23)  (22)
 (29)  (30)  31     32    33    34  (35)  (36)
45   44    43    42    41    40   39    38    37
```

PART-II : SCHOLASTIC APTITUDE TEST (SAT)

1. A Tennis ball is thrown up and reaches a certain height and comes down in 8 s. If value of acceleration due to gravity (g) = 10 m/s², then height reached by tennis ball and velocity with which it strikes the ground respectively is _____ and _____.

   (1) 640 m, 160 m/s

   (2) 320 m, 120 m/s

   (3) 160 m, 80 m/s

   (4) 80 m, 40 m/s

Answer (4)

Sol. $t_a + t_d = 8$

and $t_a = t_d$

∴ $2t_a = 8$

$t_a = 4 = t_d$

$v_2 = u_2 + g \times t_d$

$v_2 = 0 + 10 \times 4$

$= 40 \text{ ms}^{-1}$

$h = \dfrac{v_2^2 - u_2^2}{2g} = \dfrac{160 - 0}{2 \times 10} = 80 \text{ m}$

2. 200 g steam at 100ºC is introduced on 800 g ice at 0ºC. Find the final temperature of the mixture.

   (1) 20º

   (2) 30º

   (3) 40º

   (4) 50º

Answer (No option is correct)

3. For a colour blind person choose the incorrect statement from the following :

   (1) rod cells are present on retina

   (2) cone cells are present on retina

   (3) Eye sight of person is normal

   (4) Proper information about intensity of light of object is given to brain.

Answer (2)

Sol. Cone cells are responsible for color

4. A sound signal is simultaneously sent in air and water from a boat on a river. The echo of sound striked by river bed is heard in 4 s, while echo striked by aeroplane is heard in 8 s. Find the distance between aeroplane and river bed [velocity of sound in air = 350 m/s, velocity of sound in water = 1500 m/s.

   (1) 4.4 km   (2) 6.7 km

   (3) 8.8 km   (4) 13.4 km

Answer (1)

Sol. $s_{river} = v_{river}t_{river} = 1500 \times 2 = 3000$

$S_{air} = v_{air}t_{air} = 350 \times 4 = 1400$

$S_{total} = S_{river} + S_{air}$

$= 3000 + 1400 = 4400 = 4.4 \text{ km}$

5. Unit of gravitational potential energy _____

   (1) J/s   (2) Js

   (3) Nm   (4) N/m

Answer (3)

Sol. Nm

6. A ray of light is incident on the surface of transparent medium at an angle of 45º and is refracted in the medium at an angle of 30º. What will be the velocity of light in the transparent medium ?

   (1) 1.96×10^8 m/s   (2) 2.12×10^8 m/s

   (3) 2.65×10^8 m/s   (4) 1.25×10^8 m/s

Answer (2)

Sol. $\mu = \dfrac{\sin i}{\sin r} = \dfrac{c}{v}$

$\Rightarrow v = c\dfrac{\sin r}{\sin i} = 3 \times 10^8 \times \dfrac{\sin 30°}{\sin 45°}$

$= 3 \times 10^8 \times \dfrac{\frac{1}{2}}{\frac{1}{\sqrt{2}}} = 2.12 \times 10^8$ m/s

7. Match the columns, choose correct alternative from given options:

I	II	III	IV
Satellite orbits	Height above earth surface (in km)	Period of revolution (hours)	Use
A. High earth orbit	a. 180 – 2000	I. 2 – 24	(i). Meteorology
B. Medium earth orbit	b. ≥35780	II. < 1	(ii). Hubble telescope
C. Low earth orbit	c. 2000 – 35780	III. 24	(iii). GPS

(1) A-a-I-(i), B-c-II-(ii), C-b-I-(iii)

(2) A-b-III-(i), B-c-I-(iii), C-a-II-(ii)

(3) A-b-II-(ii), B-a-III-(i), C-b-III-(iii)

(4) A-c-III-(iii), B-b-II-(i), C-a-II-(i)

Answer (2)

Sol. 2

8. An electric iron uses a power of 1320 W when set to higher temperature. If set to lower temperature one third of higher temperature current is used. If iron is connected to a potential of 220 V, then power used to lower temperature is _____

(1) 220 W   (2) 440 W

(3) 660 W   (4) 880 W

Answer (4)

Sol. P = VI (power at high temperature)

1320 = 220 I (current at high temperature)

I_t = 6A

I_{LT} = 6/3 = 2A (current at low temperature)

P_{LT} = 220 × 2

= 440 (power at low temperature)

Δ Power = 1320 – 440

= 880 W

9. 250 kg of water per minute is to be drawn from a well 150 m deep. An electric pump of _____ can be used. (g = 10 m/s^2)

(1) 6 horse power

(2) 7 horse power

(3) 8 horse power

(4) 9 horse power

Answer (4)

Sol. $P = \dfrac{w}{t} = \dfrac{mgh}{t} = \dfrac{mgh}{t \times 746}$ HP = 8.35 HP

∴ P Pump = 9 HP

10. Two copper metal spheres [A & B] of same mass and surface areas at temperatures at T_A = 80ºC and T_B = 50ºC are kept separated in a heat resistant box. Due to _____ temperatures of A and B are changing and reaching a constant temperature of _____ C. Heat transfer takes place by _____, but if both spheres are in contact heat transfer is by _____.
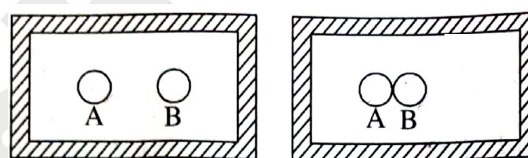
(1) Principle of heat, 70º, convection, radiation

(2) Principle of heat exchange, 68º, radiation, conduction

(3) Principle of heat exchange, 65º, radiation, conduction

(4) Principle of heat exchange, 65º, conduction, convection

Answer (3)

Sol. ms (80 – T) = ms (T – 50)

⇒ 130 = 2T

⇒ T = 65ºC by radiation per case A & conduction in B

11. An object, a convex lens of focal length 20 cm and a plane mirror are arranged as shown in figure. How far behind the mirror is the position of the final image of the object?
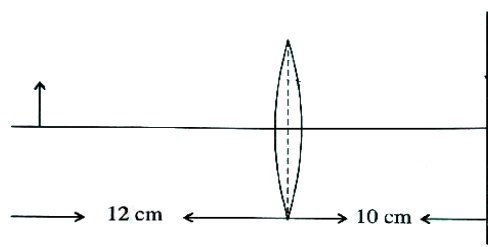
(1) 40 cm   (2) 30 cm

(3) 20 cm   (4) 10 cm

Answer (1)

Sol. $\dfrac{1}{f} = \dfrac{1}{v} - \dfrac{1}{u}$

$\dfrac{1}{v} = \dfrac{1}{f} + \dfrac{1}{u}$

$= \dfrac{1}{20} - \dfrac{1}{12}$

$= \dfrac{1}{4}\left(\dfrac{1}{5} - \dfrac{1}{3}\right)$

$= -\dfrac{1}{4}\left(\dfrac{2}{15}\right)$

v = – 30 cm

Distance of image formed by lence from mirror = 40 cm

∴ Final image from mirror behind = 40 cm

12. Choose the incorrect statement.

    (1) Alternating current is oscillatory

    (2) Electric power is transmitted over long distances using alternating current.

    (3) Frequency of alternating current in India is 50 Hz.

    (4) Alternating current can be used for electrolysis of copper chloride.

Answer (4)

Sol. Alternating current can't be used electricity.

13. Three lenses have a combined power of 2.7 D. If the powers of two lenses are 2.5 D and 1.7 D respectively, find the focal length of the third lens.

    (1) –66.66 cm   (2) –6.666 cm

    (3) –66.66 m   (4) –6.666 m

Answer (1)

Sol. $P_{net} = P_1 + P_2 + P_3$

$P_3 = P_{net} - P_1 - P_2$

$P_3 = 2.7 - 2.5 - 1.7$

$= -1.5 = \dfrac{1}{f_3}$

$\dfrac{1}{f_3} = -\dfrac{1}{1.5} = -0.666$ m

$= -66.66$ cm

14. The groups_____constitute the *p*-block.

    (1) 3 to 12   (2) 1 to 2

    (3) 13 to 18   (4) 1 to 7

Answer (3)

15. _____ metal generally occurs in free state.

    (1) Sodium   (2) Platinum

    (3) Magnesium   (4) Potassium

Answer (2)

16. In cold region during winter _____ freezes at room temperature itself and looks ice.

    (1) Palmitic acid   (2) Linoleic acid

    (3) Oleic acid   (4) Ethanoic acid

Answer (4)

17. All man made elements are placed after an element having atomic number 92 named_____.

    (1) Beryllium   (2) Cadmium

    (3) Uranium   (4) Lithium

Answer (3)

18. The molecular formula of Ethyne is_____

    (1) C_2H_5 (2) C_2H_4

    (3) C_2H_2 (4) C_2H_6

Answer (3)

19. Melting point of Tungsten metal is_____°C.

    (1) 3422   (2) 3322

    (3) 3420   (4) 3430

Answer (1)

20. Weak base is _____.

    (1) NaOH   (2) KOH

    (3) NH_4OH (4) Na_2O

Answer (3)

Sol. Fact (because it ionise partially)

21. Molecular mass of Benzene is _____.

    (1) 72   (2) 78

    (3) 79   (4) 77

Answer (2)

Sol. C_6H_6

12 × 6 + 1 × 6 = 78

22. The monomer styrene has structural formula _____.

(1) $C_6H_5 - CH = CH_2$ (2) $C_6H_5 - CH_2 = CH_2$

(3) $C_5H_6 - CH = CH_2$ (4) $C_5H_2 - CH_2 = CH_2$

Answer (1)

Sol.

$$n \begin{bmatrix} & H & H \\ & | & | \\ C_6H_5 - & C = C - H \end{bmatrix} \xrightarrow{\text{Polymerisation}} \begin{bmatrix} H & H \\ | & | \\ C - C \\ | & | \\ C_6H_5 & H \end{bmatrix}_n$$

Styrene   Poly Styrene
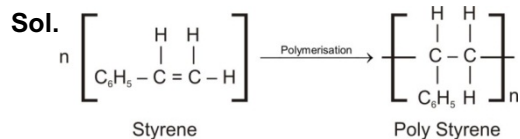
23. The percentage of carbon in Lignite is _____%.

(1) 70 to 90   (2) 60 to 80

(3) 60 to 90   (4) 60 to 70

Answer (4)

24. _____ is used in the blood test for diagnosing anaemia.

(1) Borax   (2) Baking soda

(3) Blue vitriol   (4) Bleaching powder

Answer (3)

25. Aquaregia is prepared by mixing conc. HCl and conc. HNO_3 in the ratio _____

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

(3) 1 : 4   (4) 3 : 1

Answer (4)

26. Adding zinc to blue coloured copper sulphate solution, a _____ solution of zinc sulphate is formed.

(1) Reddish

(2) Colourless

(3) Greenish

(4) Purple

Answer (2)

27. In living organisms sometimes any nucleotide of the gene changes its position that causes a minor change which is nothing but the _____.

(1) Transcription

(2) Mutation

(3) Evolution

(4) Translocation

Answer (2)

Sol. Change in nucleotide position is called mutation.

28. In mitosis in _____ step centromeres split and thereby sister chromatids of each chromosome separate and they are pulled apart in opposite directions.

(1) Prophase

(2) Metaphase

(3) Anaphase

(4) Telophase

Answer (3)

Sol. In anaphase centromeres split and sister chromatids move towards opposite direction.

29. Identify Cowper's gland from the following figure.
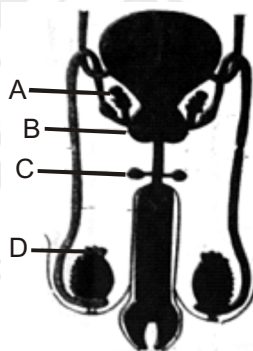
(1) A   (2) B

(3) C   (4) D

Answer (3)

Sol. In the figure –

D = Epididymis

C = Cowpers gland

B = Prostate gland

A = Seminal vesicle

30. Identify odd term related with reproduction in living organisms.

(1) Zygote formation

(2) Fragmentation

(3) Regeneration

(4) Budding

Answer (1)

Sol. Fragmentation, Regeneration and Budding are modes of asexual reproduction, so option 1 is odd.

31. Which of the following species are rare species?

    (1) Lion, tailed monkey, lesser florican

    (2) Strip tiger, geer lion

    (3) Red panda, musk deer

    (4) Shekhru squirrel

Answer (3)

Sol. Red panda & musk deer are rare species.

32. Which is the animal in phylum platyhelminthes?

    (1) Intestinal worm (Ascaris)

    (2) Planaria

    (3) Elephant's leg worm (Filaria worm)

    (4) Eye worm (Loa loa)

Answer (2)

Sol. Planaria is a platyhelminth.

33. Identify animal from phylum Mollusca which can perform three types of locomotions like swimming, creeping and walking.

    (1) Bivalve   (2) Snail

    (3) Pearl   (4) Octopus

Answer (4)

Sol. Octopus can perform swimming, creeping and walking

34. Which microbe is used in preparing beverage cider by fermenting juice in apple?

    (1) *Saccharomyces cerevisiae*

    (2) Candida

    (3) Lactobacillus brevis

    (4) Hansenula

Answer (1)

Sol. Apple juice is fermented using yeast (*Saccharomyces cerevisiae*)

35. To prepare chocolates and toffees from sugar molasses and salt which microbe is used?

    (1) *Aspergillus fereus*

    (2) *Brevibacterium*

    (3) *Aspergillus Niger*

    (4) *Lactobacillus delbrueckii*

Answer (3)

Sol. *Aspergillus Niger* is used to produce chocolate from sugar molsssea and salt.

36. In which variety of rice a gene synthesizing vitamin A (Beta Carotene) has been introduced?

    (1) Jaya   (2) Golden Rice

    (3) Ratna   (4) Indrayani

Answer (2)

Sol. Golden rice is vitamin A enriched variety of rice.

37. Which state in the country is at forefront in controlling the cyber crimes and has been proved to be a first state to start a separate cyber crime unit?

    (1) Gujarat   (2) Karnataka

    (3) Madhya Pradesh (4) Maharashtra

Answer (4)

Sol. Maharashtra is first state to start separate cycle crime unit

38. Choose the correct order of main aspects of disaster management cycle.

    (1) Impact of disaster → Response → Resurgence → Preparation → Redemption → preparedness

    (2) Preparation → Redemption → preparedness → Impact of disaster → Response → Resurgence

    (3) Resurgence → Response → Impact of disaster → preparedness → Redemption → preparation

    (4) Redemption → Response → Impact of disaster → preparation → Resurgence → preparedness

Answer (2)

Sol. Option -2 fact based

39. Abnormalities in sex chromosomes cause disorders Turner Syndrome (Turner - Monosomy) means

    (1) 44 + X   (2) 44 + XX

    (3) 44 + XY   (4) 44 + XXY

Answer (1)

Sol. 44+X is turner syndrome a female with rudimentary ovaries.

40. Identify the bacteria which spoil cooked food?

    (1) Rizobium   (2) Yeast

    (3) Clostridium   (4) Lactobacillus

Answer (3)

Sol. Clostrilium spoils food it causes food poisoning.

41. Who wrote the book, 'Discourse on Method'?

    (1) Rene Descartes   (2) Voltaire

    (3) Karl Marx   (4) Michel Foucault

Answer (1)

42. Identify the wrong pair from the pairs given below:

    (1) Kootiyattam – Sanskrit theatre, Kerala

    (2) Ramman – Religious festival and ritual theatre of the Garhwal.

    (3) Ramlila – Traditional performance of the Ramayan in Uttar Pradesh

    (4) Kalbelia – Dance form in West Bengal.

Answer (4)

43. Where we can see the Murals of Maratha style in the old wadas in Maharashtra?

    (1) Pune

    (2) Satara

    (3) Solapur

    (4) Kolhapur

Answer (2)

44. Which dance form has been shown in the picture printed below:

    (1) Kathak   (2) Kathakali

    (3) Mohiniattam   (4) Lavni

Answer (4)

45. Identify the name of the gentleman, who started The First English Newspaper of India.

    (1) Balshashtri Jambhekar

    (2) Bhau Mahajan

    (3) James Augustus Hickey

    (4) Sir John Marshal.

Answer (3)

46. Colour Television was introduced on _____ in India.

    (1) 23 July, 1927   (2) 15 September, 1959

    (3) 1 May, 1972   (4) 15 August, 1982

Answer (4)

47. Who has written the play 'Ekach Pyala' ?

    (1) Ram Ganesh Gadkari

    (2) Aacharya Aatre

    (3) Vasant Kanetkar

    (4) Vijay Tendulkar.

Answer (1)

48. Identify the movie which received an international acclaim?

    (1) Bal Shivaji

    (2) Sant Tukaram

    (3) Raja Harishchandra

    (4) Savitri Satyawan

Answer (2)

49. In which year, Indian Hockey Team won a gold medal in Olympics ?

    (1) 1928   (2) 1932

    (3) 1936   (4) 1956

Answer (3)

50. Who was the first women author known for feminist writing ?

    (1) Pandita Ramabai (2) Meera Kosambi

    (3) Sharmila Rege   (4) Tarabai Shinde

Answer (4)

51. The Louvre museum in Paris was established in the _____ century C.E.

    (1) 16th (2) 17th

    (3) 18th (4) 19th

Answer (3)

52. On _____ the mobile phone services started in India.

    (1) 22 August, 1993   (2) 22 August, 1994

    (3) 22 August, 1995   (4) 22 August, 1996

Answer (2)

53. Find out the option of correct alternatives.

'A' Group	'B' Group
A. Indian museum	I) Delhi
B. National Museum	II) Kolkata
C. Shivaji Maharaj Vastu Sangrahalaya	III) Hyderabad
D. Salarjang Museum	IV) Mumbai.

(1) A-II, B-I, C-IV, D-III

(2) A-IV, B-III, C-II, D-I

(3) A-I, B-II, C-III, D-IV

(4) A-III, B-IV, C-I, D-II

Answer (1)

54. Identify the place which is famous for caves, has been shown in the picture.

(1) Gharapuri   (2) Verul

(3) Ajanta   (4) Karla

Answer (1)

55. Where did the Government of India establish 'The Film and Television Institute' of India in 1960?

(1) Delhi   (2) Mumbai

(3) Chennai   (4) Pune

Answer (4)

56. In the year 1983, the Indian Cricket team won the World Cup under the captainship of _____ .

(1) Sunil Gavaskar   (2) Kapil Dev

(3) Sachin Tendulkar   (4) Sourav Ganguli

Answer (2)

57. Constituencies are created by _____ committee of the Election Commission.

(1) Timetable   (2) Voting

(3) Delimitation   (4) Selection

Answer (3)

58. Which organization was established in 1920 to resolve the issue of workers ?

(1) All India Trade Union Congress

(2) Indian Institute of Technology

(3) Centre for Development Union

(4) National Mill Labour Organization

Answer (1)

59. Which country is not included in the five permanent members of the security council of the United Nations ?

(1) England   (2) France

(3) China   (4) India

Answer (4)

60. After which Lok Sabha Elections, the system of one party emerging as dominant party came to an end? Since then different parties began to come together to form coalition governments.

(1) 1977   (2) 1989

(3) 1995   (4) 2001

Answer (1)

61. Features of good governance are given below. Identify the wrong option out of it.

(1) Transparency in working of the government

(2) Responsive government.

(3) Just and all inclusive development.

(4) Unaccountable government.

Answer (4)

62. Which is the main demand of the tribal movement?

(1) Accept the rights of tribes over forests.

(2) Movements against the revenue collection.

(3) Tenancy laws.

(4) Decentralization of power.

Answer (1)

63. Choose the option, which is not only a political form of democracy?

(1) Elections

(2) Voting

(3) Governmental structure

(4) Protection of Human values.

Answer (4)

64. Which country is not involved in the central powers of the First World War?

    (1) Germany   (2) Ottoman Empire

    (3) Bulgaria   (4) Italy

Answer (4)

65. Identify the bird from the Brazil which is huge in size and fly high in the sky?

    (1) Condor   (2) Macaws

    (3) Piranhas   (4) Puma

Answer (1)

66. Identify the correct option from the pairs given below:

	Agents		Landforms
A.	River	I.	Hanging Valley
B.	Wind	II.	Stalactite
C.	Glaciers	III.	Sand dune
D.	Ground water	IV.	Canyon

    (1) A-I, B-II, C-III, D-IV

    (2) A-II, B-I, C-IV, D-III

    (3) A-IV, B-III, C-I, D-II

    (4) A-III, B-IV, C-II, D-I

Answer (3)

67. Which place in western Rajasthan is driest part of India?

    (1) Mounsinram   (2) Cherapunji

    (3) Jodhpur   (4) Jaisalmer

Answer (4)

68. Settlements become sparse as we move in the central part of Brazil because:

    (1) This area has favourable climate and an ideal for human settlements.

    (2) Area is covered by thick dense equatorial rainforests.

    (3) Area has good transportation system.

    (4) Fertile soil (rich soil) has been found in this area.

Answer (2)

69. Which of the following is not the tributary of Sindhu river?

    (1) Chenab   (2) Satluj

    (3) Betva   (4) Ravi

Answer (3)

70. Observe the outline map of Brazil and identify the forest type shown by shaded part.

    (1) Swampy lands

    (2) Thorny shrubs

    (3) Equatorial forests

    (4) Hot Deciduous forests

Answer (2)

71. Identify the tributary of river Sindhu which originates near Mansarovar and flows west-ward:

    (1) Jehlum   (2) Ravi

    (3) Chenab   (4) Satluj

Answer (4)

72. Identify the correct option which shows percentage of urban population.

Group A [Percentage of Urban Population]	Group B [State/Union Territory]
1. 21-40	A. Tripura
2. 41-60	B. Delhi
3. 61-80	C. Maharashtra
4. 81-100	D. Goa

    (1) 1-A, 2-C, 3-D, 4-B   (2) 1-D, 2-B, 3-A, 4-C

    (3) 1-C, 2-A, 3-B, 4-D   (4) 1-B, 2-D, 3-C, 4-A

Answer (1)

73. The official Brazilian time is _____ behind GMT.

    (1) 5 hours 30 minutes

    (2) 3 hours 50 minutes

    (3) 3 hours

    (4) 4 hours

Answer (3)

74. Which of the following option indicates sparse density of population distribution?

    (1) Mountainous hilly regions – dry desert – dense forests

    (2) Hilly region – dense forests – industries

    (3) Dry desert – plain lands – fertile lands

    (4) Availability of water – mountainous regions – plain lands

Answer (1)

75. Identify the correct statement:

    (1) India has lower national income as compared to Brazil.

    (2) Brazil has higher national income as compared to India.

    (3) The per capita income of Brazil is lower than India.

    (4) The per capita income of India is lower than Brazil.

Answer (4)

76. Which one is not the Fold Mountain?

    (1) The Himalayas

    (2) The Black Forest

    (3) The Rockies

    (4) The Aravalis

Answer (2)

77. _____ longitude is the Indian Standard Time (IST).

    (1) 80° 30′ East longitude

    (2) 82° 30′ West longitude

    (3) 82° 30′ East longitude

    (4) 82.5′ East longitude

Answer (4)

78. Identify the state of the Brazil which does not has coastline,

    (1) Rio de Janeiro

    (2) Sao Paulo

    (3) Goias

    (4) Bahia

Answer (3)

79. Identify the correct option which shows right order of neighbouring countries lies from south to north direction.

    A. Argentina

    B. Peru

    C. Uruguay

    D. Bolivia

    (1) C, A, D, B   (2) B, A, D, C

    (3) D, C, B, A   (4) A, B, D, C

Answer (1)

80. Which one of the following is not used to measure salinity of the sea water?

    (1) Hydrometer

    (2) Barometer

    (3) Refractometer

    (4) Salinometer

Answer (2)

81. What is the sum of all natural numbers from 1 to 1000 that are divisible by 7?

    (1) 61061   (2) 71271

    (3) 71071   (4) 73371

Answer (3)

Sol. 7, 14, ……, 994

$994 = 7 + 7(n - 1)$

$\dfrac{987}{7} = n - 1$

$142 = n$

$S = \dfrac{142}{2}[7 + 994] = 71[101] = 71071$

82. 160 shares of face value Rs. 100 were purchased when the market value was Rs. 120. Company had declared 20% dividend. Find the rate of return on the investment.

    (1) 16.67%   (2) 15.67%

    (3) 14.67%   (4) 13.67%

Answer (1)

Sol. Dividend $= \dfrac{20}{100} \times 100 \times 160 = 3200$

Ratio of return $= \dfrac{3200}{120 \times 160} \times 100 = 16.67\%$

83. $\dfrac{x^3 + 7x^2 - x - 7}{x^2 + 6x - 7} = ?$

(1) $\dfrac{(x-1)}{(x+1)}$ (2) $\dfrac{(x+1)}{(x+7)}$

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

Answer (4)

Sol. $\dfrac{x^3 + 7x^2 - x - 7}{x^2 + 6x - 7} = \dfrac{(x+1)(x^2 + 6x - 7)}{x^2 + 6x - 7} = (x+1)$

84. A boat takes 3 hours to travel 30 km downstream and takes 5 hours to return to the same spot upstream. Find the speed of the boat in still water. (km/hr)

(1) 10 km/hr (2) 8 km/hr

(3) 6 km/hr (4) 5 km/hr

Answer (2)

Sol. Let speed of boat be x km/hr in still water

Let speed of stream be y km/hr

$\Rightarrow \dfrac{30}{x+y} = 3 \qquad \Rightarrow x + y = 10 \qquad \ldots(1)$

$\dfrac{30}{x-y} = 5 \qquad \Rightarrow x - y = 6 \qquad \ldots(2)$

From solving (1) and (2) so x = 8 km/hr

85. Find the difference between the sum of all even numbers from 1 to 1000 and the sum of all odd numbers from 1 to 1000.

(1) 0 (2) 250

(3) 500 (4) 1000

Answer (3)

Sol. $(2 + 4 + \ldots + 1000) - (1 + 3 + \ldots + 999)$

$= (2 - 1) + (4 - 3) + \ldots (1000 - 999)$

$= 1 + 1 + \ldots + 1 = 500$

86. From a frequency distribution table if N = 100, h = 10 c.f. = 38 f = 18 L = 50, then find the median for the distribution. Choose the correct alternative.

(1) 56.67 (2) 55.76

(3) 56.76 (4) 55.87

Answer (1)

Sol. Median $= l + \left(\dfrac{\dfrac{N}{2} - c.f.}{f} \right) \times h$

$= 50 + \dfrac{\left(\dfrac{100}{2} - 38 \right)}{18} \times 10$

$50 + \dfrac{(50 - 38)}{18} \times 10 = 50 + \dfrac{12}{18} \times 10 = 56.67$

87. If the geometric mean of (21 − x) and (35 − x) is (27 − x). Then find the value of x^2.

(1) 4 (2) 25

(3) 16 (4) 9

Answer (4)

Sol. Geometric mean

$(27 - x)^2 = (21 - x)(35 - x)$

$(27)^2 + x^2 - 54x = 735 + x^2 - 21x - 35x$
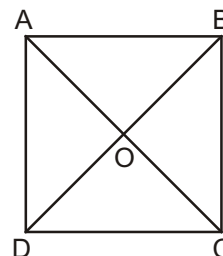
$56x - 54x = 735 - (27)^2$

$2x = 6$

$x = 3$

$x^2 = 9$

88. The difference between the diagonals of a rhombus is 4 cm and the area of the rhombus is 96 cm². Then find the difference between the length of the smaller diagonal and the length of the side of the rhombus.

(1) 2 cm (2) 3 cm

(3) 4 cm (4) 6 cm

Answer (1)

Sol. $AC - BD = 4$

$2AO - 2BO = 4$

$AO - BO = 2$

$\frac{1}{2} \times AC \times BD = 96$

$2AO \times BO = 192$

$AO \times BO = 48$

$(BO + 2)BO = 48$

$BO^2 + 2BO - 48 = 0$

$BO^2 + 6BO - 4BO - 48 = 0$

$(BO + 6)(BO - 4) = 0$

$BO = 4$, $AO = 6$

$AC = 12$, $BD = 8$

Now

$Side^2 = 4^2 + 6^2$

$Side^2 = 36 + 64$

$Side = \sqrt{100}$

$Side = 10$

Difference = $10 - 8 = 2$ cm

89. A shopkeeper sold a bicycle to a customer for Rs. 10304 including GST. The rate of GST was 12%. Find SGST payable to him.

(1) Rs. 1104   (2) Rs. 552

(3) Rs. 1210   (4) Rs. 605

Answer (2)

Sol. Let $x \rightarrow S.P$

$x + \frac{12}{100} \times x = 10304$

$\frac{112}{100}x = 10304$

$x = 9200$

GST = $10304 - 9200$

GST = 1104

SGST = 552

90. If $D = \begin{vmatrix} 3\sqrt{5} & 6 \\ 5 & m \end{vmatrix} = 0$

Find the value of m.

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

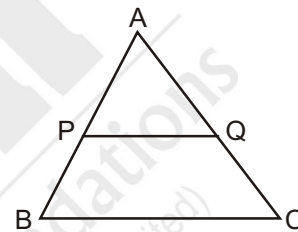(3) $\sqrt{3}$ (4) $2\sqrt{5}$

Answer (4)

Sol. $D = \begin{vmatrix} 3\sqrt{5} & 6 \\ 5 & m \end{vmatrix} = 0$

$\Rightarrow$ $3\sqrt{5}\, m - 30 = 0$

$3\sqrt{5}\, m = 30$

$m = \frac{30}{3\sqrt{5}} = \frac{10 \times \sqrt{5}}{\sqrt{5} \times \sqrt{5}} = 2\sqrt{5}$

91. In triangle ABC Seg PQ || side BC, Seg PQ divides $\triangle$ABC in two parts which are equal in areas. Which of the following alternatives indicate the ratio $\frac{BP}{AB}$?

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

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

Answer (1)

Sol. $\triangle$APQ ~ $\triangle$ABC by (AA) test

$\frac{ar(APQ)}{ar(ABC)} = \frac{AP^2}{AB^2}$

$\Rightarrow \quad \frac{ar(APQ)}{ar(APQ) + ar(BPQC)} = \frac{AP^2}{AB^2}$

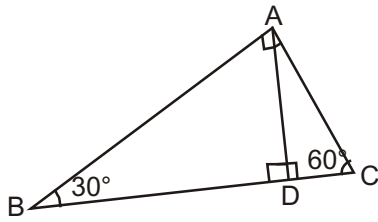$\left(\because \ \frac{ar}{APQ} = \frac{ar}{BPQ} \right)$

$\Rightarrow \quad \frac{1}{2} = \frac{AP^2}{AB^2}$

$\Rightarrow \quad \frac{1}{\sqrt{2}} = \frac{AP}{AB}$

$\Rightarrow \quad 1 - \frac{AP}{AB} = 1 - \frac{1}{\sqrt{2}}$
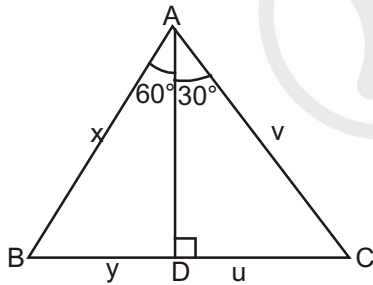
$\Rightarrow \quad \frac{BP}{AB} = \frac{\sqrt{2} - 1}{\sqrt{2}}$

92. Two triangles of the angles 30°–60°–90° are joined together as shown in the figure and ΔBAC is formed. Which of the following is the ratio of perimeter of ΔABD to the perimeter of ΔACD?

(1) $2:\sqrt{3}$ (2) $\sqrt{3}:1$

(3) $3:\sqrt{3}$ (4) $\sqrt{3}:2$

Answer (2)

Sol. $\dfrac{Per(ABD)}{Per(ACD)} = \dfrac{x+y+z}{y+v+z}$

In ΔABD,

$\sin 30° = \dfrac{-2}{n}$

$x = 2z$ ...(2)

$\tan 30° = \dfrac{z}{y}$

$y = \sqrt{3}z$ ...(4)

In ΔADC

$\sin 30° = \dfrac{u}{v}$

$v = 24$ ...(3)

$\tan 60° = \dfrac{z}{u}$

$u = \dfrac{z}{\sqrt{3}}$ ...(5)
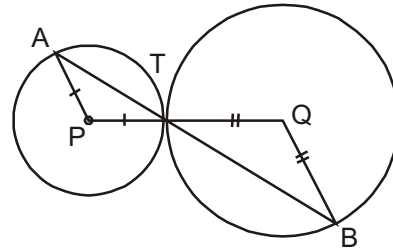
Using (1), (2), (3), (4), (5)

$\dfrac{Per(ABD)}{Per(ACD)} = \dfrac{2z + \sqrt{3}z + z}{\dfrac{z}{\sqrt{3}} + \dfrac{2 \times z}{\sqrt{3}} + z} = \dfrac{\sqrt{3}}{1}$

93. The circles with centres P and Q have different radius. They touch each other at T. A line passing through T meets the circle at A and B respectively. Which of the following statement is true?

(1) Seg PA ≅ Seg QB

(2) Seg Pa || Seg QB

(3) Seg PA and Seg QB are perpendicular

(4) Seg PA and Seg QB will intersect each other

Answer (2)

Sol.

ΔPAT ~ ΔBQT by (AA)

⇒ ∠PAT = ∠QBT (Alternate angle)

⇒ AP || BQ

94. Which of the following points are not on the X-axis? P(0, 3), Q(1, 0), R(0, –1), S(–5, 0) and T(1, 2).

(1) Only P and R   (2) Only Q and S

(3) Only P, R and T   (4) Only Q, S and T

Answer (3)

Sol. By drawing the co-ordinates in cartesian plane.

95. A pole of height 6 m casts shadow of $2\sqrt{3}$ m on the ground. Find the angle of elevation of the sun.

(1) 90°   (2) 45°

(3) 30°   (4) 60°

Answer (4)

Sol. $\tan\theta = \dfrac{6}{2\sqrt{3}} = \sqrt{3}$ ⇒   θ = 60°

96. Which of the following are the co-ordinates of the centre of the circle that passes through P(6, –6), Q(3, –7) and R(3, 3)?

(1) (3, –2)   (2) (2, –3)

(3) (0, 0)   (4) (2, –2)

Answer (1)

Sol. Let centre be A(x, y)

AP² = AQ² (Radii of same circle)

(x – 6)² + (y + 6)² = (x – 3)² + (y + 7)²

⇒   3x + y = 7   ...(1)

Similarly AQ² = AP²

⇒   (x – 3)² + (y + 7)² = (x – 3)² + (y – 3)²

⇒   y = –2   ...(2)

From (1) and (2)

x = 3

97. The height of a cone is 9 cm and the radius of the base is 7 cm. The cone is melted and a cuboid is formed. The length of the base of the cuboid is 11 cm and breadth is 6 cm. Find the height of the cuboid.
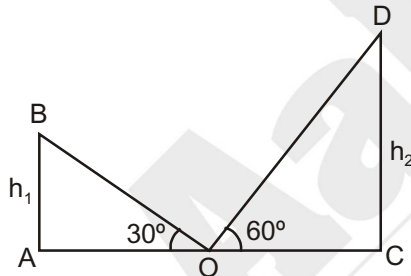
(1) 11 cm

(2) 9 cm

(3) 7 cm

(4) 5 cm

Answer (3)

Sol. Volume of cone = Volume of cuboid

$$\frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 9 = 11 \times 6 \times h$$

$$\Rightarrow \quad h = 7 \text{ cm}$$

98. AB and CD are two poles of height h_1 and h_2 respectively. Point 'Q' is the centre of segment AC. When the observer looks at the top of the poles from point 'Q' the angle of elevation formed is 30° and 60° respectively. Find the ratio of h_1 and h_2

(1) 1 : 2

(2) 2 : 3

(3) $1 : \sqrt{3}$

(4) 1 : 3

Answer (4)

Sol. $\tan 30 = \dfrac{h_1}{AO}$, $\tan 60° = \dfrac{h_2}{OC}$

$$\frac{1}{\sqrt{3}} = \frac{h_1}{AO} \qquad \text{...(1)} \qquad \sqrt{3} = \frac{h_2}{OC}$$

Dividing (1) and (2)

$$\frac{1}{3} = \frac{h_1}{h_2} \qquad (\because OA = OC)$$

99. The diameter of a metallic sphere is 6 cm. It was melted to make a wire of diameter 4 mm. Find the length of the wire.
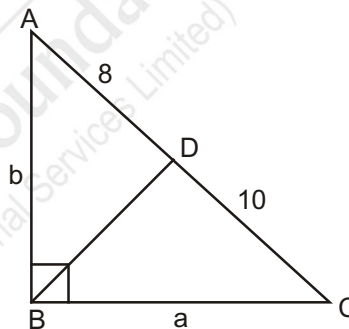
(1) 90 mm

(2) 90 cm

(3) 9 cm

(4) 9 m

Answer (4)

Sol. Volume of cylindrical wire = Volume of metallic sphere

$$\pi \times 2 \times 2 \times h = \frac{4}{3} \times \pi \times 30 \times 30 \times 30$$

$$\Rightarrow \quad h = 9 \text{ m}$$

100. In right angled $\triangle ABC$ $\angle B = 90°$ BD $\perp$ AC, AB = b, BD = c, BC = a, AD = 8 DC = 10. Then find 'b'.

(1) $4\sqrt{5}$

(2) 12

(3) $6\sqrt{5}$

(4) $\sqrt{18}$

Answer (2)

Sol. $\triangle ABD \sim \triangle ACB$ (by AA test)

$$\frac{AB}{AC} = \frac{AD}{AB}$$

$$\Rightarrow \quad \frac{b}{18} = \frac{8}{b}$$

$$\Rightarrow \quad b = 12 \text{ cm.}$$

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