Date : 03/11/2019 CHANDIGARH

Aakash
Medical | IIT-JEE | Foundations
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Answers & Solutions

for

NTSE (Stage-I) 2019-20

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 : 1 - 100 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. 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.
6. Separate sheet has been provided for rough work in this test booklet.
7. Please handover the OMR Sheet to the invigilator before leaving the Examination Hall.
8. Darken completely the ovals of your answer on OMR Sheet in the time limit allotted for that particular paper.
9. Your OMR Sheet will be evaluated through electronic scanning process. Incomplete and incorrect entries may render your OMR Sheet invalid.
10. Use of electronic gadgets, calculator, mobile etc, is strictly prohibited.

PART-I : MENTAL ABILITY TEST (MAT)

Direction (Q1 to Q5) **:** There is number series following a pattern, one blank is left, to fill the blank find the number/word from given alternatives.

1. 3, 7, 16, 35, 74_____

(1) 150 (2) 153

(3) 161 (4) 163

Answer (2)

Sol. 3, 7, 16, 35, 74, 153 (×2+1, ×2+2, ×2+3, ×2+4, ×2+5)

2. 38, 49, 62, 70, 77_____

(1) 82 (2) 81

(3) 97 (4) 91

Answer (4)

Sol. 38, 49, 62, 70, 77, 91 (4+9, 3+8, 7+0, 6+2, 7+7)

3. 3, 4, 13, 4, 5, 21, 5, 6, 31, 7, 6_____

(1) 55 (2) 42

(3) 57 (4) 45

Answer (1)

Sol. 3, 4, 13, 4, 5, 21, 5, 6, 31, 7, 6, 55

$3^2 + 4 = 13$

$4^2 + 5 = 21$

$5^2 + 6 = 31$

$7^2 + 6 = 55$

4. 1, 8, 9, 64, 25, 216, 49, _____

(1) 343 (2) 512

(3) 1001 (4) 81

Answer (2)

Sol. 1, 8, 9, 69, 25, 216, 49, 512

1^3 2^3 3^2 4^3 5^2 6^3 7^2 8^3

5. AY,CW,EU,GS, _____

(1) JO (2) LN

(3) IQ (4) DV

Answer (3)

Sol. AY, CW, EU, GS, IQ (−2, −2, −2, −2; +2, +2, +2, +2)

Direction (6 to 10) **:** Three terms are alike in certain way and one is different, find that odd/wrong/different term.

6. 2, 12, 36, 80, 152, 252

(1) 252 (2) 152

(3) 12 (4) 40

Answer (2)

Sol. 2, 12, 36, 80, 152, 252

Wrong term

$1^3 + 1^2 = 2$

$2^3 + 2^2 = 12$

$3^3 + 3^2 = 36$

$4^3 + 4^2 = 80$

$5^3 + 5^2 = 150$

$6^3 + 6^2 = 252$

7. 2, 3, 8, 27, 110, 565

(1) 110 (2) 8

(3) 27 (4) 565

Answer (1)

Sol. 2, 3, 8, 27, 110, 565 (×1+1, ×3+3, ×2+2, ×4+4, 112, ×5+5; wrong term)

8. 12, 14, 18, 26, 38, 60, 74

(1) 26 (2) 74

(3) 18 (4) 60

Answer (4)

Sol. 12, 14, 18, 26, 38, 62, 60, 74 (+1×4, +1×2, +2×6, +1×8, ×3×8; wrong term)

9. (1) AEDCB (2) KONML

(3) QSTUR (4) HLKJI

Answer (3)

Sol. By observation 3 option is correct.

10. (1) ANRYAAH (2) DGRHAAIHCN

(3) ANHTAJASR (4) BNJUAP

Answer ()

Sol. Except 4 option, all other options have 3 vowels, so, correct option is 4 option

Direction-In questions (Q11 to Q15) **:** analyze the series and fill the gap

11. a__ba__bb___ ___bb___a___
    (1) aabbaa (2) abbbab
    (3) baaaab (4) baaaba

Answer (3)

Sol. a b ba/ a bb a/a bb a/a b

12. ___aab___caa___bbc___a___b___ca
    (1) abaaba (2) abaaab
    (3) cbacaa (4) abcbaa

Answer (2)

Sol. a aa b b c aaa bb c aaa bbca

13. _____bc__ ___bb__aab___
    (1) ababc (2) acacc
    (3) aaccb (4) babcc

Answer (2)

Sol. a b c / c a b / b c a / a b c

14. 23__4__1__53___ ___3___41
    (1) 514322 (2) 513242
    (3) 254312 (4) 514225

Answer (4)

Sol. 2 3 5 4 1 / 1 4 5 3 2 / 2 3 5 4 1

15. 10__2__02__ __022
    (1) 2122 (2) 2121
    (3) 2101 (4) 1022

Answer (2)

Sol. 10 2 2 / 1 0 2 2 / 1 0 2 2

Direction (Q16 to Q20) **:** Two terms before sign : : have some relationship between them. Analyzing relationship develop same kind of relationship among the terms after sign : : and answer among alternatives

16. 321 : 12 : : 524 : ?
    (1) 29 (2) 33
    (3) 35 (4) 31

Answer (4)

Sol. 321 : 12 : : 524 : ?

$3^2 + 2+1 = 12$

$5^2 + 2 +4 = 31$

17. 23 : 127 : : 47 : ?
    (1) 423 (2) 525
    (3) 345 (4) 341

Answer (3)

Sol. $5^2 - 2 = 23$, $5^3 + 2 = 127$

$7^2 - 2 = 47$, $7^3 + 2 = 345$

18. 24 : 816 : : 35 : ?
    (1) 2527 (2) 2725
    (3) 2716 (4) 618

Answer (2)

Sol. 24 : 816 : : 35

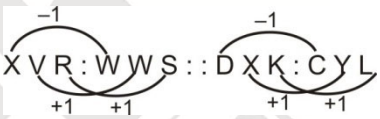
$2^3 4^2 = 816$

$3^3 5^2 = 2725$

19. XVR : WWS : : DXK : ?
    (1) LCY (2) CYL
    (3) YCL (4) RLY

Answer (2)

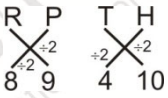
Sol.



20. RP : 89 : : TH : ?
    (1) 104 (2) 420
    (3) 410 (4) 424

Answer (3)

Sol. RP : 89 : : TH : 410



Direction (Q21 to Q24) **:** Find the missing character.

21.

23	24	48
32	33	54
34	17	?

    (1) 58 (2) 63
    (3) 93 (4) 84

Answer (4)

Sol.

23	24	48	→ 2×3×2×4 = 48
32	33	54	→ 3×2×3×3 = 54
34	17	?	→ 3×4×1×7 = 84

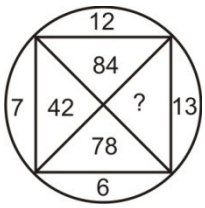
22.

37	61	71
47	53	41
59	?	43

    (1) 29 (2) 67
    (3) 84 (4) 62

Answer (2)

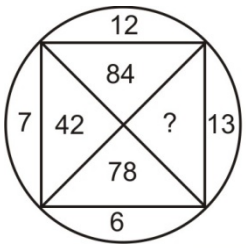
Sol. By observation 2 option.

23. 

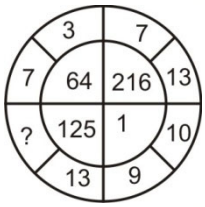
(1) 26 (2) 156

(3) 39 (4) 70

Answer (2)

Sol. 

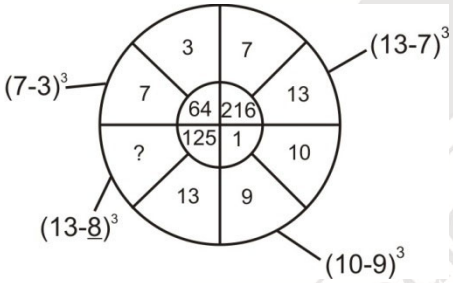
$12 \times 7 = 84$
$7 \times 6 = 42$
$13 \times 6 = 78$
$12 \times 13 = 156$

24. 

(1) 10 (2) 8

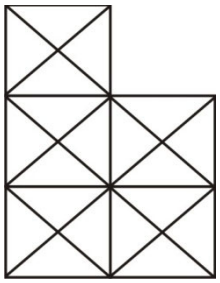
(3) 112 (4) 124

Answer (2)

Sol. 

Direction (25 to 27) **:** Answer the questions based on diagram

25. How many squares are there?



(1) 10 (2) 12

(3) 15 (4) 14

Answer (2)

Sol. By observation, 2 option

26. How many rectangles are there excluding squares

(1) 10 (2) 13

(3) 15 (4) 12

Answer (4)

Sol. By observation, 4 option

27. How many triangles are in given figure?

(1) 56 (2) 57

(3) 54 (4) 43

Answer (1)

Sol. By observation, 1 option

28. How many straight lines in given figure?

(1) 10 (2) 12

(3) 14 (4) 16

Answer (3)

Sol. By observation, 3 option

Direction **:** According to code language words in the column are given and their codes are given in column-II, Decode the language and choose the correct code for the words in questions (Q29 to Q34) among given alternatives.

Column-I	**Column-II**
LASER	lnmcq
HEAVY	nstmz
WATER	hxqkm
PLANE	menfe
SHOCK	xlyzd
MIRTH	wzkaq
STONE	xnlke

29. Code for E

(1) n (2) m

(3) q (4) s

Answer (1)

Sol. $\begin{matrix} HEAVY \rightarrow nstmz \\ STONE \rightarrow xnlke \end{matrix} \Rightarrow$ code for E is n

30. Code for A

(1) x (2) z

(3) d (4) m

Answer (4)

Sol. $\begin{matrix} LASER \rightarrow lnmcq \\ HEAVY \rightarrow nstmz \end{matrix} \Rightarrow$ Code for AE is n m

As code for E is n, therefore code for A is m

31. Code for S

(1) x (2) l

(3) c (4) a

Answer (2)

Sol. $LA\underline{S}ER \rightarrow \underline{l}nmcq$

$\underline{S}HOCK \rightarrow x\underline{l}yzd$ $\Rightarrow$ code for S is l

32. Code for L

(1) m (2) e

(3) c (4) z

Answer (3)

Sol. LASER → lnmcq

code ↓ ↓ ↓ ↓ ↓

c m l n q

$\therefore$ code for l is c

33. Code for R

(1) z (2) k

(3) l (4) q

Answer (4)

Sol. $LASE\underline{R} \rightarrow lnmc\underline{q}$

$MI\underline{R}TH \rightarrow wzka\underline{q}$ $\Rightarrow$ code of R is q

34. In a certain code language, 134 means 'Good and Tasty', 478 means 'See Good Picture', and 729 means 'Picture and faint'. Which of the following numerical symbols stands for 'See'?

(1) 4 (2) 2

(3) 7 (4) 8

Answer (4)

Sol. Code for good from 1 & 2 statement is 4

Code for picture from 2 & 3 statement is 7

$\therefore$ Code for see is 8.

Direction (Q35 to Q37) : Study the following information carefully and answer the questions that follows:

A, B, C, D, E, F and G are seven kids playing in the garden. They are wearing clothes of colours-black, blue, white, green, pink, yellow and brown. Out of seven, three are girls. No girl is wearing either black, yellow or brown. D's sister F is wearing pink while he is wearing brown. A is wearing blue, while his sister B is not wearing green. E is wearing yellow, while his best friend G is a boy.

35. What colour is B wearing?

(1) Green (2) Pink

(3) Brown (4) None of these

Answer (4)

Sol. Boy = +

Girl = –

$A^{+}_{blue} - B^{-}_{white}$, $D^{+}_{brown} - F^{-}_{pink}$, E^{+}_{yellow}, G^{+}_{black}, C^{-}_{green}

36. What colour is G wearing?

(1) Black (2) Blue

(3) White (4) Green

Answer (1)

37. What colour is C wearing?

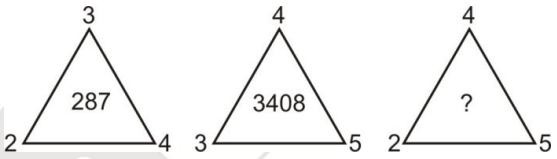
(1) Black (2) Green

(3) White (4) None of these

Answer (2)

Direction **:** Find the missing character in questions (Q38 to Q39) such that it follows some rule.

38.

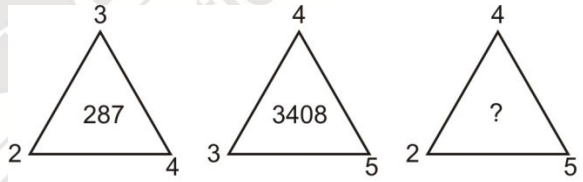


(1) 3385 (2) 3395

(3) 3412 (4) 297

Answer (1)

Sol.

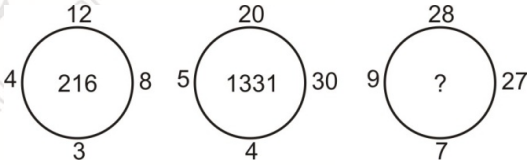


$2^2 + 3^3 + 4^4 = 287$

$3^3 + 4^4 + 5^5 = 3408$

$4^4 + 2^2 + 5^5$
$= 256 + 4 + 3125$
$= 3385$

39.

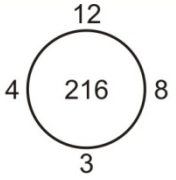


(1) 125 (2) 512

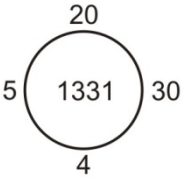
(3) 1728 (4) 343

Answer (4)

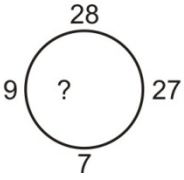
Sol.



$\left(\frac{8}{4}+\frac{12}{3}\right)^3 = (2+4)^3 = 216$



$\left(\frac{30}{5}+\frac{20}{4}\right)^3 = (6+5)^3 = 1331$



$\left(\frac{27}{9}+\frac{28}{7}\right)^3 = (3+4)^3 = 343$

40. At what time between 4 and 5 O'clock will the hands of clock coincides?

(1) $32\frac{10}{11}$ minute past 4

(2) $21\frac{9}{11}$ minute past 4

(3) $21\frac{10}{11}$ minute past 4

(4) 22.5 minute past 4

Answer (2)

Sol. Time = $40 \times 30 \times \frac{2}{11}$ min past 4

$= \frac{240}{11}$ min past 4

$= 21\frac{9}{11}$ min past 4

41. India got independence on FRIDAY, What will be the day on which Indians will celebrate the independence day in 2047?

(1) Thursday (2) Friday

(3) Sunday (4) Tuesday

Answer (1)

Sol. 15 Aug 1947 $\rightarrow$ Friday

No. of odd days from 15 August 1947 to 15 August 2047 is 6 odd days

$\therefore$ 15 August 2047 = Friday + 6 days

= Thursday

42. If 2nd day of a month is Tuesday, which will be the fifth day from 20th day of that month?

(1) Tuesday (2) Wednesday

(3) Thursday (4) Friday

Answer (3)

Sol. 2nd, 9th, 16th, 23rd $\rightarrow$ Tuesday

So, 25th is Thursday

43. If G + I = 130, then H + L will be equal to

(1) 20 (2) 144

(3) 206 (4) 208

Answer (4)

Sol. G + I = 130 = $7^2 + 9^2 = 49 + 81 = 130$

H + L = $8^2 + 12^2 = 64 + 144 = 208$

44. P and Q are married couple, R and S are sisters. Q's son is S's father. How is P related to R?

(1) Uncle (2) Mother

(3) Grandmother (4) Father

Answer (3)

Sol. Male $\rightarrow$ +

Female $\rightarrow$ –

Couple $\rightarrow$ =

$P = Q$

$|$

O^+

$|$

$R^- — S^-$

P is either grand father / mother of R.

45. Pointing to a boy, Rita said "His father is my son's only son". How is the boy related to Rita?

(1) Son (2) Daughter

(3) Grand daughter (4) Great Grand Son

Answer (4)

Sol. Rita

$|$

O^+

$|$

O^+

$|$

Boy

Boy is great grand son of Rita.

46. In a row. A is 8th from the left and B is 17th from the right. If they interchange their positions A becomes 14th from the left. How many persons are there in the row?

(1) 25 (2) 27

(3) 31 (4) 30

Answer (4)

Sol.

$\rightarrow 8$	$17 \leftarrow$
A	B
B	A
	$\rightarrow 14$

Total number of persons in a row = 14 + 17 – 1 = 30

47. Suresh left home for the bus stop 10 minutes earlier than the usual time and reached the bus stop at 9.25 a.m., he takes another 20 minutes to reach office. If Suresh usually reach office 5 minutes before office time, then at what time today he reached office?

(1) 9.00 am (2) 8.00 am

(3) 10.00 am (4) 9.30 am

Answer ()

Sol.

	Today	Usual
Reached at bus stop	9 : 25 a.m.	9 : 35 a.m.
Reached at office	9 : 45 a.m.	9 : 55 a.m.

Suresh reached at office 9:45 AM.

Hence no option is correct.

Direction Questions (Q48 to Q51) **:** Are based upon the sum of addition, each letter has unique value and for unique value there is unique letter. If E = 4,

$$\begin{array}{r} \text{LET} \\ +\ \text{THE} \\ \hline \text{LOSS} \end{array}$$

48. Value of S

(1) 4 (2) 2

(3) 5 (4) 6

Answer (2)

Sol.

$$\begin{array}{rrr} \text{L E T} & 148 & \text{So, L = 1} \\ +\ \text{THE} & +\ 874 & \text{E = 4} \\ \hline \text{LOSS} & 1022 & \text{T = 8} \end{array} \quad \begin{array}{|l} \text{H = 7} \\ \text{O = 0} \\ \text{S = 2} \end{array}$$

49. Value of H

(1) 3 (2) 6

(3) 9 (4) 7

Answer (4)

50. Value of L

(1) 4 (2) 3

(3) 1 (4) 2

Answer (3)

51. Value of T

(1) 8 (2) 9

(3) 7 (4) 2

Answer (1)

52. If NTSE = 58, NMMS = 59, then PSTSE = ?

(1) 79 (2) 62

(3) 56 (4) 48

Answer (1)

Sol. PSTSE = 16 + 19 + 20 + 19 + 5 = 79

53. If OM = 195, HARI = 1296, then RAM = ?

(1) 186 (2) 294

(3) 1392 (4) 234

Answer (4)

Sol. RAM = $18 \times 1 \times 13 = 234$

Direction-in questions (Q54 and Q55) **:** Mathematical signs have no meaning. Find clue and target answer

54. 3 × 4 × 4 = 82

9 × 3 × 4 = 93

7 × 7 × 7 = 89

5 × 8 × 7 = ?

(1) 95 (2) 69

(3) 86 (4) 87

Answer (2)

Sol. $3 \times 4 \times 4 = 82$

$(3 + 4)4 = 28 \xrightarrow{\text{reverse}} 82$

$9 \times 3 \times 4 = 93$

$(9 + 4)\ 3 = 39 \xrightarrow{\text{reverse}} 93$

$7 \times 7 \times 7 = 89$

$(7 + 7)\ 7 = 98 \xrightarrow{\text{reverse}} 89$

$5 \times 8 \times 7 = \underline{\ ?\ }$

$(5 + 7)8 = 96 \xrightarrow{\text{reverse}} 69$

55. 46 – 3 = 12

64 – 9 = 12

? – 6 = 3

(1) 62 (2) 43

(3) 28 (4) 24

Answer (3)

Sol. 46 – 3 = 12

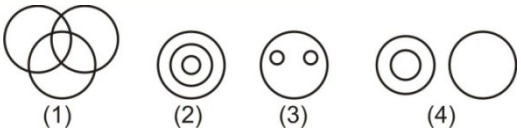
$\frac{46-1}{3} - 3 = 15 - 3 = 12$

$64 - 9 = 12 \Rightarrow \frac{64-1}{3} - 9 = 21 - 9 = 12$

$? - 6 = 3 \Rightarrow \frac{?-1}{3} - 6 = 3 \Rightarrow ? - 1 = 27$

? = 28

Directions (Q56 to Q58) : In the following questions three classes are given, out of the following four figures that follow, you are to indicate which figure will represent the relationship amongst the three classes.



56. Beverages,

Tea,

Coffees

Answer (3)

57. Triangle,

Rectangle,

Polygon

Answer (3)

58. Patiala,
Punjab,
Gujarat

Answer (4)

Direction in Question (Q59 to Q62) : Six faces of a cube are painted in a manner that no two adjacent faces have the same colour. The three colours used are red, blue and green. The cube is cut into 36 cubes in a manner that 32 cubes are of smaller same size and 4 cubes are of bigger size. Each bigger cube has no red face

59. How many cubes in all have red face?
(1) 8 (2) 16
(3) 20 (4) 32

Answer (4)

60. How many cubes have only one face coloured?
(1) 0 (2) 16
(3) 8 (4) 20

Answer (3)

61. How many cubes have three faces painted?
(1) 8 (2) 20
(3) 16 (4) 28

Answer (1)

62. How many cubes have only two faces painted?
(1) 28 (2) 20
(3) 16 (4) 8

Answer (2)

63. Rohit is facing west. He turns 45º in the anticlock wise direction and then 180º in the clockwise direction. Which direction is he facing now?
(1) North (2) North-East
(3) East (4) South-East

Answer (2)

64. Rajan moves 3 meters in north direction, then he moves 4 meters in east direction. How far is he from the starting point?
(1) 7 meters (2) 5 meters
(3) 4 meters (4) 1 meters

Answer (2)

65. 36 Vehicles are parked in a single row. After the first car there is one scooter, after the second car there are two scooters. After the third car there are three scooters. How many scooters are in the second half of the row?
(1) 17 (2) 15
(3) 12 (4) 10

Answer (2)

66. Which word cannot formed from RECOMENDABLE?
(1) COMENDOR
(2) MENDRECO
(3) ABLEDGOR
(4) MOCABLE

Answer (3)

67. Mansavi wants to go to the market. She starts from her house which is in north and comes to the crossing. The road to her left ends in a park and straight ahead is the office complex. In which direction is the market?
(1) East (2) North
(3) West (4) South

Answer (3)

Direction (Q68 to Q71) : Study the following information and answer the given questions.

In the following cases/questions in certain code language if

'+' means '÷'
'–' means '×'
'×' means '+'
'÷' means '–'

68. 8 + 2 × 5 – 3 = ?
(1) 27 (2) 15
(3) 19 (4) 47

Answer (3)

69. 9 – 2 × 27 + 3 ÷ 1 = ?
(1) –51 (2) 180
(3) 26 (4) None of these

Answer (3)

70. 16 + 2 – 3 × 7 ÷ 1 = ?
(1) –3 (2) 30
(3) 105 (4) None of these

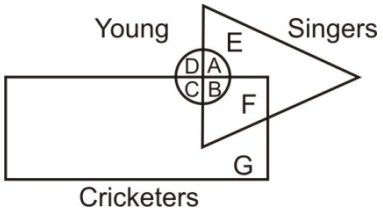
Answer (2)

71. 49 + 7 – 5 × 8 = ?
(1) 16
(2) 22
(3) 43
(4) None of these

Answer (3)

Direction (Q72 to Q75) **:** Study the following information and answer the given question.

In the following figure 'Rectangle represents Cricketers', 'Circle represents Young' and 'Triangle represents Singers'.



72. Which region represents Young Cricketers who are not singers?

(1) B (2) G

(3) C (4) F

Answer (3)

73. Which region represents Old Cricketers who are not singers?

(1) B (2) G

(3) F (4) C

Answer (2)

74. Which region represents Young people who are neither Cricketers nor Singers?

(1) A (2) D

(3) B (4) C

Answer (2)

75. Which region represents Cricketers who are Singers but not Young?

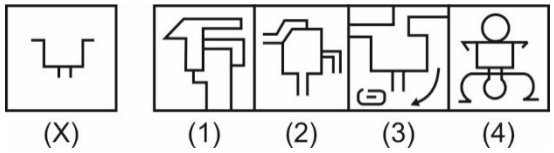
(1) E (2) A

(3) C (4) F

Answer (4)

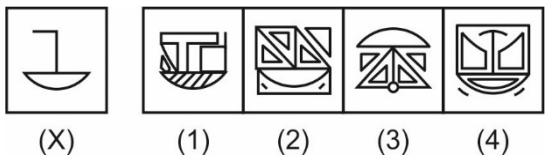
Direction – Figure(X) is embedded in which of the following four alternatives

76.



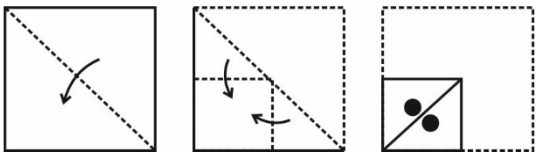
Answer (4)

77.

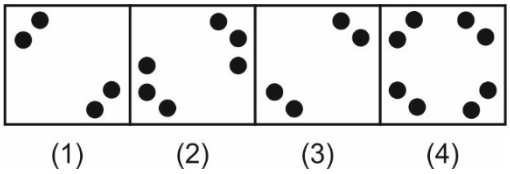


Answer (2)

78. Question Figure:



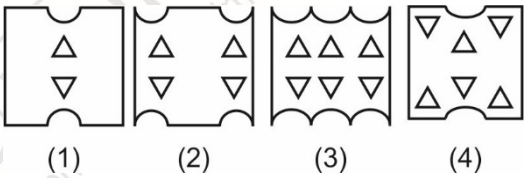
Answer Figure:



Answer (4)

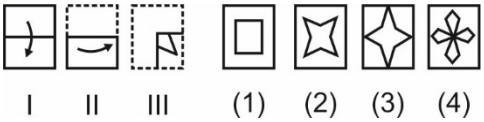
79. Question Figure:

Answer Figure:



Answer (3)

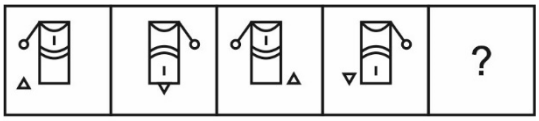
80. Direction-Three figures marked I, II,III have one fold at 1, 2nd fold at II and is cut in figure III. From among the four alternatives which will show the unfolded position of figure III.

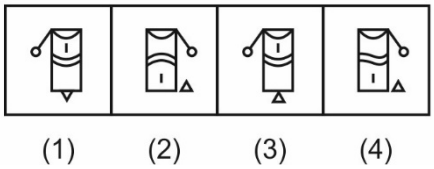


Answer (2)

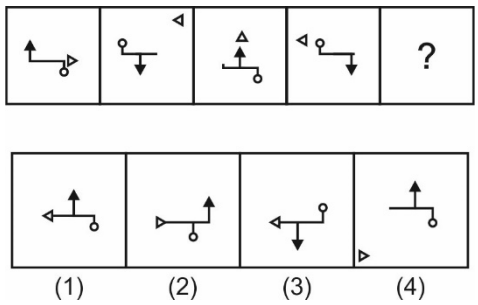
Direction (Q81 to Q82) : In questions, select the correct figure among alternatives to continue series.

81.





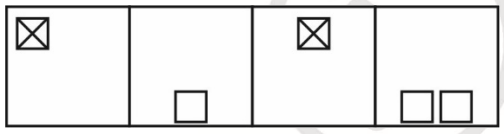
Answer (3)

82. 

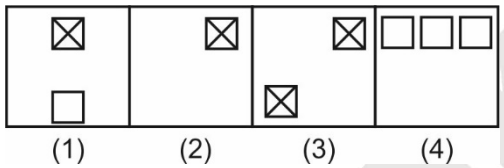
Answer (1)

Direction : In the following question, there are four question figures followed by the answer figures labelled as (1), (2), (3) and (4). The four question figures make common series. Find the correct figures from answer figures which will complete the series.

83. Question figure :

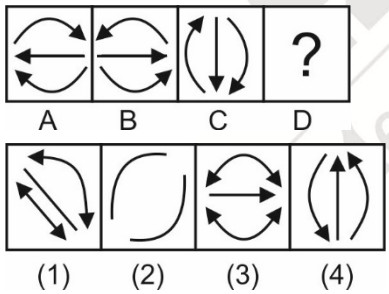


Answer Figure:

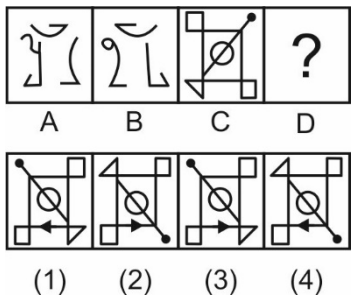


Answer (2)

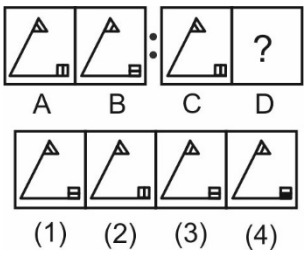
Direction : Figure A and B are related in a particular manner. Establish the relationship between C and D by choosing figure among four alternatives

84. 

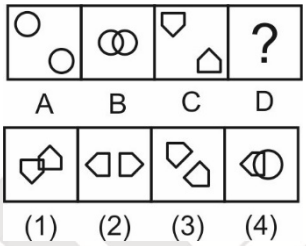
Answer (4)

85. 

Answer (1)

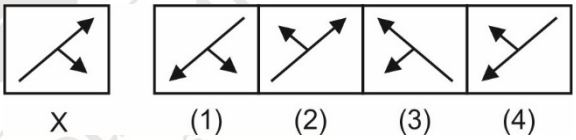
86. 

Answer (3)

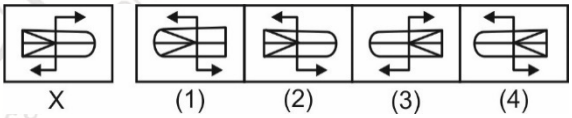
87. 

Answer (1)

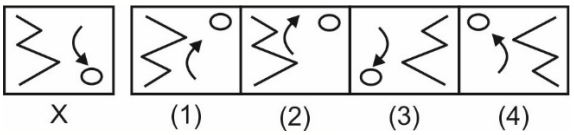
Direction : Find the mirror image of figure (X).

88. 

Answer (3)

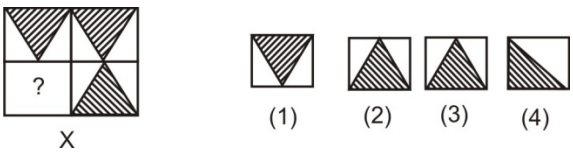
89. 

Answer (4)

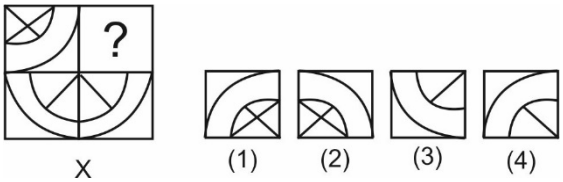
90. 

Answer (3)

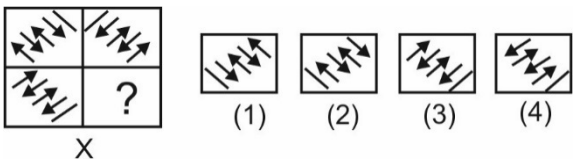
Direction : Complete the given figure (X) among alternatives.

91. 

Answer (3)

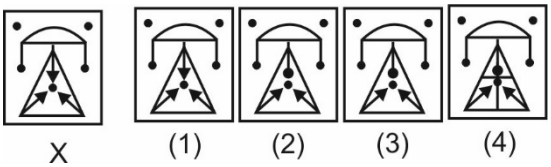
92. 

Answer ()

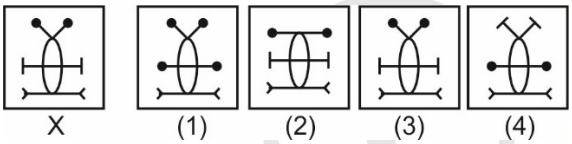
93. 

Answer (1)

Direction : Find the figure which is exactly similar to figure(X) from given alternatives

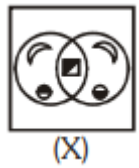
94. 

Answer (1)

95. 

Answer (3)

Direction : Find the water image of (X)

96. 

(1) 

(2) 

(3) 

(4) 

Answer (4)

97. DOLLAR

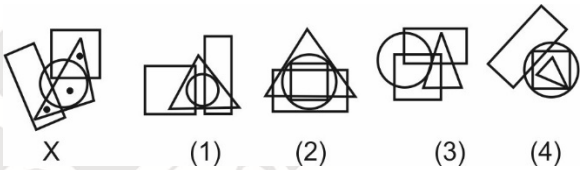
?

(1) ꓷOꓶꓶAꓤ (2) DOꓶꓶAꓤ

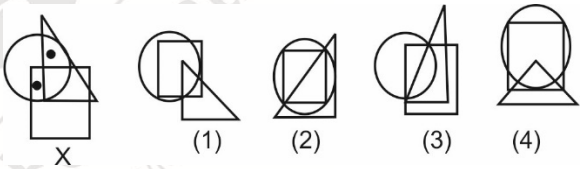
(3) ꓤAꓶꓶOꓷ (4) ꓤAꓶꓶOꓷ

Answer (2)

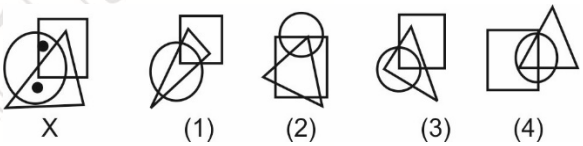
Direction : In questions, select among the alternatives which satisfy the same condition of placement of dots as in the given figure(X).

98. 

Answer (1)

99. 

Answer (2)

100. 

Answer (4)

PART-II : SCHOLASTIC APTITUDE TEST (SAT)

1. Slavery was finally abolished in French colonies in _____
   (1) 1848 (2) 1815
   (3) 1804 (4) 1884

Answer (1)

2. Put the following events in sequence
   i. Return of Lenin
   ii. October Revolution
   iii. Russian peace with Germany
   iv. February Revolution
   v. Centralised Planning
   (1) I, iii, iv, v, ii (2) iv, I, ii, iii, v
   (3) iv, ii, I, iii, v (4) ii, v, I, iii, v

Answer (2)

3. Name the minister of Propaganda under the Hitler Rule
   (1) Joseph Goebbels (2) Hindenburg
   (3) Hjalmar Schacht (4) Ernest Heimer

Answer (1)

4. Name the axis powers in second world war
   (1) Germany, Italy, Japan
   (2) Germany, Austria, Prussia
   (3) Germany, Austria, Russia
   (4) Germany, Japan, Russia

Answer (1)

5. Consider the following Indian leaders.
   i. Motilal Nehru
   ii. Dada Bhai Naoroji
   iii. Raja Ram Mohan Roy
   iv. Mahatma Gandhi

   The correct Chronological order in which they appeared on national scene is
   (1) I, ii, iii, iv (2) iv, iii, ii, i
   (3) iii, ii, i, iv (4) ii, I, iii, iv

Answer (3)

6. Who founded SATYA SHODHAK SAMAJ?
   (1) Jyotiba Phule
   (2) Raja Ram Mohan Roy
   (3) Swami Vivekanand
   (4) Swami Dayanand

Answer (1)

7. Which of the following picture was on cover page of music book of E.T. Paul
   (1) Dawn of century
   (2) Dawn of industrial age
   (3) Dawn of Agricultural age
   (4) Dawn of 21st Century

Answer (1)

8. Choose the correct statements :
   i. The Zollverein was formed in 1834
   ii. It abolished tariff barriers
   iii. It reduced the number of currencies from thirty to one
   iv. It was initiative of Prussia and joined by all German states
   (1) I, ii, iii, iv (2) ii and iii
   (3) I, ii and iv (4) ii, iii and iv

Answer (3)

9. The people gathered in Jallianwala Bagh to protest against the arrest of two leaders. They were _____
   (1) Bhagat Singh and Dr. Satyapal
   (2) Bhagat Singh and Rajguru
   (3) Dr. Saifuddin Kitchlu and Mahatma Gandh
   (4) Dr. Saifuddin Kitchlu and Dr. Satyapal

Answer (4)

10. The national assembly of France voted in April 1792 to declare war against _____.
    (1) Germany and Austria
    (2) Germany and England
    (3) Prussia and England
    (4) Prussia and Austria

Answer (4)

11. Out of 250 members of Rajya Sabha, how many members are nominated by president.
    (1) 11 (2) 10
    (3) 14 (4) 12

Answer (4)

12. Which article in Indian Constitution stipulates that there shall be vice President of India
    (1) Article 63 (2) Article 65
    (3) Article 66 (4) Article 62

Answer (1)

13. Point out the difference between the local government in India before and after the constitutional amendment in 1992.
    i. It became mandatory to hold regular elections to the local government bodies
    ii. One third positions reserved for women
    iii. Elected officials exercise supreme power in the government
    (1) Only i (2) i and ii
    (3) i, ii and iii (4) ii and iii

Answer (2)

14. When did the civil rights movement take place in USA
    (1) 1953-1958 (2) 1954-1968
    (3) 1960-1970 (4) 1946-1978

Answer (2)

15. When was Bhartiya Janta Party formed?
    (1) 10^{th} April, 1975 (2) 6^{th} April, 1970
    (3) 6^{th} April, 1980 (4) 10th April, 1985

Answer (3)

16. In the context of democracies, what is successfully done by democracies?
    (1) Eliminated conflicts among people
    (2) Eliminated economic inequalities among people
    (3) Eliminated differences of opinion about how merginalized actions are to be treated
    (4) Rejected the idea of political inequality

Answer (4)

17. Who passed "Legal Frame work Order 2002"?
    (1) Zanu
    (2) Robert Mugabe
    (3) General Musharraf
    (4) Allende

Answer (3)

18. Select the right combination of subjects under union list.
    (1) Defence, Atomic energy, Post and telegraphs, war and peace
    (2) Railway, Land, Trade, Police
    (3) Education, Agricultural land, Trade, Defence
    (4) Cyber laws, Adoption, Trade, Forests

Answer (1)

19. Which one of the following countries was the first one to grand Universal Suffrage?
    (1) Russia (2) Germany
    (3) New Zealand (4) The Netherland

Answer (3)

20. Which of the following is working capitals?
    (1) Electricity Bill (2) Tube well
    (3) Tractor (4) Machines

Answer (1)

21. Coins in India are minted by _____
    (1) Ministry of Finance, Government of India
    (2) Reserve Bank of India
    (3) State Bank of India
    (4) Central Bank of India

Answer (1)

22. What should be included in national income by expenditure method
    i. Self-produced final product
    ii. Expenditure on second hand goods
    iii. Expenditure on shares
    iv. Expenditure on intermediate goods
    (1) ii, iii, iv (2) i and ii
    (3) i only (4) iii and iv

Answer (3)

23. What is the definition of overweight?
    (1) BMI > 25 kg/m^2
    (2) BMI = 25 kg/m^2
    (3) BMI = 25-29.9 kg/m^2
    (4) BMI = 25-30 kg/m^2

Answer ()

24. Name one of the following Agency that develops standards for goods and services.
    (1) COPRA
    (2) National Consumer Forum
    (3) Consumer protection council
    (4) Bureau of Indian Standards

Answer (4)

25. National Food for Work Programme was launched in _____
    (1) 2003 (2) 2001
    (3) 2004 (4) 2005

Answer (3)

26. Which of the following countries has poor natural resources but rich human resources?
(1) India (2) Nepal
(3) Japan (4) Sri Lanka

Answer (3)

27. What is the Gross National Product?
(1) The total value of Goods and services manufactured in country
(2) The total value of all the transactions in the country
(3) Reduction in the total value of goods and services produced in the country
(4) The total worth of goods and services generated in the country and net factor income from abroad.

Answer (4)

28. Which one of the following is an incorrect fact regarding south India.
(1) Diurnal range of temperature is less
(2) Annual range of temperature is less
(3) Temperatures are high throughout the year
(4) Extreme climatic conditions are found here

Answer (4)

29. Read the two statements A and B and choose the best answer.
A. Assertion: Petrochemical Industry is a fast-growing Industry.
B. Reason: Synthetic rubber, plastics, insecticides etc are the products of Petro chemical industry
(1) A and B both are correct and B explains A
(2) A and B are both correct but B does not explain A
(3) A is correct but B is incorrect
(4) A and B are both incorrect

Answer (2)

30. The process of "Retting" is associated with which of the following?
(1) Tea
(2) Coffee
(3) Jute
(4) Rubber

Answer (3)

31. The "Golden Quadrilateral" which connects Delhi-Mumbai-Chennai-and Kolkata passes through….
(1) Amritsar-Ahmedabad-Pune-Patna
(2) Jaipur-Porbander-Hyderabad-Varanasi
(3) Vadodara-Pune
Vishakhapatnam-Varanasi
(4) Nagpur-Bhopal-Surat-Amritsar

Answer (3)

32. The Narmada river in the Peninsular plateau flows westward with a remarkably straight channel. It is because_____
(1) Slope gradient in this part controls the river channel pattern
(2) River carries huge amount of water which has created straight channel course
(3) River forms the boundary between central highlands and the Deccan Plateau
(4) River flows through the trough of a rift valley inclined westward

Answer (4)

33. If it is 12 noon in a city located on 90° W longitude, what would be time in a city located on 105° W longitude
(1) 13:00 (2) 12:30
(3) 11:30 (4) 11:00

Answer (4)

34. Iron ore from kudermukh is most likely to be exported through
(1) Goa (2) Kochi
(3) Mangalore (4) Ennore

Answer (3)

35. Marble is a type of _____ rock.
(1) Sedimentary (2) Metamorphic
(3) Basalt (4) Igneous

Answer (2)

36. Match the following

i	Iron	a	Digboi
ii	Coal	b	Singhbhum
iii	Manganese	c	Balaghat
iv	Oil	d	Raniganj

(1) i-b, ii-d, iii-a, iv-c (2) i-b, ii-d, iii-c, iv-a
(3) i-d, ii-b, iii-a, iv-c (4) i-d, ii-b, iii-c, iv-a

Answer (2)

37. Which of the following is found on the foothills and river valley placer deposits:
(1) lead (2) gypsum
(3) bauxite (4) gold

Answer (4)

38. Choose the false statement among the following statements :
(1) The southwest monsoon is a continuation of the southeast trade wind, deflected towards the Indian subcontinent after crossing the equator
(2) In winter, India is under the influence of North West monsoon due to westerly jet stream
(3) The southwest monsoon sets in over the kerala coast by 1st June
(4) The shift in the position of the ITCZ is related to the phenomena of the withdrawal of the westerly jet stream from its position over the north Indian plane.

Answer (2)

39. Aus Aman and Boro, grown thrice in a year are types of _____ crops.
(1) Maize (2) Rice
(3) Millets (4) Wheat

Answer (2)

40. Which of the following is the type of plate boundary of Indian plate along Himalayan mountains
(1) Ocean-Continent Convergence
(2) Divergent boundary
(3) Transform boundary
(4) Continent-continent convergence

Answer (4)

41. The process of formation of seed without the act of fertilization is known as :
(1) Parthenogenesis
(2) Sporulation
(3) Apomixis
(4) Vegetative reproduction

Answer (3)

42. If the tip of sugarcane plant is removed from the field, even then it keeps on growing in length. It is due to the presence of :
(1) Cambium (2) Apical Meristem
(3) Lateral Meristem (4) Intercalary Meristem

Answer (4)

43. Which among the following has specialized tissue for conduction of water :
(i) Thallophyta
(ii) Bryophyta
(iii) Pteridophyta
(iv) Gymnosperms
(1) (i) and (ii) (2) (ii) and (iii)
(3) (iii) and (iv) (4) (i) and (iv)

Answer (3)

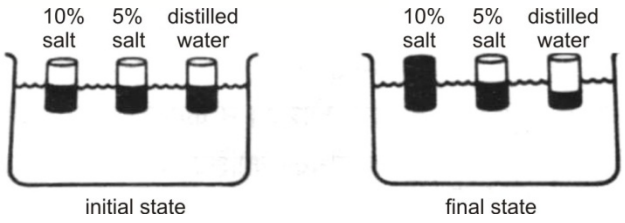
44. If pepsin is lacking in gastric juice then which of the following event in stomach will be affected :
(1) Digestion of starch into sugars
(2) Digestion of fats into glycerol and fatty acids
(3) Digestion of nucleic acids
(4) Digestion of proteins into peptides

Answer (4)

45. Colourblindness is more common in males than in females due to:
(1) Dominant gene of such traits lies on Y chromosome
(2) Dominant gene of such traits lies on X chromosome
(3) Recessive gene lies on X chromosome
(4) Recessive gene lies on Y chromosome

Answer (3)

46. Three cylinders each closed by a membrane permeable to water and containing a different fluid are placed in same solution. After adjusting to solution the fluid rises in one of the cylinder, remains the same in another and falls in the third. What is the concentration of the solution in which cylinders have been placed:



(1) 0% salt solution (2) 2.5% salt solution
(3) 5 % salt solution (4) 10% salt solution

Answer (3)

Sol. In the final state the water does not rises in container having 5% salt solution, it means the solution in which containers are placed also have the same concentration (5% salt solution)

47. Mitochondria and chloroplast are:
(i) Semiautonomous organelles
(ii) Formed by division of pre existing organelles and the contain DNA but lack protein synthesizing machinery.
Which one of the following option is correct :
(1) Both (i) and (ii) are correct
(2) (ii) is true, (i) is false
(3) (i) is true but (ii) is false
(4) Both (i) and (ii) are false

Answer (3)

48. Climbers grow towards and around a support is an example of:
(1) Hydrotropism (2) Geotropism
(3) Haptotropism (4) Phototropism

Answer (3)

49. Which of the following statement about transmission of nerve impulse is incorrect:
(1) Nerve impulse travels from dendritic end towards axonal end
(2) At the dendritic end electrical impulses bring about the release of some chemicals which generate an electrical impulse at the axonal end of another neuron
(3) The chemicals released from axonal end of one neuron cross the synapse and generate a similar impulse in a dendrite of another neuron
(4) A neuron transmits electrical impulses not only to another neuron but also to muscle and gland cell

Answer (2)

50. Which of the following is an example of homologous organs?
(1) Wings of a bad and butterfly
(2) Wings of a bird and a bat
(3) Wings of pigeon and a butterfly
(4) Forelimbs of cow and lizard

Answer (4)

51. As we travel along the food chain, the concentration of DDT
(1) Increases
(2) Remains constant
(3) Decreases
(4) Fluctuate randomly

Answer (1)

52. Which among the following statements are true for unisexual flowers?
(i) They possess both stamens and carpel
(ii) They possess either stamen or carpel
(iii) They exhibit cross pollination
(iv) Unisexual flowers possessing only stamens cannot produce fruits
(1) (i) and (iv)
(2) (ii), (iii) and (iv)
(3) (iii) and (iv)
(4) (i), (iii) and (iv)

Answer (2)

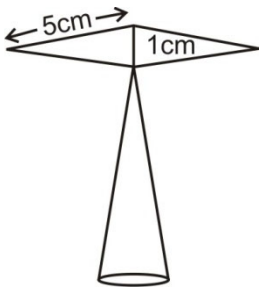
53. Lack of oxygen in muscles often leads to cramps among cricketers. This is due to:
(1) Conversion of pyruvate to lactic acid
(2) Conversion of pyruvate to glucose
(3) Non-conversion of glucose to pyruvate
(4) Conversion of pyruvate to ethanol

Answer (1)

54. Choose the correct path of urine in our body:
(1) Kidney $\rightarrow$ Ureter $\rightarrow$ Urinary bladder $\rightarrow$ Urethra
(2) Kidney $\rightarrow$ Ureter $\rightarrow$ Urethra $\rightarrow$ Urinary bladder
(3) Kidney $\rightarrow$ Urinary bladder $\rightarrow$ Urethra $\rightarrow$ Ureter
(4) Urinary bladder $\rightarrow$ Kidney $\rightarrow$ Ureter $\rightarrow$ Urethra

Answer (1)

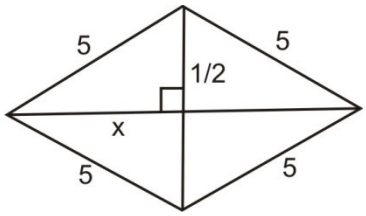
55. The area of the Blades of the magnetic compass as shown in figure will be: (Take $\sqrt{11} = 3.32$)



(1) 9 cm^2 (2) 5.58 cm^2
(3) 11 cm^2 (4) 4.98 cm^2

Answer (4)

Sol.



Applying Pythagoras theorem

$$5^2 = x^2 + \left(\frac{1}{2}\right)^2$$

$$x^2 = 25 - \frac{1}{4}$$

$$x^2 = \frac{99}{4}$$

$$x = \frac{3}{2}\sqrt{11}$$

We know that, area of Rhombus = $\frac{1}{2} \times d_1 \times d_2$

$\therefore$ Area = $\frac{1}{2} \times 2\sqrt{11} \times 1$

Area = $\frac{1}{2} \times 3 \times 3.32$

Area = 4.98 cm^2

56. By selling 12 oranges for a rupee, a man losses 20%. How many for a rupee should he sell to gain 20%:

(1) ₹15 (2) ₹10

(3) ₹ 8 (4) ₹ 5

Answer (3)

Sol. Let the cost price of 12 oranges be ₹ x

As man had a loss of 20%

$\therefore$ $x - \frac{20}{100}x = 1$

$\frac{4}{5}x = 1$

$x = \frac{5}{4}$ ₹

In order to have 20% gain

Selling price should be $\frac{5}{4} + 20\%$ of $\frac{5}{4} = \frac{5}{4} + \frac{1}{4}$

Thus S.P. of 12 oranges = $\frac{6}{4}$Rs.

₹ oranges

$\frac{6}{4}$ ------- 12

$\frac{6}{4} \times \frac{4}{6}$ ----- $12 \times \frac{4}{6}$

1 ------- 8

So in order to gain 20% he should sell 8 oranges for a rupee

57. In an Arithmetic Progression, the sum of first 'n' terms is $\frac{3n^2}{2} + \frac{5n}{2}$. Then the 25th term will be:

(1) 4 (2) 3

(3) – 4 (4) 3.5

Answer (No option matches)

Sol. 25th term = (sum of 25 terms) – (sum of 24 terms)

25th term = $\left(\frac{3 \times 25^2}{2} + \frac{5 \times 25}{2}\right) - \left(\frac{3 \times 24^2}{2} + \frac{5 \times 24}{2}\right)$

25th term = $\left(\frac{1875 + 125}{2}\right) - (864 + 60)$

25th term = 1000 – 924

$\therefore$ 25th term = 76

No option matches

58. Probability that a leap year selected at random will contain 53 Sundays is :

(1) $\frac{2}{7}$ (2) $\frac{53}{365}$

(3) 1/7 (4) $\frac{7}{365}$

Answer (1)

Sol. A leap year will have 52 weeks and two extra days.

$\therefore$ total cases : SM, MT, TW, WT, TF, FS, SS

So total cases = 7

Favourable cases = 2

$\therefore$ P(53 Sundays) = $\frac{2}{7}$

59. If A + B = 90° then $\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} - \frac{\sin^2 B}{\cos^2 A}$ is equal to:

(1) $\cot^2 A$ (2) $\cot^2 B$

(3) $-\tan^2 A$ (4) $-\cot^2 A$

Answer (2)

Sol. Given A + B = 90°, B = 90° – A

$$\frac{\tan A+\tan B+\tan A\cot B}{\sin A\sec B}-\frac{\sin^2 B}{\cos^2 A}$$

$$=\frac{\tan A\tan(90°-A)+\tan A\cot(90°-A)}{\sin A\sec(90°-A)}-\frac{\sin^2(90°-A)}{\cos^2 A}$$

$$=\frac{\tan A\cot A+\tan A\tan A}{\sin A\operatorname{cosec}A}-\frac{\cos^2 A}{\cos^2 A}$$

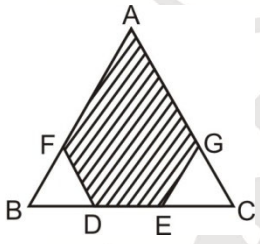
$$\left[\because \tan(90°-\theta=\cot\theta \atop \sec(90°-\theta)=\operatorname{cosec}\theta\right]$$

$$=\frac{1+\tan^2 A}{1}-1$$

$= \tan^2A$

$= \cot^2B$

60. ΔABC is an Equilateral triangle. We have BD = EG = DF = DE = EC; then the ratio of the area of the shaded portion to the area of ΔABC is:

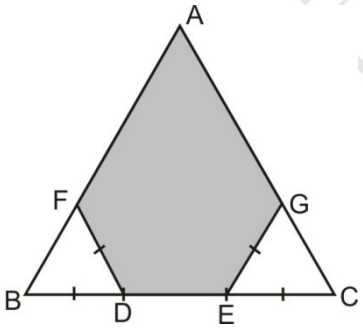


(1) $\frac{4}{11}$ (2) $\frac{7}{9}$

(3) $\frac{5}{12}$ (4) $\frac{6}{7}$

Answer (2)

Sol.



ΔABC is an equilateral triangle.

Let BC = 3x

As we know BD = EG = DF =DE = EC = x

Now area of

$\Delta ABC = \frac{\sqrt{3}}{4}(BC)^2 = \frac{\sqrt{3}}{4}(3x)^2 = \frac{9\sqrt{3}}{4}x^2$

Area of AFDEG = $\frac{\sqrt{3}}{4}(3x)^2 - \frac{\sqrt{3}}{4}(x)^2 - \frac{\sqrt{3}}{4}(x)^2$

[$\because$ ΔFBD & ΔGEC are equilateral triangle]

Area of AFDEG $= \frac{7\sqrt{3}}{4}x^2$

Now required ratio = $\frac{\text{area of the shaded portion}}{\text{area of }\Delta ABC}$

Ratio = $\frac{\frac{7\sqrt{3}}{4}x^2}{\frac{9\sqrt{3}}{4}x^2} = \frac{7}{9}$

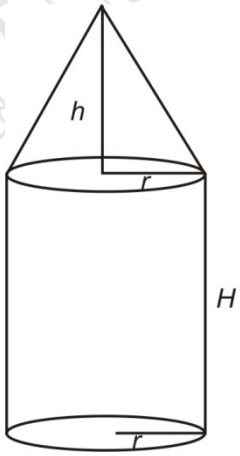
61. A solid consists of a rectangular cylinder with an exact fitting right circular cone placed on the top. Height of the cone is 'h'. If total volume of the solid is three times the volume of the cone, then the height of the circular cylinder is:

(1) $\frac{2h}{9}$ (2) $\frac{2h}{3}$

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

Answer (2)

Sol.



Let height of cylinder be H

and radius of cylinder & cone = r

Given that

Volume of cylinder + volume of cone = 3 (volume of cone)

Volume of cylinder = 2 (volume of cone)

$$\pi r^2 H = 2\times\frac{1}{3}\times\pi r^2 h$$

$\Rightarrow$ H = $\frac{2}{3}$h.

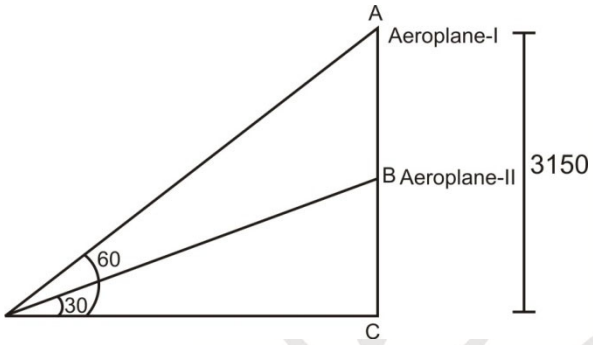
62. An aeroplane is flying horizontally at a height of 3150 m above horizontal plane ground. At a particular instant, it passes another Plane Vertically below it. At this instant, the angles of elevation of the planes from a point on the ground are 30° and 60°. Hence the distance between the two planes at that instant is:

(1) 1050 m (2) 2100 m

(3) 4200 m (4) 5250 m

Answer (2)

Sol.



In ΔADC

$\tan 60^\circ = \frac{AC}{DC} = \frac{3150}{DC}$

$\Rightarrow \sqrt{3} = \frac{3150}{DC}$

$\Rightarrow DC = \frac{3150}{\sqrt{3}}$

Now In ΔBDC

$\tan 30^\circ = \frac{BC}{DC}$

$\Rightarrow$ DC.tan30° = BC

$\frac{3150}{\sqrt{3}} \cdot \frac{1}{\sqrt{3}} = BC$

$\Rightarrow$ BC = $\frac{3150}{3} = 1050$ m

Now distance between two planes = AB

= AC – BC

= 3150 – 1050

= 2100 m

63. The compound interest is Rs. 6.40 more than the simple interest. If a sum is lent for 2 years at 8% compound interest. The sum will be:

(1) ₹ 1800 (2) ₹ 10,000

(3) ₹ 800 (4) ₹ 1000

Answer (4)

Sol. Let the simple interest for one year be ₹ x

	S.I.	C.I.
I year	x	X
II year	x	x + 8% of Rs. x

ATQ

8% of x = 6.4

$\frac{8}{100}x = 6.4$

x = 80

As simple interest for one year in 80 Rs. At 8%

$\therefore$ sum = ₹ 1000

64. If a, b, c, d and e are in continuous proportion, then a/e is equal to:

(1) $\frac{a^3}{b^3}$ (2) $\frac{a^4}{b^4}$

(3) $\frac{b^3}{a^3}$ (4) $\frac{b^4}{a^4}$

Answer (2)

Sol. Given that

$\frac{a}{b} = \frac{b}{c} = \frac{c}{d} = \frac{d}{e} = k$

Now $\frac{a}{e} = \frac{a}{d/k} = \frac{a}{d}k \left[e = \frac{d}{k}\right]$

$\frac{a}{e} = \frac{a}{c/k}k \left[d = \frac{c}{k}\right]$

$\frac{a}{e} = \frac{a}{c}.k^2$

$\frac{a}{e} = \frac{a}{b/k}.k^2 \left[c = \frac{b}{k}\right]$

$\frac{a}{e} = \frac{a}{b}.k^3$

$\frac{a}{e} = \frac{a}{a/k}.k^3 \left[b = \frac{a}{k}\right]$

$\frac{a}{e} = k^4$

$\frac{a}{e} = \frac{a^4}{b^4} \left[k = \frac{a}{b}\right]$

65. The line segment joining the points (3, –4) and (1, 2) is trisected at the points P & Q. If the coordinates of P & Q are (p, –2) & $\left(\frac{5}{3}, q\right)$ respectively. Find the values of p & q.

(1) p = 0, q = $\frac{7}{3}$ (2) p = $\frac{7}{3}$, q = 0

(3) p = 7, q = 3 (4) p = 3, q =7

Answer (2)

Sol.

P & Q trisect AB

$\Rightarrow \frac{AP}{PB}=\frac{1}{2}$ and $\frac{AQ}{QB}=\frac{2}{1}$

Now co-ordinate of

$P \equiv \left(\frac{(3\times 2)+(1\times 1)}{1+2}, \frac{(-4\times 2)+(2\times 1)}{1+2}\right)$

$\equiv \left(\frac{7}{3}, -2\right)$

Co-ordinate of P(p,–2) $\equiv \left(\frac{7}{3}, -2\right)$

$\Rightarrow \boxed{p=\frac{7}{3}}$

Now coordinate of $Q \equiv \left(\frac{3\times 1+1\times 2}{2+1}, \frac{-4\times 1+2\times 2}{2+1}\right)$

$Q \equiv \left(\frac{5}{3}, 0\right)$

Coordinate of $Q \equiv \left(\frac{5}{3}, q\right) \equiv \left(\frac{5}{3}, 0\right)$

$\Rightarrow \boxed{q=0}$

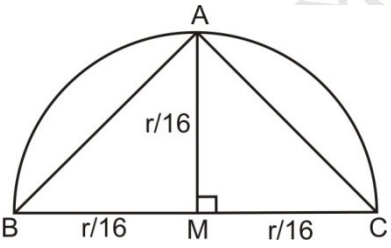
66. What will be the area of largest triangle that can be inscribed in the semicircle of radius $\frac{'r'}{16}$

(1) $16r^2$ (2) $\frac{r^2}{256}$

(3) $\frac{r^2}{64}$ (4) $\frac{r^2}{32}$

Answer (2)

Sol.



Area of largest triangle that can be inscribed in the semicircle is $=\frac{1}{2}\times BC\times AM$

$=\frac{1}{2}\times\frac{2r}{16}\times\frac{r}{16}$

$=\frac{r^2}{256}$

67. If x + y + z = 0 & $x \neq 0, y \neq 0, z \neq 0$ then the value of $\frac{x^2}{yz}+\frac{y^2}{xz}+\frac{z^2}{xy}$ is?

(1) 0 (2) 1

(3) 2 (4) 3

Answer (4)

Sol. If $x + y + z = 0$ $x \neq 0, y \neq 0, z \neq 0$

$\Rightarrow x^3+y^3+z^3=3xyz$

Now $\frac{x^2}{yz}+\frac{y^2}{xz}+\frac{z^2}{xy}$

$=\frac{x^3+y^3+z^3}{xyz}$

$=\frac{3xyz}{xyz}$

= 3

68. If $x^2 + y^2 + z^2 = r^2$where, x = r cos*a* cos*b*, y = r cos*a* sin*b* then z has one of the following values.

(1) r cos*a* (2) r tan*a* cos*b*

(3) r tan*a* tan*b* (4) r sin*a*

Answer (4)

Sol. $x = r\cos a\cos b$, $y = r\cos a\sin b$

$\Rightarrow x^2+y^2 = r^2\cos^2 a\cos^2 b + r^2\cos^2 a\sin^2 b$

$= r^2\cos^2 a(\cos^2 b+\sin^2 b)$

$= r^2\cos^2 a$

Now $x^2+y^2+z^2=r^2$

$z^2 = r^2-(x^2+y^2)$

$z^2 = r^2 - r^2\cos^2 a$

$z^2 = r^2(1-\cos^2 a)$

$z^2 = r^2\sin^2 a$

$z = r\sin a$

69. If α & β are the roots of the equation $3x^2 – 5x + 3 = 0$ then the quadratic equation whose roots are $\alpha^2\beta$ and $\alpha\beta^2$ is.

(1) $3x^2 – 5x + 3 = 0$ (2) $3x^2 – 8x + 5 = 0$

(3) $3x^2 – 8x + 3 = 0$ (4) $3x^2 – 5x – 3 = 0$

Answer (1)

Sol. α, β are the roots of $3x^2-5x+3=0$

$\alpha+\beta=\frac{5}{3}$ and $\alpha\beta=1$

Now equation whose roots are $\alpha^2\beta$ and $\alpha\beta^2$ is

$x^2 - (\alpha^2\beta + \alpha\beta^2)x + (\alpha^2\beta \times \alpha\beta^2) = 0$

$x^2 - [\alpha\beta(\alpha + \beta)]x + \alpha^3\beta^3 = 0$

$x^2 - \left(\frac{5}{3}\right)x + 1 = 0$

$3x^2 - 5x + 3 = 0$ is the required quadratic equation

70. The sum of length, breadth and height of cuboid is 19 m, its diagonal is $5\sqrt{5}$ m long. Its surface area is

(1) 286 m^2 (2) 236 m^2

(3) 226 m^2 (4) 256 m^2

Answer (2)

Sol. l + b + h = 19 m

Length of diagonal of cuboid

$= \sqrt{l^2 + b^2 + h^2} = 5\sqrt{5}$

$\Rightarrow \quad l^2 + b^2 + h^2 = 125\,m$

Now $(l + b + h)^2 = (19)^2$

$l^2 + b^2 + h^2 + 2lb + 2bh + 2lh = 361$

$125 + 2lb + 2bh + 2hl = 361$

$\Rightarrow \quad 2(lb + bh + hl) = 361 - 125$

= 236 m^2

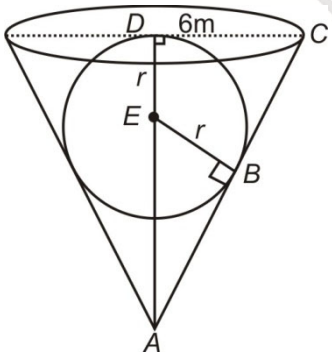
71. A conical vessel of radius 6 m and height 8 m is completely filled with water. A sphere is lowered into the water and its size is such that when it touches the side, it is just completely immersed. What fraction of water over flowed?

(1) 5/8 (2) 3/4

(3) 3/8 (4) 5/4

Answer (3)

Sol.



$\Delta ABE \sim \Delta ADC$ (*by AA* similarity)

$\Rightarrow \quad \frac{BE}{DC} = \frac{AE}{AC}$

$\frac{r}{6} = \frac{8 - r}{10}$

$\Rightarrow$ r = 3m

Now volume of sphere

$= \frac{4}{3}\pi r^3 = \frac{4}{3} \times \pi(3)^3 = 36\pi\ m^2$

And volume of cone

$= \frac{1}{3}\pi R^2 h = \frac{1}{3} \times \pi(6)^2 \times 8 = 96\pi\ m^2$

Fraction of water overflowed = $\frac{\text{volume of sphere}}{\text{volume of cone}}$

$= \frac{36\pi}{96\pi} = \frac{3}{8}$

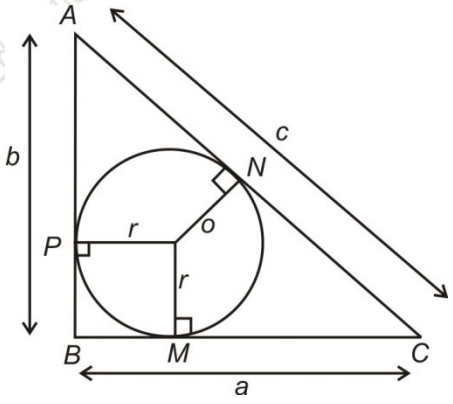
72. If a, b, c are the sides of right triangle where C is the hypotenuse, then radius 'r' of the circle which touches the sides of the triangle is

(1) $\frac{a+b+c}{2}$ (2) $\frac{a+c-b}{2}$

(3) $\frac{a+b-c}{2}$ (4) $\frac{b+c-a}{2}$

Answer (3)

Sol.



BM = PB = r

MC = a-r

Now *NC = MC = a – r*

AP = b – r

Now *AN = b – r*

Now *AN + NC = AC*

B – r + a – r = c

$\Rightarrow \quad r = \frac{a+b+c}{2}$

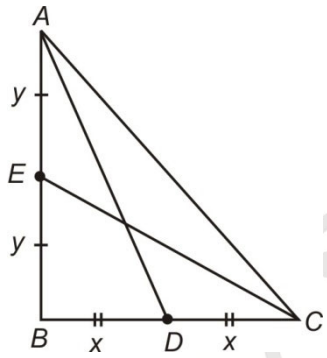
73. ΔABC is right angled at B. AD, CE are the two medians drawn from A and C respectively. If $AD = \frac{3\sqrt{5}}{2}$, $CE = 2\sqrt{5}$. The value of AC will be

(1) 13 (2) 5

(3) $12\sqrt{5}$ (4) 12

Answer (2)

Sol.



Let $BD = DC = x$

$AE = EB = y$

Now in ΔABD

$AB^2 + BD^2 = AD^2$

$(2y)^2 + x^2 = \frac{45}{4}$

$\Rightarrow 4y^2 + x^2 = \frac{45}{4}$ ....(i)

In Δ BEC

$BC^2 + BE^2 = EC^2$

$4x^2 + y^2 = 20$ ...(ii)

Adding (i) & (ii)

$5x^2 + 5y^2 = \frac{45}{4} + 20$

$x^2 + y^2 = \frac{25}{4}$

$4x^2 + 4y^2 = 25$

$(2x)^2 + (2y)^2 = 25$

$BC^2 + AB^2 = 25 = AC^2 \Rightarrow AC = 5.$

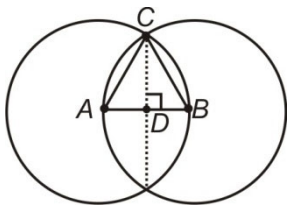
74. If two circles are such that the centre of one lies on the circumference of the other then the ratio of common chord of the two circles to the radius of any one of the circle is:

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

(3) $\sqrt{5}:1$ (4) 4 : 1

Answer (2)

Sol.



As two circle pass through centres of each other

ΔABC will be equilateral

Let $AB = BC = AC = 2x$ units

$\therefore$ CD = $\sqrt{3}x$ (altitude of equilateral $\Delta = \frac{\sqrt{3}}{2}$ side)

$\therefore$ Common chord = $2\sqrt{3}x$ units.

Thus required ratio = $\frac{2\sqrt{3}x}{2x}$

$(\sqrt{3}:1)$

75. Which of the following is most malleable metal?

(1) Na

(2) Si

(3) Au

(4) Pb

Answer (3)

76. When carbon dioxide is passed through lime water then:

(1) Calcium hydroxide is formed

(2) Colour of lime water disappears

(3) White precipitates of calcium carbonate is formed

(4) White precipitates of calcium oxide is formed

Answer (3)

Sol. $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

77. Arrange the following elements in the order of their decreasing metallic character:

(1) Cl > Si > Al > Mg > Na

(2) Na > Mg > Al > Si > Cl

(3) Na > Al > Mg > Cl > Si

(4) Al > Na > Si > Ca > Mg

Answer (2)

Sol. Metallic character decreases along the Period

78. Meena visited a natural gas compressing unit and found that the gas can be liquefied under specific conditions of temperature and pressure while sharing her experience with friends she got confused. Help her to identify the correct set of conditions.
(1) Low temperature, Low pressure
(2) High temperature, Low pressure
(3) Low temperature, High pressure
(4) High temperature, High pressure

Answer (3)

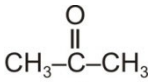
79. The scattering of beam of light is shown by _____.
(1) Mud water
(2) Milk
(3) Copper sulphate solution
(4) NaCl solution

Answer (2)

Sol. Scattering of light by colloidal solution

80. What is the formula of acetone:
(1) CH_3CH_2COOH (2) CH_3COCH_3
(3) CH_3, CH_2CHO (4) $CH_3CH_2COCH_3$

Answer (2)

Sol.

Acetone

81. Match the correct atomic radius with the element

Element	Atomic radius (pm)
(a) Be	(i) 75
(b) C	(ii) 88
(c) O	(iii) 111
(d) B	(iv) 77
(e) N	(v) 74

(1) (a)-(ii), (b)-(iii), (c)-(v), (d)-(iv), (e)-(i)
(2) (a)-(iii), (b)-(iv), (c)-(v), (d)-(ii), (e)-(v)
(3) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i), (e)-(v)
(4) (a)-(v), (b)-(iii), (c)-(iv), (d)-(ii), (e)-(i)

Answer (2)

Sol. Atomic radius decreases along the period.

82. 22 carat gold means
(1) 20 parts of pure gold alloyed with 2 parts of Cu or Ag
(2) 22 parts of pure gold alloyed with 2 parts of Cu or Zn
(3) 21 parts of pure gold alloyed with 1 parts of Cu or Ag
(4) 22 parts of pure gold allowed with 2 parts of Cu or Ag

Answer (4)

83. Anodising is a process of forming a thick oxide layer of _____.
(1) Zinc (2) Aluminium
(3) Copper (4) Tin

Answer (2)

84. Which of the following element does not have allotrope
(1) P (2) B
(3) Bi (4) S

Answer (3)

85. Which of following combination about acids is incorrect
(1) Ethanoic acid Vinegar
(2) Citric acid Orange
(3) Carbonic acid Soft Drinks
(4) Lactic acid Tea

Answer (4)

Sol. Tannic acid is present in tea

86. Which is chemically most active non-vetal.
(1) Br_2 (2) N_2
(3) O_2 (4) F_2

Answer (4)

87. A ball is released from the top of a tower of height h meter. It takes T seconds to reach the ground. What is the position of the ball at T/3 second ?
(1) $\frac{8h}{9}$ m from the ground
(2) $\frac{7h}{9}$ m from the ground
(3) $\frac{h}{9}$ m from the ground
(4) $\frac{17h}{18}$ m from the ground

Answer (1)

Sol. $s = ut + \frac{1}{2}at^2$

$a = g$

$u = 0$

$s = \frac{1}{2}gt^2$

$\frac{s_1}{s_2} = \left(\frac{t_1}{t_2}\right)^2$

$$\frac{h}{s_2} = \left(\frac{T}{T/3}\right)^2$$

$$s_2 = \frac{h}{9}$$

Position from ground = $\frac{8h}{9}$.

88. Two bodies have masses 2m and m. Their Kinetic energies are in the ratio 8:1. Their linear momentum are in the ratio of

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

(3) 4 : 1 (4) 8 : 1

Answer (3)

Sol. $\frac{k_1}{k_2} = \left(\frac{p_1}{p_2}\right)^2 \times \frac{m_2}{m_1}$

$$\frac{p_1}{p_2} = \frac{4}{1}$$

89. Water is pouring down from a waterfall at the rate of 75 kg/s on the blades of a turbine. If the height of the fall is 100m, then power delivered to the turbine is nearly

(1) 95 kw (2) 75 kw

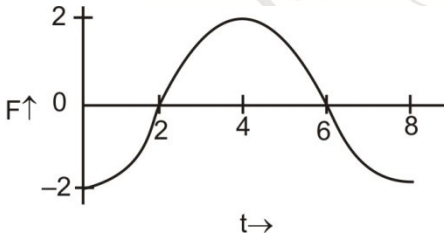
(3) 100 kw (4) 0 kw

Answer (2)

Sol. $P = \frac{mgh}{t} = 75 \times 10 \times 100$

= 75 kw

90. A force-time graph for a linear motion is shown. The linear momentum changed between 0 and 8 second is



(1) –2π Ns (2) Zero

(3) 4π Ns (4) 6π Ns

Answer (2)

Sol. Area under F-t curve

= 0

Momentum change = 0

91. The length of a given cylindrical wire is increased by 100%. Due to consequent decrease in diameter, the change in the resistance of the wire will be

(1) 200% (2) 100%

(3) 50% (4) 300%

Answer (4)

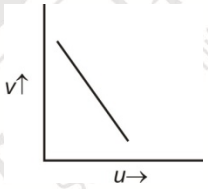
Sol. $\frac{R_1}{R_2} = \left(\frac{l_1}{l_2}\right)^2$

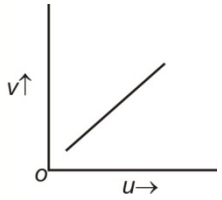
$$= \left(\frac{100}{200}\right)^2$$

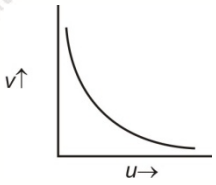
$$\frac{R_1}{R_2} = \frac{1}{4}$$

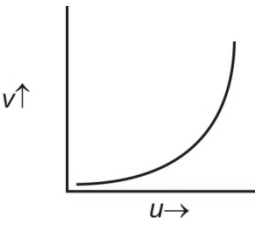
% change = 300%

92. In an experiment to find the focal length of a concave mirror, a graph is drawn between magnitude of *u* and *v*. The graph looks like

(1) 

(2) 

(3) 

(4) 

Answer (3)

93. Two circular coils of diameter 10 cm and 20 cm have same number of turns. The ratio of magnetic field inductions produced at the centres of coils when connected in series is

(1) 1 : 2

(2) 3 : 2

(3) 2 : 1

(4) 2 : 3

Answer (3)

Sol. $B = \frac{\mu_0 I}{2r} \cdot n$

For same I and n

$$\frac{B_1}{B_2} = \frac{r_2}{r_1} = 2:1$$

94. Green light of wavelength 5460Å is incident on an air-glass interface. If the refractive index of glass is 1.5, the wavelength of light in glass would be (given velocity of light in air c = 3×10^8 ms^{-1})

(1) 3640 Å (2) 5460 Å

(3) 4861 Å (4) None of the above

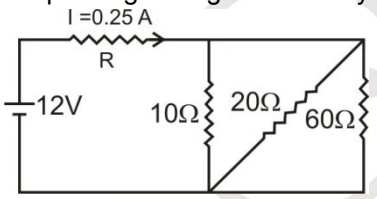
Answer (1)

Sol. $\frac{C}{V} = \frac{n\lambda_1}{n\lambda_2} = 1.5$

$\frac{5640}{\lambda_2} = 1.5$

$\lambda_2 = 3640$ Å

95. What is the value of R in the circuit given below if the current passing through the battery is 0.25 A.



(1) 42 Ω (2) 62 Ω

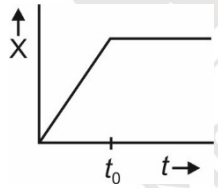
(3) 84 Ω (4) None of these

Answer (1)

Sol. $0.25 = \frac{12}{R + \frac{1}{\frac{1}{10} + \frac{1}{20} + \frac{1}{60}}}$

$\Rightarrow R = 42\Omega$

96. Figure shows the displacement-time graph of a particle moving along X-axis.



(1) The particle is continuously going in positive x-direction

(2) The particle is at rest.

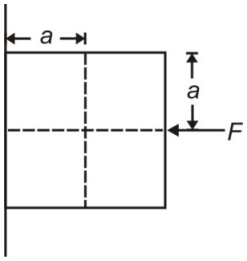
(3) The velocity increases upto time 't_0' and then becomes constant.

(4) The particle moves at a constant velocity upto time 't_0' and then stops.

Answer (4)

Sol. By the slope of X-t curve

97. A block of mass m is at rest under the action of force F against a wall as shown in figure.



Which of the following statement is incorrect?

(1) f = mg (where f is the frictional force)

(2) F = N (where N is the normal force)

(3) F will not produce torque

(4) N will not produce torque

Answer (4)

Sol. N will not produce torque

98. A hot and cold body are kept in vacuum separated from each other. Which of the following causes decreases in temperature of the hot body?

(1) Radiation

(2) Convection

(3) Conduction

(4) Temperature remains unchanged

Answer (1)

99. A man is standing at the middle point between two cliffs. On clapping his hands, a series of echoes are heard at the interval of 1 sec. If the speed of sound is 350 m/s, the distance between the two cliffs is

(1) 175 m (2) 350 m

(3) 725 m (4) 700 m

Answer (2)

Sol. $\left(\frac{x}{2} + \frac{x}{2}\right) = v \times t$

X = 350 m

100. A rubber ball filled with water is having a small hole. This is used as the bob of a simple pendulum. Then, the period of such a pendulum

(1) Decreases

(2) First increases then decreases

(3) First decreases then increases

(4) Increases

Answer (2)

Sol. First increases then decreases

$T = 2\pi\sqrt{\frac{I}{g}}.$

When water leaks, centre of mass of ball shifts downward, hence, I increases. Then it decreases when the ball is empty because COM shifts upwards.

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