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# Solved Paper

# A.I.E.E.E., 2007 (PAPER-II) (C.B.S.E.), DELHI

# MATHEMATICS AND APTITUDE TEST

## MATHEMATICS

1. If  $x = 1 + a + a^2 + \dots$  ( $|a| < 1$ ) and  $y = 1 + b + b^2 + \dots$  ( $|b| < 1$ ), then the sum of the series  $1 + ab + a^2b^2 + \dots$  is equal to :

- (A)  $\frac{xy}{x+y-1}$       (B)  $\frac{xy}{x-y-1}$   
(C)  $\frac{xy}{x-y+1}$       (D)  $\frac{xy}{x+y+1}$

2. The set of values of  $\alpha$  for which the quadratic equation

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

has two roots on the number line symmetrically placed about the point 1 is :

- (A) {0, 1}      (B) {-1, 0}  
(C) {0, 2}      (D)  $\phi$

3. A parallelogram is cut by two sets of  $n$  parallel lines, parallel to the sides of the parallelogram. The number of parallelograms so formed is :

- (A)  ${}^n C_2 \times {}^n C_2$       (B)  ${}^{n+2} C_2 \times {}^{n+2} C_2$   
(C)  ${}^n C_2 \times {}^{n+1} C_2$       (D)  ${}^n C_2 \times {}^{n+2} C_2$

4. The equations of motion of a particle are given by

$$\frac{dx}{dt} = t(t+1), \quad \frac{dy}{dt} = \frac{1}{t+1}$$

where the particle is at  $(x(t), y(t))$  at time  $t$ . If the particle is at the origin at  $t = 0$ , then:

- (A)  $6x = (2e^y + 1)(e^y - 1)^2$   
(B)  $6x = (e^y + 1)(e^y - 1)^2$   
(C)  $6x = (2e^y - 1)(e^y + 1)^2$   
(D)  $6x = (e^y - 1)(e^y + 1)^2$

5. If  $\lim_{x \rightarrow \lambda} \left( \frac{f(x)}{g(x)} \right)$  exists, then :

- (A) both  $\lim_{x \rightarrow c} f(x)$  and  $\lim_{x \rightarrow c} g(x)$  must exist  
(B)  $\lim_{x \rightarrow c} f(x)$  must exist  
(C) neither  $\lim_{x \rightarrow c} f(x)$  nor  $\lim_{x \rightarrow c} g(x)$  may exist  
(D)  $\lim_{x \rightarrow c} g(x)$  must exist

6. Let  $L_1$  be a line with direction ratios  $(-2, -1, 2)$  and  $L_2$  be the line joining the points  $(1, 2, 3)$  and  $(3, 2, 1)$ . If  $\theta$  is the angle between the lines  $L_1$  and  $L_2$ , then  $|\sin \theta|$  equals :

- (A)  $\frac{1}{2}$       (B)  $\frac{1}{3}$   
(C)  $\frac{1}{4}$       (D)  $\frac{1}{3\sqrt{2}}$

7. If  $\vec{a}$  and  $\vec{b}$  are two non-parallel vectors having equal magnitude, then the vector  $(\vec{a} - \vec{b}) \times (\vec{a} \times \vec{b})$  is parallel to :

- (A)  $\vec{a}$       (B)  $\vec{b}$   
(C)  $\vec{a} - \vec{b}$       (D)  $\vec{a} + \vec{b}$

8. The numbers  $a, b, c$  are distinct and non-negative. If the three vectors  $a\vec{i} + a\vec{j} + c\vec{k}$ ,  $c\vec{i} + c\vec{j} + b\vec{k}$  and  $\vec{i} + \vec{k}$  are coplanar, then  $c$  is :

- (A) arithmetic mean of  $a, b$   
(B) geometric mean of  $a, b$   
(C) harmonic mean of  $a, b$   
(D) equal to zero

9. There are 30 boys and 20 girls in a class. The mean and variance of their marks in Maths are, respectively, 65 and 100. If 5 grace marks are added to the score of each student, then the revised mean and variance will be, respectively :

- (A) 65, 100      (B) 70, 100  
(C) 70, variance  $> 100$   
(D) 65, variance  $< 100$

10. A bullet fired at a target loses half of its velocity after penetrating 6 cm into it. How much further will it penetrate before its velocity is destroyed ?

- (A)  $\frac{3}{2}$  cm      (B) 3 cm  
(C) 2 cm      (D) 1 cm

11. If the ratio of the 7th term from the beginning to the 7th term from the end in the expansion of  $(2^{1/3} + 3^{1/3})^n$  is  $\frac{1}{6}$ , then the value of  $n$  is :

- (A) 3      (B) 9  
(C) 12      (D) 6

12. If three distinct positive numbers  $a, b, c$  are in A.P. such that  $abc = 4$ , then the value of  $b$  is always :

- (A) equal to  $(2)^{3/2}$  (B) greater than  $(2)^{2/3}$   
 (C) less than  $(2)^{2/3}$  (D) equal to  $(2)^{2/3}$

13. If there are 30 onto mappings from a set containing  $n$  elements to the set  $\{0, 1\}$ , then  $n$  equals :

- (A) 2 (B) 3  
 (C) 5 (D) 7

14. The coefficient of  $y^{11}$  in  $\frac{(1+y)^2}{(1-y)^2}$  is :

- (A) 46 (B) 44  
 (C) 42 (D) 40

15. The system of linear equations

$$(\lambda + 3)x + (\lambda + 2)y + z = 0$$

$$3x + (\lambda + 3)y + z = 0$$

$$2x + 3y + z = 0$$

has nontrivial solutions

- (A) if  $\lambda = 0$   
 (B) if  $\lambda = 1$   
 (C) if  $\lambda = -1$   
 (D) for no real value of  $\lambda$

16. An antiderivative of the integral

$$\int e^x \left( \frac{1-x}{1+x^2} \right)^2 dx$$

is :

- (A)  $e^x/(1+x^2)$   
 (B)  $e^x/(1+x^2)^2$   
 (C)  $-xe^x/(1+x^2)^2$   
 (D)  $e^x(1-x)/(1+x^2)^2$

17.  $\int_{-a}^a \log(x + \sqrt{x^2 + 1}) dx$  equals :

- (A)  $2 \log(a + \sqrt{a^2 + 1})$   
 (B)  $2 \log(a^2 + 1)$   
 (C)  $2 \log(\sqrt{a^2 + 1} + a)$   
 (D) 0

18. Let  $f(x) = \begin{cases} ax, & x < 2 \\ ax^2 + bx + 3, & x \leq 2 \end{cases}$

If  $f$  is differentiable for all  $x$ , then the value of  $(a, b)$  is equal to :

- (A)  $(3/4, -9/4)$   
 (B)  $(1, 2)$   
 (C)  $(3/2, 9/2)$   
 (D)  $(3/4, -9/2)$

19. The value of  $c$  for which the conclusion of Lagrange's mean value theorem hold for the function  $f(x) = \sqrt{25 - x^2}$  on the interval  $[1, 5]$  is :

- (A) 2 (B)  $\sqrt{3}$   
 (C)  $\sqrt{5}$  (D)  $\sqrt{15}$

20. Let  $f(x) = \begin{cases} |x-1| + a & \text{if } x \geq 1 \\ 2x+3 & \text{if } x < 1 \end{cases}$

If  $f(x)$  has a local minimum at  $x = 1$ , then :

- (A)  $a = 5$  (B)  $a > 5$   
 (C)  $0 < a \leq 5$  (D)  $a \leq 5$

21. The area enclosed by the curves  $x^2 = y$ ,  $y = x + 2$  and  $x$ -axis is :

- (A)  $\frac{5}{6}$  sq. units (B)  $\frac{5}{4}$  sq. units  
 (C)  $\frac{5}{2}$  sq. units (D)  $\frac{15}{4}$  sq. units

22. In an ellipse, the distance between its directrices is four times the distance between its foci. If  $(-2, 0)$  is one of its vertices, then the equation of the ellipse is:

- (A)  $4x^2 + 3y^2 = 1$  (B)  $3x^2 + 4y^2 = 1$   
 (C)  $4x^2 + 3y^2 = 12$  (D)  $3x^2 + 4y^2 = 12$

23. If the section of the sphere  $x^2 + y^2 + z^2 = a^2$  by the plane  $z = a/2$  is a circle of radius  $\sqrt{27}$  units, then its section by the plane  $z = a/6$  is a circle of radius :

- (A)  $\sqrt{30}$  units (B)  $\sqrt{35}$  units  
 (C)  $\sqrt{40}$  units (D)  $\sqrt{45}$  units

24. If  $a, b, c$  are in A.P. with non-zero common difference and  $x, y, z$  are in G.P., then the points  $(a, x)$ ,  $(b, y)$  and  $(c, z)$  are collinear, if :

- (A)  $x = y = z$  (B)  $y^2 = z$   
 (C)  $x = z^2$  (D)  $x^2 = y$

25. The distance between the point  $(-1, -5, -10)$  and the point of intersection of the line  $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{12}$  with the plane  $x - y + z = 5$  is :

- (A) 12 (B) 13  
 (C) 15 (D) 16

26. The equation of pair of straight lines through the origin, each of which makes an angle  $\alpha$  with the line  $y = x$  is :

- (A)  $x^2 - 2xy \cos 2\alpha + y^2 = 0$   
 (B)  $x^2 - 2xy \sin 2\alpha + y^2 = 0$   
 (C)  $x^2 - 2xy \sec 2\alpha + y^2 = 0$   
 (D)  $x^2 - 2xy \operatorname{cosec} 2\alpha + y^2 = 0$

which the conclusion of  
value theorem hold for  
 $\sqrt{25 - x^2}$  on the interval

- (B)  $\sqrt{3}$
- (D)  $\sqrt{15}$

$+a$  if  $x \geq 1$   
 $x > 1$   
minimum at  $x = 1$ , then :

- (B)  $a > 5$
- (D)  $a \leq 5$

by the curves  $x^2 = y$ ,  
is :

- (B)  $\frac{5}{4}$  sq. units
- (D)  $\frac{15}{4}$  sq. units

the distance between its  
times the distance  
 $(-2, 0)$  is one of its  
equation of the ellipse is:

- (B)  $3x^2 + 4y^2 = 1$
- (D)  $3x^2 + 4y^2 = 12$

the sphere  $x^2 + y^2 + z^2 = a^2$   
 $\sqrt{2}$  is a circle of radius  
section by the plane  
radius :

- (B)  $\sqrt{35}$  units
- (D)  $\sqrt{45}$  units

with non-zero common  
 $z$  are in G.P., then the  
and  $(c, z)$  are collinear, if :

- (B)  $y^2 = z$
- (D)  $x^2 = y$

between the point  
the point of intersection of  
 $\frac{1}{12} = \frac{z-2}{12}$  with the plane

- (B) 13
- (D) 16

pair of straight lines  
each of which makes an  
one  $y = x$  is :

- $x + y^2 = 0$
- $-y^2 = 0$
- $-y^2 = 0$
- $2\alpha + y^2 = 0$

27. The y-axis and the lines

$$(a^5 - 2a^3)x + (a + 2)y + 3a = 0 \quad \text{and}$$

$$(a^5 - 3a^2)x + 4y + a - 2 = 0 \quad \text{are concurrent}$$

- for :
- (A) No value of a
  - (B) Two values of a
  - (C) Three values of a
  - (D) Five values of a

28. If  $X$  has a Poisson distribution where  
 $2P(X = 0) = P(X = 2)$ , then  $P(0 < X < 3)$  is :

- (A)  $5e^{-2}$
- (B)  $4e^{-2}$
- (C)  $\frac{16}{3}e^{-2}$
- (D)  $\frac{19}{3}e^{-2}$

29. If forces  $P + Q$  and  $P - Q$  make an angle  
 $2\alpha$  with one another and their resultant  
makes an angle  $\theta$  with the bisector of the  
angle between them, then  $\frac{\sin(\alpha + \theta)}{\sin(\alpha - \theta)}$  is  
equal to :

- (A)  $P/(P + Q)$
- (B)  $Q/(P - Q)$
- (C)  $(P - Q)/(P + Q)$
- (D)  $(P + Q)/(P - Q)$

30. If  $\Delta$  stands for the area of the triangle  $ABC$ ,  
then  $b^2 \sin 2C + c^2 \sin 2B$  is equal to :

- (A)  $\Delta$
- (B)  $2\Delta$
- (C)  $3\Delta$
- (D)  $4\Delta$

31. If  $f(x) = \frac{1}{2^n}$ , when  $\frac{1}{2^{n+1}} < x \leq \frac{1}{2^n}$ ,  $n = 0, 1, 2, \dots$

then  $\text{Lt}_{n \rightarrow \infty} \int_{1/2^n}^1 f(x) dx$  equals :

- (A)  $\frac{1}{2}$
- (B)  $\frac{1}{3}$
- (C)  $\frac{2}{3}$
- (D) 0

32. Ship A is 6 kilometre west of a point O and  
moving east at 3 kilometre per hour, ship B  
is 8 kilometre north of O and moving south  
at 4 kilometre per hour. They are nearest to  
one another, when time in hours equals :

- (A)  $1\frac{1}{2}$
- (B) 2
- (C)  $2\frac{1}{2}$
- (D) 3

33. Two points  $P$  and  $Q$  in the Argand diagram  
represent complex numbers  $z$  and  
 $3z + 2 + i$ . If  $P$  moves around the circle with  
centre at origin and radius 2, then  $Q$  moves  
on the circle, whose centre and radius are :

- (A)  $2 + i, 3$
- (B)  $-2 - i, 6$
- (C)  $2 - i, 3$
- (D)  $2 + i, 6$

34. The value of  $k$  for which the circle  
 $x^2 + y^2 - 4x + 6y + 3 = 0$   
will bisect the circumference of the circle  
 $x^2 + y^2 + 6x - 4y + k = 0$  is :

- (A) -47
- (B) 53
- (C) -53
- (D) 47

35. If  $\Delta_k = \begin{vmatrix} 2 \cdot 3^{k-1} & 3 \cdot 4^{k-1} & 4 \cdot 5^{k-1} \\ \alpha & \beta & \gamma \\ 3^n - 1 & 4^n - 1 & 5^n - 1 \end{vmatrix}$

then the value of  $\sum_{k=1}^n \Delta_k$  depends :

- (A) only on  $\alpha$ , not on  $\beta, \gamma$
- (B) only on  $\alpha$  and  $\beta$ , not on  $\gamma$
- (C) on all of  $\alpha, \beta$  and  $\gamma$
- (D) on none of  $\alpha, \beta$  and  $\gamma$

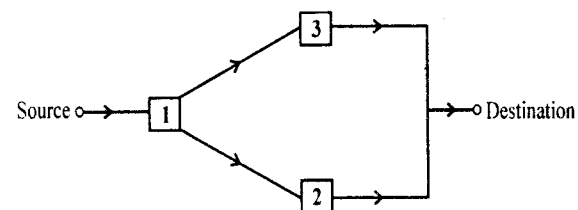
36. If the point  $(2, \kappa)$  lies outside the circle  
 $x^2 + y^2 = 13$  and  $x^2 + y^2 + x - 2y - 14 = 0$ ,  
then :

- (A)  $\kappa \in ] -\infty, -3 [ \cup ] 4, \infty [$
- (B)  $\kappa \in ] -\infty, -2 [ \cup ] 3, \infty [$
- (C)  $\kappa \in ] -3, -2 [ \cup ] 3, 4 [$
- (D)  $\kappa \in ] -3, 4 [$

37. If for real  $p$  the equation  
 $\sin^6 x + \cos^6 x = p$   
always has real solutions, then  $p$  lies in the  
interval :

- (A)  $]1, 2[$
- (B)  $]1, 2]$
- (C)  $[\frac{1}{4}, 1[$
- (D)  $[\frac{1}{4}, 1]$

38. A certain water-supply system consist of a  
source, three pumping stations, and a  
destination. Each pumping station has  
probability  $p$  ( $0 < p < 1$ ) of being operable at  
a specified time  $t_0$  and the stations function  
independently of one another. The stations  
are connected as shown below :



The probability that water is available to  
the destination at time  $t_0$  is :

- (A)  $p^2$
- (B)  $2p^2$
- (C)  $p^2(2 - p)$
- (D)  $p^3$

39. Suppose  $P, Q$  are two like parallel forces. A couple of moment  $G$  is combined with them. Then resultant is displaced through a distance :

- (A)  $\frac{G}{P-Q}$  (B) 0  
(C)  $\frac{2G}{P+Q}$  (D)  $\frac{G}{P+Q}$

40. If  $m$  is the slope of a tangent to the curve  $e^{2y} = 1 + 4x^2$  then :

- (A)  $|m| < 1$  (B)  $|m| \leq 1$   
(C)  $|m| > 1$  (D)  $|m| \geq 1$

### APTITUDE TEST

41. Maitri Mandir is situated in :

- (A) None of these (B) Auroville  
(C) Andhra Pradesh (D) Kerala

42. The famous Padmanabhapuram Palace is located in the State of :

- (A) Kerala (B) Tamil Nadu  
(C) Andhra Pradesh (D) Karnataka

43. Tansen lived during the times of :

- (A) Shivaji (B) Sher Shah Suri  
(C) Akbar (D) Jahangir

44. Which one of the following is not an architect ?

- (A) Le-Corbusier (B) Inder Gujral  
(C) Charles Correa (D) Anant Raje

45. Henry Moore was a :

- (A) Astronomer (B) Architect  
(C) Archaeologist (D) Sculptor

46. In which of these countries can you find the famous man-made constructions of Buckingham Palace and The Big Ben ?

- (A) Japan (B) United Kingdom  
(C) China (D) India

47. The structure of Golden Gate Bridge is :

- (A) Column and Beam  
(B) Floating  
(C) Suspension  
(D) Trussed

48. Famous 'Sun Temple' is situated at :

- (A) Kanpur (B) Puri  
(C) Konark (D) Bhubaneshwar

49. Victoria Memorial is a :

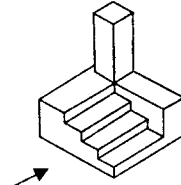
- (A) Railway Station (B) Museum  
(C) Theatre (D) Hospital

50. The famous work of Leonardo da Vinci is :

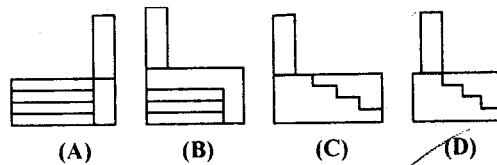
- (A) Cleopatra (B) Elizabeth  
(C) Mona Lisa (D) The king

Directions (for Q. 51 to 53) : 3-D problem figure shows the views of an object. Identify the correct front view as indicated by arrow

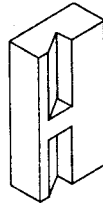
51. Problem Figure



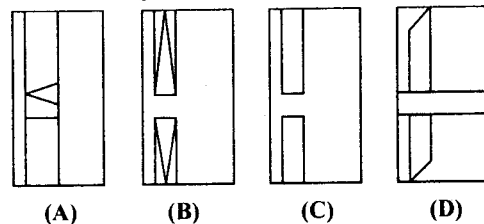
Answer Figures



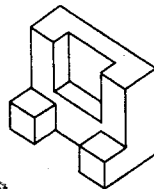
52. Problem Figure



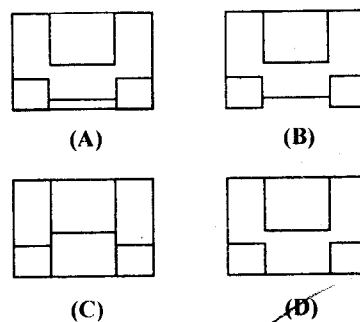
Answer Figures



53. Problem Figures

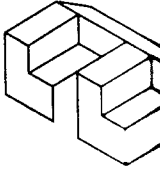


Answers Figures

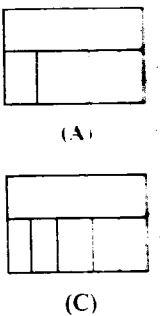


Directions (for Q. 54 to 56) : 3-D problem figure shows the views of an object. Identify the correct front view as indicated by arrow

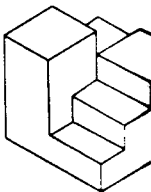
54. Problem Figure



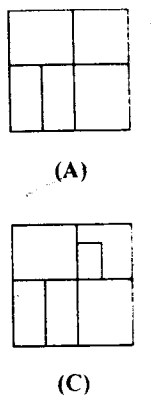
Answer Figure



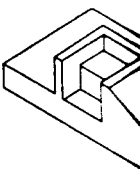
55. Problem Figure



Answer Figure



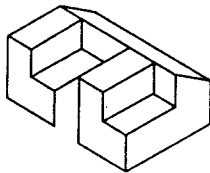
56. Problem Figure



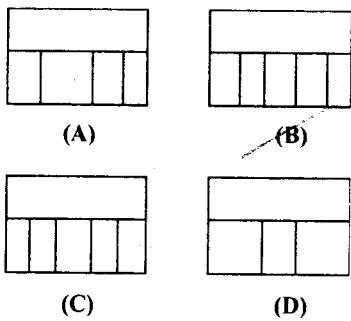
Q. 51 to 53) : 3-D problem views of an object. Identify view as indicated by arrow.

Directions (for Q. 54 to 56) : 3-D problem figure shows the view of an object. Identify the correct top view from amongst the answer figures.

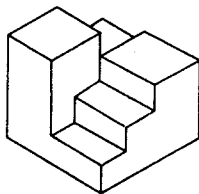
54. Problem Figure



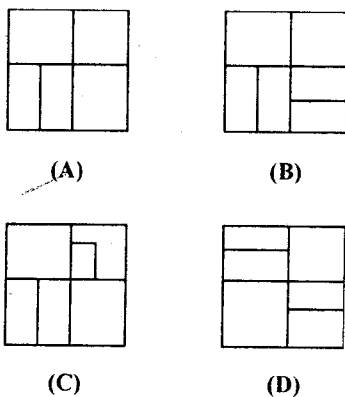
Answer Figures



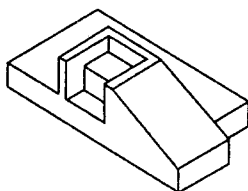
55. Problem Figure



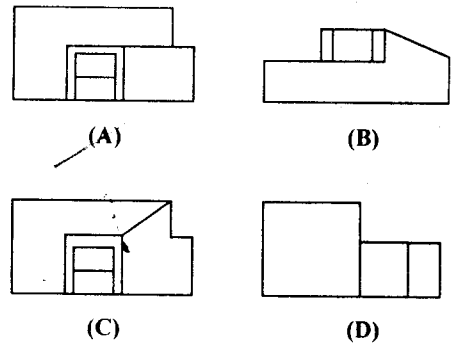
Answer Figures



56. Problem Figure



Answer Figures

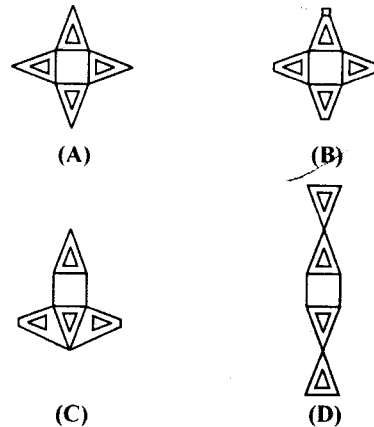


Directions (for Q. 57 to 59) : Which one of the answer figures, shows the correct view, of the 3-D problem figure, after it is opened up ?

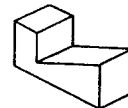
57. Problem Figure



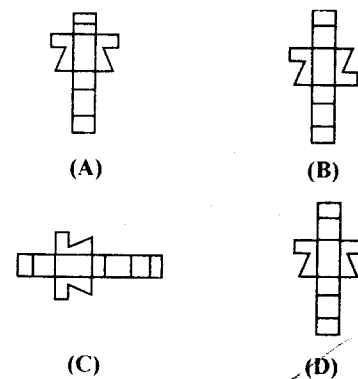
Answer Figures



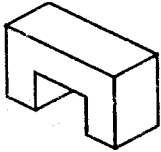
58. Problem Figure



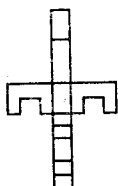
Answer Figures



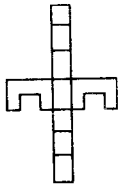
59. Problem Figure



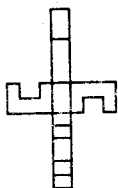
Answer Figures



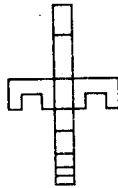
(A)



(B)



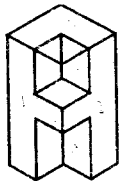
(C)



(D)

Directions (for Q. 60 to 62) : Find out the total number of surfaces of the object given below in the problem figures.

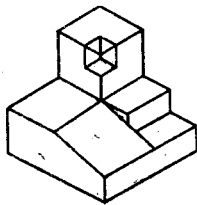
60. Problem Figure



- (A) 8
- (C) 12

- (B) 10
- (D) 14

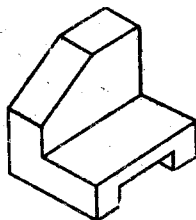
61.



- (A) 16
- (C) 18

- (B) 17
- (D) 19

62.

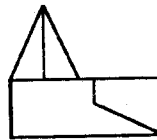


- (A) 10
- (C) 11

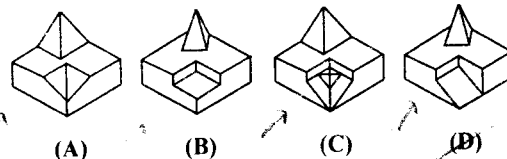
- (B) 12
- (D) 13

Directions (for Q. 63) : Identify the correct 3-D figure, from the answer figures, which has the front view, as given in the problem figure on the left.

63. Problem Figure



Answer Figures

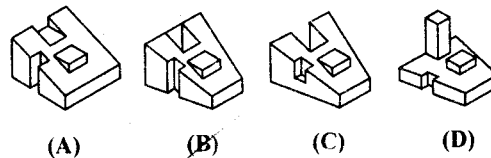


Directions (for Q. 64 and 65) : Identify the correct 3-D figure, from the answer figures, which has the same top view, as given in the problem figure on the left.

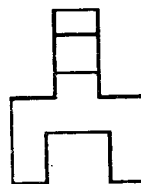
64. Problem Figure



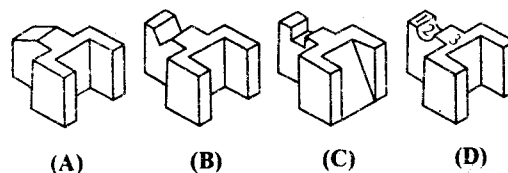
Answer Figures



65. Problem Figure



Answer Figures



66. Which one of the following is a good conductor of radiant heat ?

- (A) Black marble
- (B) White marble
- (C) Red sandstone
- (D) Cement plaster

67. Cement is made of

- (A) Marble
- (C) Sandstone

68. Which of the following is a good conductor of heat ?

- (A) Sandstone
- (C) Brick

69. Which of the following is a good conductor of heat ?

- (A) Jute Mat
- (C) Ground Glass

70. Ozone layer is formed by

- (A) Infrared rays
- (C) Sound waves

71. A white color is a good reflector of heat because

- (A) it absorbs heat
- (B) it reflects heat
- (C) it is a poor conductor
- (D) it is a good conductor

72. Sanitary Fixtures should be

- (A) Glossy and smooth
- (B) Matt and smooth
- (C) Glossy and rough
- (D) Matt and rough

73. Which of the following is a good conductor of heat ?

- (A) Orange, black
- (B) Purple, black
- (C) Orange, white
- (D) Green, white

74. Three true colors are

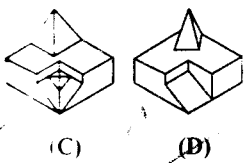
- (A) Black
- (C) Violet

75. Which one of the following is a good conductor of heat ?

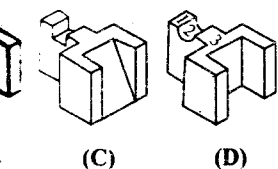
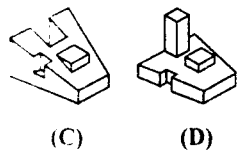
- (A) Black
- (C) Red

Directions : Identify the correct 3-D figure, from the answer figures, which has the same top view, as given in the problem figure on the left.

Q. 63) : Identify the correct answer figures, from the answer figures, at view, as given in the figure on the left.



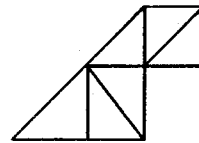
Q. 64 and 65) : Identify the correct answer figures, from the answer figures, at view, as given in the figure on the left.



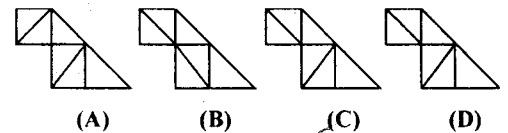
66. Which one of the following will reflect more radiant heat ?  
 (A) Black marble  
 (B) White marble  
 (C) Red sandstone  
 (D) Cement plastered surface
67. Cement is made out of :  
 (A) Marble  
 (B) Limestone  
 (C) Sandstone  
 (D) Granite
68. Which of the following gives smoother surface when polished ?  
 (A) Sandstone  
 (B) Granite  
 (C) Brick  
 (D) Concrete
69. Which of the following is not a sound absorbing material ?  
 (A) Jute Matt  
 (B) Thermocole  
 (C) Ground Glass  
 (D) Glass Wool
70. Ozone layer around the earth prevents penetration of :  
 (A) Infrared rays  
 (B) Ultra-violet rays  
 (C) Sound waves  
 (D) Excessive heat
71. A white coloured building interior looks larger because :  
 (A) it absorbs more light  
 (B) it reflects more light  
 (C) it is a cool colour  
 (D) it is a warm colour
72. Sanitary Fixtures are :  
 (A) Glossy and smooth  
 (B) Matt and smooth  
 (C) Glossy and rough  
 (D) Matt and rough
73. Which of the following are secondary colour ?  
 (A) Orange, blue and green  
 (B) Purple, blue and green  
 (C) Orange, purple and green  
 (D) Green, orange and yellow
74. Three true primary colours when mixed together are closest to :  
 (A) Black  
 (B) White  
 (C) Violet  
 (D) Blue
75. Which one of the following colours is the most tranquilizing ?  
 (A) Black  
 (B) Blue  
 (C) Red  
 (D) Yellow

Directions (for Q. 76 to 77) : Which one of the answer figures is the correct mirror image of the given problem figure ?

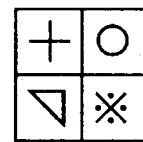
76. Problem Figure



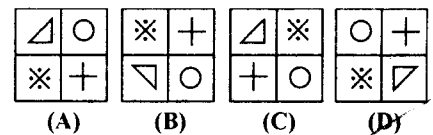
Answer Figures



77. Problem Figure

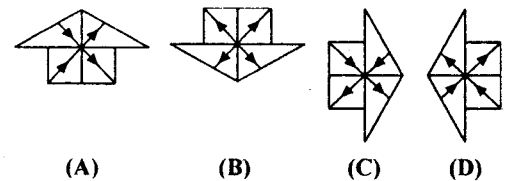


Answer Figures

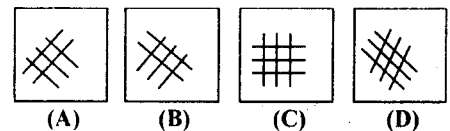


Directions (for Q. 78 to 80) : Find the odd figure out :

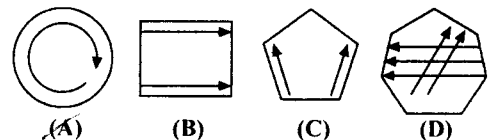
78.



79.

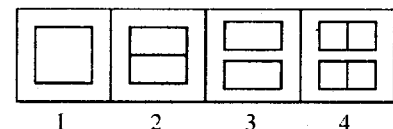


80.

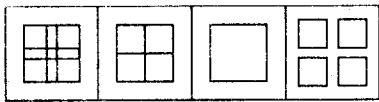


Directions (for Q. 81 to 84) : Which one of the answer figures will complete the sequence of the problem figures ?

81. Problem Figures

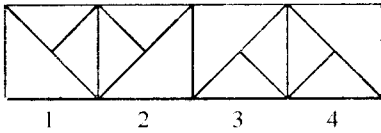


Answer Figures

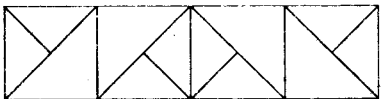


(A) (B) (C) (D)

82. Problem Figures

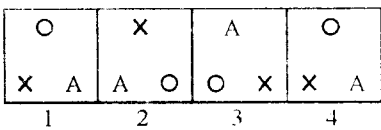


Answer Figures

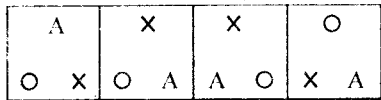


(A) (B) (C) (D)

83. Problem Figures

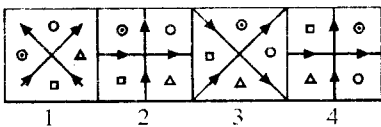


Answer Figures

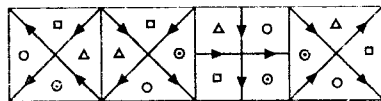


(A) (B) (C) (D)

84. Problem Figures



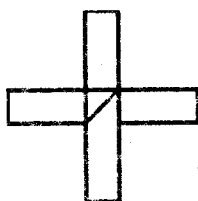
Answer Figures



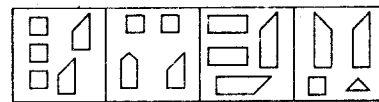
(A) (B) (C) (D)

**Direction (for Q. 85) :** Some geometrical shapes are given, on the right, in answer figures. When they are assembled, which one of them, will form the figure given on the left ?

85. Problem Figure



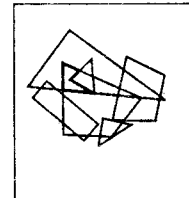
Answer Figures



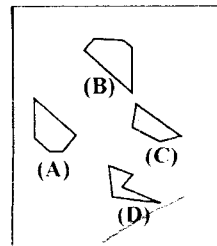
(A) (B) (C) (D)

**Directions (for Q. 86) :** Which one of the answer figures, is hidden in the problem figure, in the same size and direction ?

86. Problem Figure

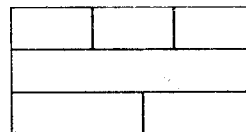


Answer Figures



**Directions (for Q. 87) :** How many total number of rectangles are there in the problem figure, given below ?

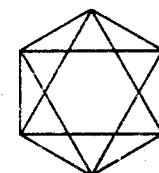
87.



(A) 11 (B) 12 (C) 13 (D) 14

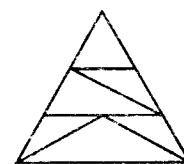
**Directions (for Q. 88 and 89) :** How many total number of triangles are there in the problem figure, given below ?

88. Problem Figure



(A) 28 (B) 30 (C) 36 (D) 38

89. Problem Figure



(A) 6 (B) 7 (C) 8 (D) 9

Directi  
number  
figure. g

90.



(A) 20  
(B) 16  
(C) 14  
(D) 15

1. (A) 2  
6. (B) 7  
11. (C) 12  
16. (D) 17  
21. (C) 22  
26. (C) 27  
31. (D) 32  
36. (A) 37  
41. (B) 42  
46. (B) 47  
51. (D) 52  
56. (A) 57  
61. (A) 62  
66. (B) 67  
71. (B) 72  
76. (C) 77  
81. (D) 82  
86. (D) 87

1. (A), x

x

=> 1 - a

=> a

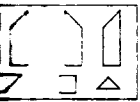
y

y

=> 1 - b

=> b





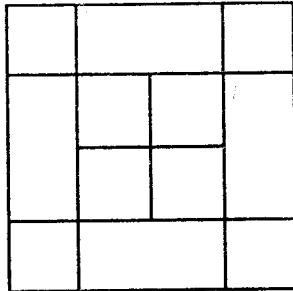
86) : Which one of the hidden in the problem size and direction ?

87) : How many total are there in the below ?

88 and 89) : How many triangles are there in the below ?

Directions (for Q. 90) : How many total number of squares are there in the problem figure, given below ?

90.



- (A) 20
- (B) 16
- (C) 14
- (D) 18

**ANSWERS SHEET**

- |         |         |         |         |         |
|---------|---------|---------|---------|---------|
| 1. (A)  | 2. (A)  | 3. (A)  | 4. (A)  | 5. (D)  |
| 6. (B)  | 7. (D)  | 8. (A)  | 9. (C)  | 10. (C) |
| 11. (C) | 12. (B) | 13. (D) | 14. (B) | 15. (D) |
| 16. (D) | 17. (D) | 18. (A) | 19. (D) | 20. (D) |
| 21. (C) | 22. (D) | 23. (B) | 24. (A) | 25. (B) |
| 26. (C) | 27. (B) | 28. (B) | 29. (D) | 30. (D) |
| 31. (D) | 32. (B) | 33. (D) | 34. (A) | 35. (C) |
| 36. (A) | 37. (B) | 38. (B) | 39. (B) | 40. (A) |
| 41. (B) | 42. (B) | 43. (C) | 44. (B) | 45. (C) |
| 46. (B) | 47. (A) | 48. (C) | 49. (B) | 50. (C) |
| 51. (D) | 52. (D) | 53. (D) | 54. (A) | 55. (A) |
| 56. (A) | 57. (B) | 58. (D) | 59. (D) | 60. (C) |
| 61. (A) | 62. (A) | 63. (C) | 64. (B) | 65. (D) |
| 66. (B) | 67. (B) | 68. (B) | 69. (C) | 70. (B) |
| 71. (B) | 72. (A) | 73. (C) | 74. (A) | 75. (D) |
| 76. (C) | 77. (D) | 78. (B) | 79. (C) | 80. (A) |
| 81. (D) | 82. (D) | 83. (C) | 84. (B) | 85. (C) |
| 86. (D) | 87. (A) | 88. (A) | 89. (D) | 90. (C) |

**SOLUTIONS**

1. (A),  $x = 1 + a + a^2 + \dots$  ( $|a| < 1$ )

$$x = \frac{1}{1-a}$$

$$\Rightarrow 1-a = \frac{1}{x} \Rightarrow a = 1 - \frac{1}{x}$$

$$\Rightarrow a = \frac{x-1}{x}$$

$y = 1 + b + b^2 + \dots$  ( $|b| < 1$ )

$$y = \frac{1}{1-b}$$

$$\Rightarrow 1-b = \frac{1}{y} \Rightarrow b = 1 - \frac{1}{y}$$

$$\Rightarrow b = \frac{y-1}{y}$$

(C) 36 (D) 38

(C) 8 (D) 9

Sum of the series

$$= 1 + ab + a^2b^2 + \dots (|ab| < 1)$$

$$= \frac{1}{1-ab}$$

$$= \frac{1}{1 - \left(\frac{x-1}{x}\right)\left(\frac{y-1}{y}\right)} = \frac{xy}{xy - (xy - x - y + 1)}$$

$$= \frac{xy}{x+y-1}$$

2. (A), Equation  $(\alpha + 2)x^2 - 2\alpha x - \alpha = 0$

$$x = 2\alpha \pm \frac{\sqrt{4\alpha^2 + 4\alpha(\alpha + 2)}}{2(\alpha + 2)}$$

$$= \frac{2\alpha \pm \sqrt{8\alpha^2 + 8\alpha}}{2(\alpha + 2)} = \frac{\alpha \pm \sqrt{2\alpha^2 + 2\alpha}}{\alpha + 2}$$

According to the given condition

$$(\alpha + \sqrt{2\alpha^2 + 2\alpha}) - 1 = 1 - (\alpha - \sqrt{2\alpha^2 + 2\alpha})$$

$$2\alpha = 2\sqrt{2\alpha^2 + 2\alpha} + 2$$

$$\alpha = \sqrt{2\alpha^2 + 2\alpha} + 1$$

$$(\alpha - 1)^2 = 2\alpha^2 + 2\alpha$$

$$\alpha^2 - 2\alpha + 1 = 2\alpha^2 + 2\alpha$$

$$\alpha^2 + 4\alpha - 1 = 0$$

$$\alpha = \frac{-4 \pm \sqrt{16 + 4}}{2} = \frac{-4 \pm 2\sqrt{4 + 1}}{2}$$

$$= -2 \pm \sqrt{5}$$

$$\Rightarrow \alpha \in \{0, 1\}$$

3. (A),  ${}^nC_2 \times {}^nC_2$

4. (A),  $\frac{dx}{dt} = t(t+1)$

$$\Rightarrow dx = t(t+1) dt$$

$$x = \frac{t^3}{3} + \frac{t^2}{2} + C$$

at  $t = 0, x = 0 \Rightarrow C = 0$

$$\therefore x = \frac{t^3}{3} + \frac{t^2}{2}$$

$$\Rightarrow 6x = 2t^3 + 3t^2$$

Now,  $\frac{dy}{dt} = \frac{1}{t+1}$

$$\Rightarrow dy = \frac{1}{t+1} dt$$

$$y = \log(t+1) + C_2$$

at  $t = 0, y = 0 \Rightarrow C_2 = 0$

$$y = \log(t+1) \Rightarrow t+1 = e^y$$

$$\Rightarrow t = e^y - 1$$

Now  $6x = t^2(2t+3)$

$$6x = (e^y - 1)^2(2e^y + 1)$$

5. (D),

6. (B), Directions Ratios of  $L_2$  will be  $(3 - 1)$   
 $(2 - 2), (1 - 3)$  i.e.,  $2, 0, -2$

Angle between  $L_1$  and  $L_2$  is given by

**SOLVED  
PAPER-II**

**ALL INDIA ENGINEERING/  
ARCHITECTURE ENTRANCE  
EXAM. (AIEEE), 2006**

**Mathematics  
Aptitude Test**

**PART - I**

**MATHEMATICS**

- If a circle of area  $16\pi$  has two of its diameters along the lines  $2x - 3y + 5 = 0$  and  $x + 3y - 11 = 0$ , then the equation of the circle is :  
(A)  $x^2 + y^2 - 4x - 6y - 13 = 0$   
(B)  $x^2 + y^2 - 4x + 6y - 3 = 0$   
(C)  $x^2 + y^2 - 4x + 6y - 13 = 0$   
(D)  $x^2 + y^2 - 4x - 6y - 3 = 0$
- The mean deviation of an ungrouped data is 10. If each observation is increased by 4%, the revised mean deviation is :  
(A) 10.04 (B) 9.6  
(C) 10.0 (D) 10.4
- The line  $x \sin \alpha - y \cos \alpha = a$  touches the circle  $x^2 + y^2 = a^2$ . Then :  
(A)  $\alpha$  can have any value  
(B)  $\alpha \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$   
(C)  $\alpha \in [0, \pi]$   
(D)  $\alpha \in [-\pi, \pi]$
- If  $f$  is a continuously differentiable function then  $\int_0^{1.5} [x^2] f'(x) dx$  is :  
(A)  $2f(1.5) + f(\sqrt{2}) + f(1)$   
(B)  $2f(1.5) - f(\sqrt{2}) - f(1)$   
(C)  $f(1.5) - f(\sqrt{2}) - f(1)$   
(D)  $f(1.5) + f(\sqrt{2}) + f(1)$
- A particle has two velocities  $\vec{v}_1$  and  $\vec{v}_2$ . Its resultant velocity is equal to  $\vec{v}_1$  in magnitude. The angle which the new resultant makes with  $\vec{v}_2$  when  $\vec{v}_1$  is doubled is :  
(A)  $180^\circ$  (B)  $60^\circ$   
(C)  $90^\circ$  (D)  $120^\circ$
- The domain of the function  $f(x) = \sqrt{2x-3} + \sin x + \sqrt{x-1}$  is :  
(A)  $\left[\frac{3}{2}, \infty\right)$  (B)  $[1, \infty)$   
(C)  $[-\infty, 1]$  (D)  $[0, 1]$
- The system of equations  
 $x + y + z = 0$   
 $ax + by + z = 0$   
 $bx + y + z = 0$   
has a non-trivial solution, when  
(A)  $b - a = 0$  (B)  $b^2 = 2b$   
(C)  $b^2 = 2b + 1$  (D)  $b^2 = 2b - 1$
- The slope of the normal to the curve  $y = x^3 - 4x^2$  at  $(2, -1)$  is :  
(A) 4 (B) -4  
(C)  $-\frac{1}{4}$  (D)  $\frac{1}{2}$
- If  $A$  and  $B$  are square matrices of the same order, then which of the following is always true ?  
(A)  $A$  and  $B$  are non-zero and  $|AB| = 0 \Leftrightarrow |A| = 0$  and  $|B| = 0$   
(B)  $(AB^{-1}) = A^{-1}B^{-1}$   
(C)  $(A+B)^{-1} = A^{-1} + B^{-1}$   
(D)  $\text{adj}(AB) = (\text{adj } B)(\text{adj } A)$
- If the centroid of the triangle with vertices  $(3c+2, 2, 0)$ ,  $(2c, -1, -1)$  and  $(c+2, 3c+1, c+3)$  coincides with the centre of the sphere  $x^2 + y^2 + z^2 + 5ax - 4by - 2cz = 13$  then :  
(A)  $c = 3$  (B)  $c = 0$   
(C)  $c = 1$  (D)  $c = 2$
- Let  $\vec{a} = (\hat{i} - 2\hat{j} + 3\hat{k})$  and  $\vec{b} = (\hat{i} + 11\hat{j} + 7\hat{k})$  be given vectors. The vector  $\vec{r} = \hat{i} + y\hat{j} + z\hat{k}$  that satisfies the equation  $\vec{r} \times \vec{a} = \vec{b}$  is :  
(A)  $(1, 9, -14)$  (B)  $(1, -9, -14)$   
(C)  $(1, -9, 14)$  (D)  $(1, 9, 14)$
- The greatest resultant and the smallest resultant that two given forces can have are of magnitude  $R$  and  $S$  respectively. The given forces and a third force whose magnitude is  $\sqrt{RS}$  keep a particle in equilibrium. Then :  
(A) two of these forces are perpendicular to each other  
(B) two of these forces are parallel to each other  
(C) angle between two of these forces is  $60^\circ$   
(D) angle between two of these forces is  $45^\circ$
- If the quadratic equations  $ax^2 + cx - b = 0$  and  $ax^2 - 2bx + \frac{c}{2} = 0$ ,  $\left(b + \frac{c}{2} \neq 0\right)$  have a common root, then the value of  $a - 4b + 2c$  is :

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- (A) 2 (B) 1  
(C) 0 (D) -1
14. Two friends A and B start walking from the same point O. A heads straight towards north. But B first walks 4 km towards north-east, then heads towards  $30^\circ$  west of north. If A and B meet at a point X, then distance of X from O is :
- (A)  $2\sqrt{2}\left(1 + \frac{1}{\sqrt{3}}\right)$  km (B)  $2\sqrt{2}(1 + \sqrt{3})$  km  
(C)  $4\left(1 + \frac{1}{2}\right)$  km (D)  $2\sqrt{2}\left(1 + \frac{1}{2}\right)$  km
15. A particular solution of the initial value differential equation :
- $\log\left(\frac{dy}{dx}\right) = 3x + 4y, y(0) = 0$  is :
- (A)  $4e^{3x} + 3e^{-4y} = 7$   
(B)  $16y = -3(4x + 3 - 3e^{4x})$   
(C)  $16y = 3(4x - 3 + 3e^{4x})$   
(D)  $3e^{-4y} - 4e^{4x} = 1$
16. An equilateral triangle is inscribed in the parabola  $y^2 = 8x$  with one of its vertices at the vertex of the parabola. Then the length of its side is :
- (A) 16 (B) 8  
(C)  $8\sqrt{3}$  (D)  $16\sqrt{3}$
17. The area enclosed by the parabola  $y = 3(1 - x^2)$  and the  $x$ -axis is :
- (A) 9 (B) 2  
(C) 4 (D) 3
18. The pair of straight lines joining the origin to the point of intersection of the straight lines  $y = 2x + c$  and the curve  $x^2 + y^2 = 7$  are at right angles if :
- (A)  $c^2 = 70$  (B)  $c^2 = 35$   
(C)  $c^2 = 11$  (D)  $c^2 = 17.5$
19. A plane passes through a fixed point  $(p, q, r)$ . The locus of the foot of the perpendicular to the plane from the origin is :
- (A) a sphere  
(B) a plane perpendicular to the given plane  
(C) a plane inclined at an angle of  $\frac{\pi}{4}$  with the given plane  
(D) a straight line
20. The number of solutions of the equation  $\tan x + \sec x = 2 \cos x$  lying in the interval  $[0, 2\pi]$  is :
- (A) 3 (B) 0  
(C) 1 (D) 2
21. If  $|z| = 3$ , then the point representing the complex number  $-3 + 3z$  lies on a circle :
- (A) with centre 3 and radius 9  
(B) with centre -3 and radius 3  
(C) with centre -3 and radius 9  
(D) with centre 3 and radius 3

22. If the first three terms of a sequence  $\frac{1}{16}, a, b, \frac{1}{6}$  are in G.P. and the last three are in H.P., then the values of  $a$  and  $b$  respectively are :
- (A)  $\frac{1}{9}, \frac{1}{12}$  (B)  $-\frac{1}{4}, 1$   
(C)  $\frac{1}{12}, \frac{4}{9}$  (D)  $\frac{4}{7}, \frac{3}{4}$
23.  $\frac{5 + i \sin \theta}{5 - 3i \sin \theta}$  is a real number when :
- (A)  $\theta = -\frac{\pi}{2}$  (B)  $\theta = \frac{\pi}{2}$   
(C)  $\theta = \frac{\pi}{4}$  (D)  $\theta = -\pi$
24. If the roots of the quadratic equation  $x^2 + 2px + q = 0$  are  $\tan 30^\circ$  and  $\tan 15^\circ$ , respectively, then  $q$  is :
- (A)  $1 - 2p$  (B)  $1 + 2p$   
(C)  $1 + p$  (D)  $1 - p$
25. Two events A and B are such that  $P(B) = 0.55$  and  $P(AB) = 0.15$ . The probability of the occurrence of at least one event is :
- (A) 0.35 (B) 0.30  
(C) 0.70 (D) 0.20
26. For  $\theta \neq 0$ , if  $\cos \theta + \sec \theta = 2$ , then  $\cos^n \theta + \sec^n \theta$  equals :
- (A)  $2^{n+1}$  (B) 2  
(C)  $2^n$  (D)  $(-2)^n$
27. A function  $f(x)$  is defined as
- $$f(x) = \begin{cases} xg(x); & x \neq 0 \\ 0 & ; x = 0 \end{cases}$$
- where it is given that  $\lim_{x \rightarrow 0} g(x) = 5$ . Then  $f'(0)$  is :
- (A) 5 (B) 0  
(C)  $\infty$  (D) 1
28. For the curve  $x = t^2 - 1, y = t^2 - t$ , the tangent line is perpendicular to the  $x$ -axis when :
- (A)  $t = \frac{1}{\sqrt{3}}$  (B)  $t = \frac{1}{2}$   
(C)  $t = 0$  (D)  $t = 1$
29. If  $x = a \cos^3 t, y = a \sin^3 t$ , then  $\left(\frac{d^2y}{dx^2}\right)_{t=\frac{\pi}{3}}$  is :
- (A)  $\frac{32}{27a}$  (B)  $\frac{32}{3\sqrt{3}a}$   
(C)  $\frac{16}{3\sqrt{3}a}$  (D)  $\frac{16}{27a}$
30.  $\int_4^{-5} e^{(x+5)^2} dx + 3 \int_{1/3}^{2/3} e^{9\left(x-\frac{2}{3}\right)^2} dx$  is :
- (A) 1 (B) 2  
(C) 0 (D) -2

31. The line  $y = \dots$   
curves  $y = \dots$   
regions wh  
(A) 2:3  
(C) 2:1
32. If PQ is a  
 $\frac{x^2}{a^2} - \frac{y^2}{b^2} = \dots$   
triangle, O  
the eccent
- (A)  $e > \frac{2}{\sqrt{3}}$   
(C)  $e = \frac{2}{\sqrt{3}}$
33. If  $a, x, b$  are  
the value o
- (A)  $\frac{1}{2} ab$   
(C)  $ab$
34. Let  $\vec{u}, \vec{v}$   
 $\vec{u} + \vec{v} + \vec{w} = \dots$   
If  $|\vec{u}| = 3, |\vec{v}| = \dots$   
 $\vec{u} \cdot \vec{v} = \dots$
- (A) 25  
(C) -25
35. If  $f(x) = 4$   
 $[0, \pi]$ , then  
= 0 of :
- (A)  $c = \frac{\pi}{2}$   
(C)  $c = \frac{\pi}{6}$
36. If  $(1+x)(1+x^2+\dots+x^{n-1}) = 1+x^n$   
the value of
- (A)  $n$   
(C)  $m+1$
37. If in the exp  
efficients of  
the third te
- (A) 605  
(C) 455
38. A set B con

of a sequence  $\frac{1}{16}, a, b, \frac{1}{6}$  three are in H.P., then the respectively are :

- (B)  $-\frac{1}{4}, 1$
- (D)  $\frac{4}{7}, \frac{3}{4}$

number when :

- (B)  $\theta = \frac{\pi}{2}$
- (D)  $\theta = -\pi$

quadratic equation  $x^2 + 2px + q = 0$  has roots  $\alpha, \beta$  such that  $\alpha^2 + \beta^2 = 15$ , respectively, then  $q$

- (B)  $1 - 2p$
- (D)  $1 - p$

such that  $\alpha + \beta = 0.15$  occurrence of at least one

- (B) 30
- (D) 20

if  $\theta = 2$ , then  $\cos^n \theta + \sec^n \theta$

- (B) 2
- (D)  $-2^n$

is defined as

- (B) 2
- (D)  $-2^n$

if  $g(x) = 5$ . Then  $f'(0)$  is :

- (B) 0
- (D) 1

if  $y = t^2 - t$ , the tangent line to the curve at  $t = 1$  is parallel to the x-axis when :

- (B)  $t = \frac{1}{2}$
- (D)  $t = 1$

if  $y = \frac{d^2y}{dx^2}$  at  $t = \frac{\pi}{3}$  is :

- (B)  $\frac{32}{3\sqrt{3}a}$
- (D)  $\frac{16}{27a}$

if  $\int_0^1 (x - \frac{2}{3})^2 dx$  is :

- (B) 2
- (D) -2

31. The line  $y = x + 1$  divides the area between the curves  $y = \cos x$ ,  $[-\frac{\pi}{2}, \frac{\pi}{2}]$  and the x-axis into two regions which are in the ratio :

- (A) 2:3
- (B) 1:1
- (C) 2:1
- (D) 1:3

32. If PQ is a double ordinate of the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ , such that OPQ is an equilateral triangle, O being the centre of the hyperbola, then the eccentricity  $e$  of the hyperbola satisfies :

- (A)  $e > \frac{2}{\sqrt{3}}$
- (B)  $1 < e < \frac{2}{\sqrt{3}}$
- (C)  $e = \frac{2}{\sqrt{3}}$
- (D)  $e = \frac{\sqrt{3}}{2}$

33. If  $a, x, b$  are in H.P. and  $a, y, z, b$  are in G.P., then the value of  $\frac{xy}{x(y^3 + z^3)}$  is :

- (A)  $\frac{1}{2} ab$
- (B)  $2ab$
- (C)  $ab$
- (D)  $\frac{1}{2ab}$

34. Let  $\vec{u}, \vec{v}$  and  $\vec{w}$  be vectors such that  $\vec{u} + \vec{v} + \vec{w} = 0$ .

If  $|\vec{u}| = 3, |\vec{v}| = 4$  and  $|\vec{w}| = 5$ , then  $\vec{u} \cdot \vec{v} + \vec{v} \cdot \vec{w} + \vec{w} \cdot \vec{u}$  is :

- (A) 25
- (B) 47
- (C) -25
- (D) 0

35. If  $f(x) = 4^{\sin x}$  satisfies the Rolle's theorem on  $[0, \pi]$ , then the value of  $c \in (0, \pi)$ , for which  $f'(c) = 0$  of :

- (A)  $c = \frac{\pi}{2}$
- (B)  $c = \frac{\pi}{3}$
- (C)  $c = \frac{\pi}{6}$
- (D)  $c = \frac{\pi}{4}$

36. If  $(1+x)(1+x+x^2)(1+x+x^2+x^3) + \dots + (1+x+x^2 + \dots + x^n) = a_0 + a_1x + a_2x^2 + \dots + a_nx^n$ , then the value of  $a_1$  is :

- (A)  $n$
- (B)  $m$
- (C)  $m+1$
- (D)  $n+1$

37. If in the expansion of  $(x^3 - \frac{1}{x^2})^n$ , the sum of coefficients of  $x^5$  and  $x^{10}$  is 0, then the coefficient of the third term is :

- (A) 605
- (B) 120
- (C) 455
- (D) 105

38. A set B contains 2007 elements. Let C be the set

consisting of subsets of B which contain at most 1003 elements. The number of elements of C is :

- (A)  $2^{1003}$
- (B)  $2^{2007}$
- (C)  $2^{2005}$
- (D)  $2^{2006}$

39. If  $\sin(xy) + \cos(xy) = 1$  and  $\tan(xy) \neq 1$ , then  $\frac{dy}{dx}$  is equal to :

- (A)  $-\frac{x}{y}$
- (B)  $-xy$
- (C)  $xy$
- (D)  $-\frac{y}{x}$

40. The circle passing through the distinct points  $(1, t), (t, 1)$  and  $(t, t)$  for all values of  $t$  passes through the point :

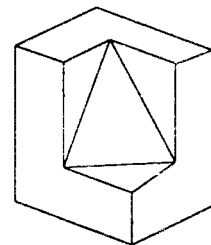
- (A)  $(-1, -1)$
- (B)  $(1, 1)$
- (C)  $(1, -1)$
- (D)  $(-1, 1)$

**PART - II**

**APTITUDE TEST**

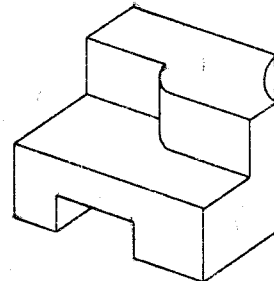
Direction : (For Q. 41 to 44). Find out the total number of surfaces of the object given below in the problem figure.

41. Problem Figure



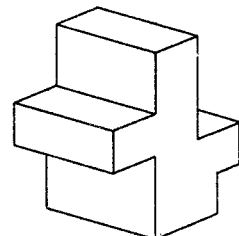
- (A) 14
- (B) 8
- (C) 10
- (D) 12

42. Problem Figure



- (A) 15
- (B) 12
- (C) 13
- (D) 14

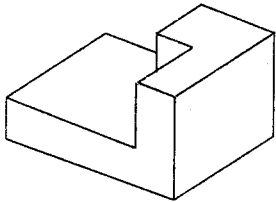
43. Problem Figure



- (A) 14  
(C) 12

- (B) 11  
(D) 13

44. Problem Figure

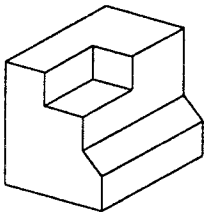


- (A) 12  
(C) 10

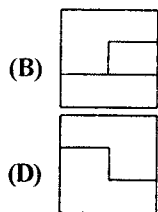
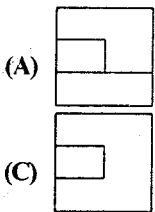
- (B) 9  
(D) 11

Directions : (For Q. 45 to 49). 3-D Problem figure shows the view of an object. Identify the correct top view from amongst the answer figures.

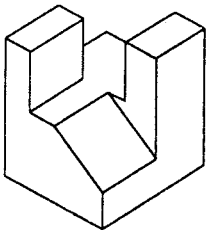
45. Problem Figure



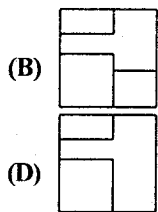
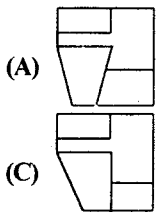
Answer Figures



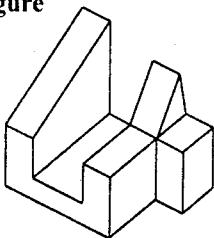
46. Problem Figure



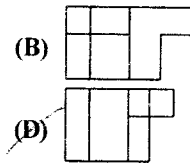
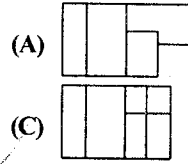
Answer Figures



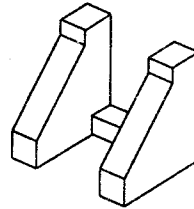
47. Problem Figure



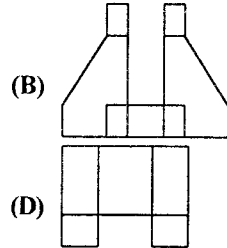
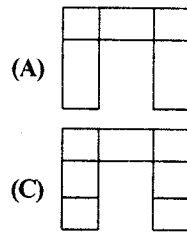
Answer Figures



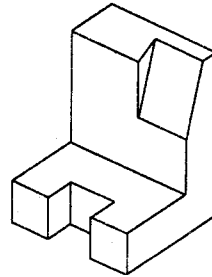
48. Problem Figure



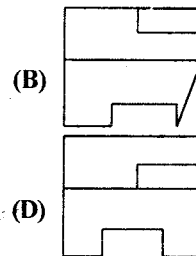
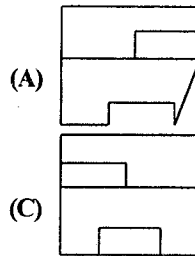
Answer Figures



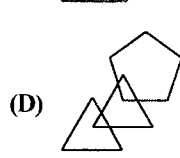
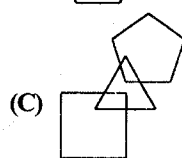
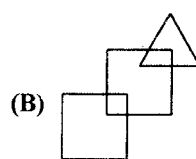
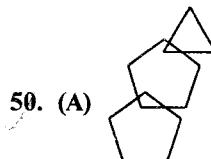
49. Problem Figure



Answer Figures



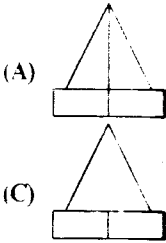
Directions : (For Q. 50). Find the odd figure out.



Directions : (For Q. 51). Problem figure shows top view of an object. Identify the correct elevation, from amongst the answer figures.

51. Problem Figure

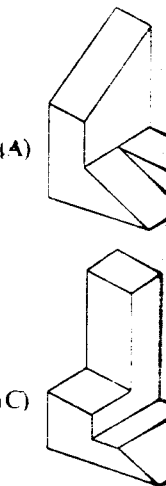
Answer Figure



Directions : (For Q. 52). Correct 3-D figures show the elevation of the object from the left.

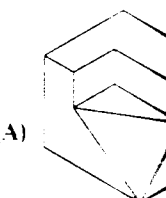
52. Problems Figure

Answer Figure

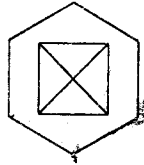


53. Problems Figure

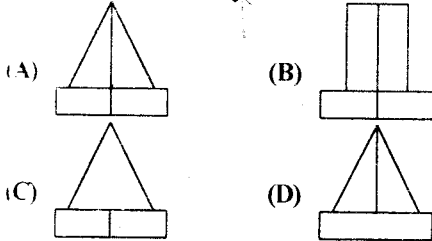
Answer Figure



51. Problem Figure

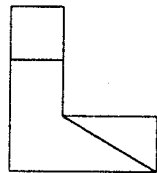


Answer Figures

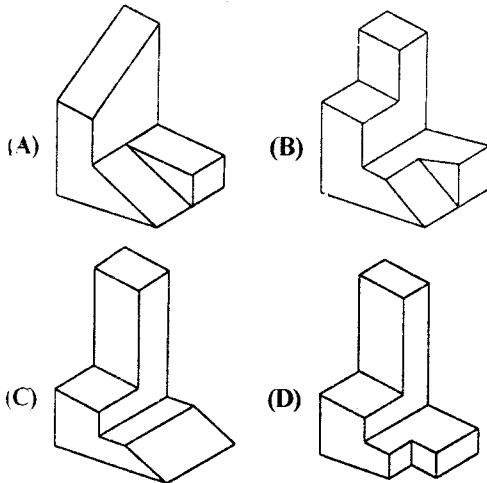


Directions : (For Q. 52 and 53). Identify the correct 3-D figures from the answer figures, which has the elevation, as given in the problem figure on the left.

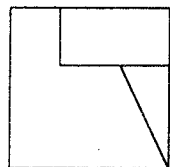
52. Problems Figure



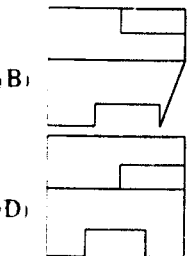
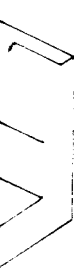
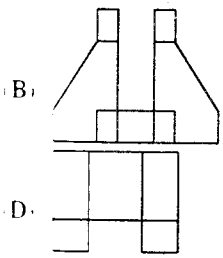
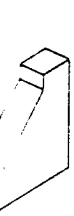
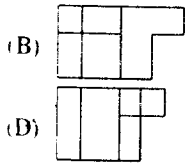
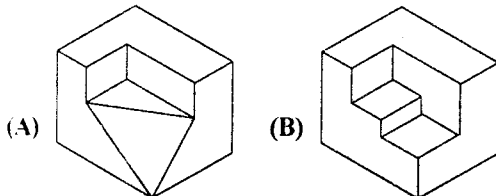
Answer Figures



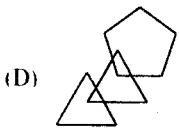
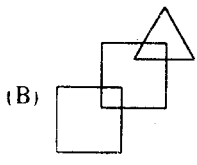
53. Problems Figure



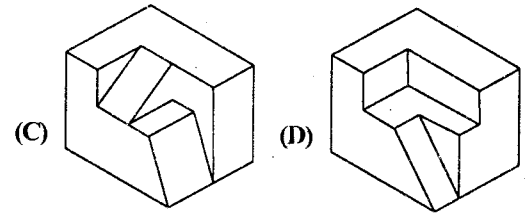
Answer Figures



54. Find the odd figure out.

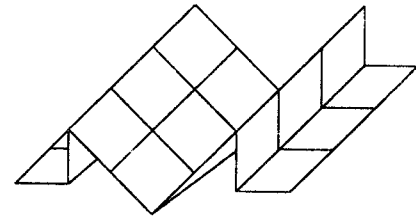


55. Problem figure shows top view. Find the correct elevation, from the answer figures.



Direction : (For Q. 54). Squares were drawn on one side of the entire sheet of paper. The paper was then folded as shown in the figure. How many total number of squares are there on the flat surfaces ?

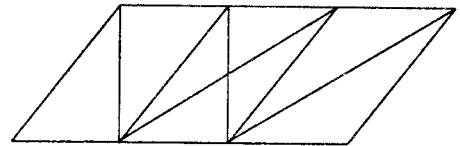
54.



- (A) 34 (B) 24  
(C) 28 (D) 32

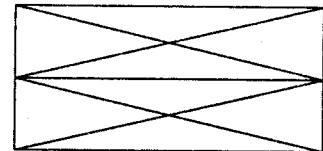
Directions : (For Q. 55 and 56). How many total number of triangles are there in the problem figure given below ?

55. Problem Figure



- (A) 16 (B) 10  
(C) 12 (D) 14

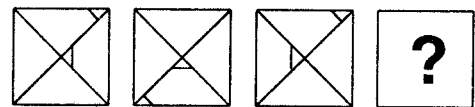
56. Problem Figure



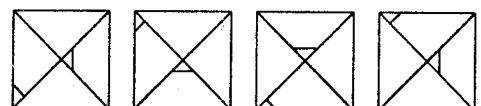
- (A) 22 (B) 16  
(C) 18 (D) 20

Directions : (For Q. 57 and 58). Which one of the answer figures will complete the sequence of the three problem figures ?

57. Problem Figures

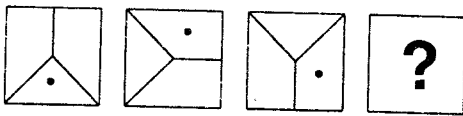


Answer Figures

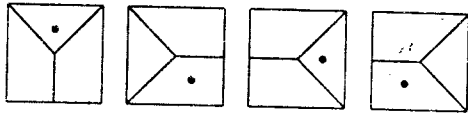


- (A) (B) (C) (D)

58. Problem Figures

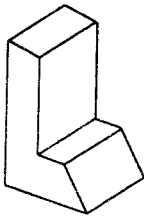


Answer Figures

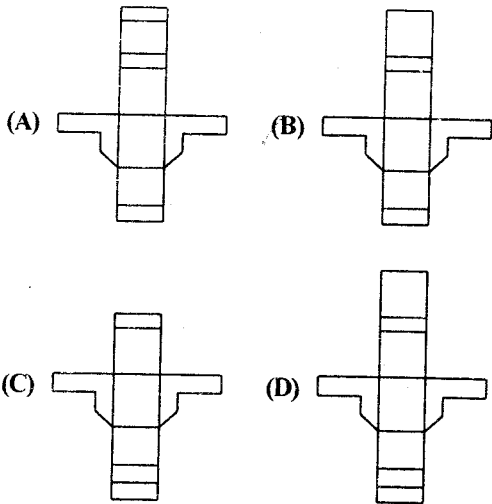


Directions : (For Q. 59, 60 and 61). Which one of the answer figures, shows the correct view of the problem figure, after it is opened up ?

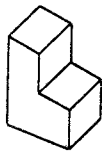
59. Problem Figure



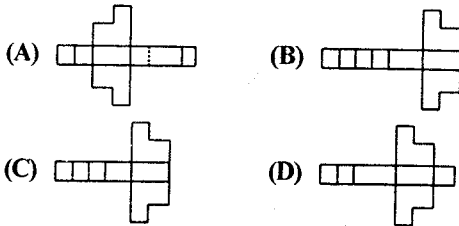
Answer Figures



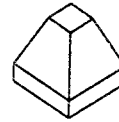
60. Problem Figure



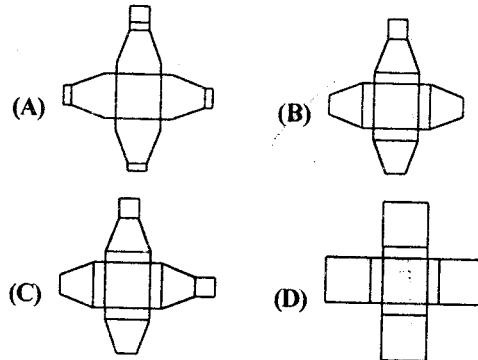
Answer Figures



61. Problem Figure

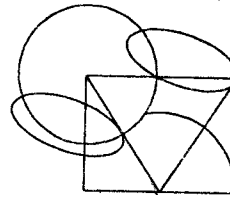


Answer Figures

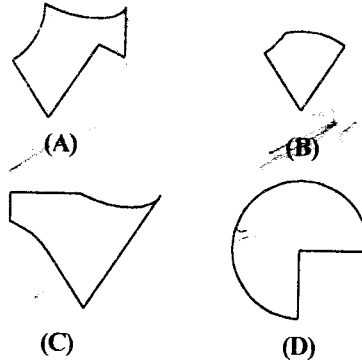


Directions : (For Q. 62). One of the following answer figures is not hidden in the problem figure, in the same size and direction. Select that one as the correct answer.

62. Problem Figure

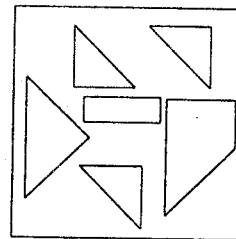


Answer Figures

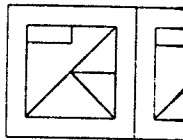


Directions : (For Q. 63). Some geometrical figures are given in the problem figure. After assembling them, which figure will be formed, from amongst the answer figures ?

63. Problem Figure

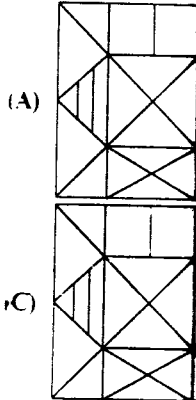


Answer Figures

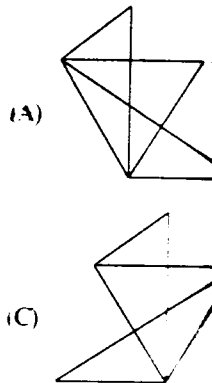


Directions : (For answer figures is given problem figure)

64. Problem Figure

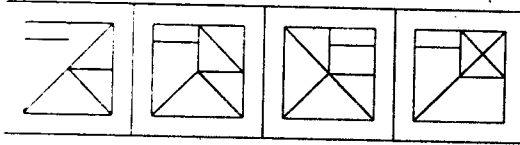


65. Problem Figure



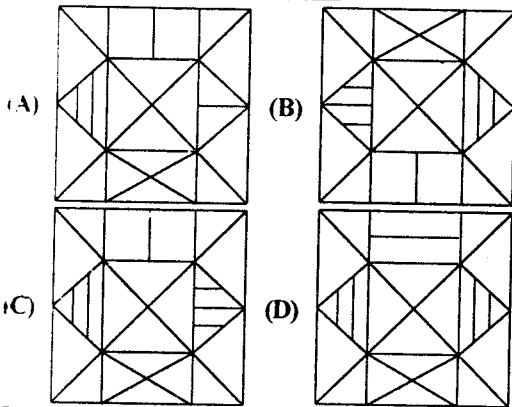
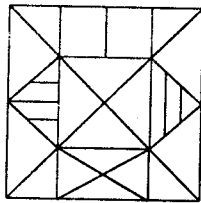
Directions : (For Q. 65) (A) shows the view from the front view, from the direction of the arrow, looking in the direction of the arrow.

Answer Figures

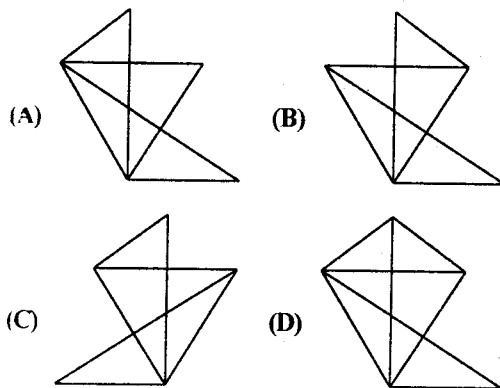
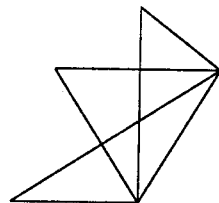


(A) (B) (C) (D)  
 Directions : (For Q. 64 and 65). Which one of the answer figures is the correct mirror image of the given problem figure ?

64. Problem Figure

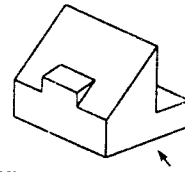


65. Problem Figure

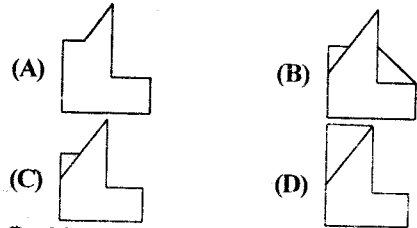


Directions : (For Q. 66 to 70). 3-D problem figures shows the view of an object. Identify the correct front view, from amongst the answer figures, looking in the direction of arrow.

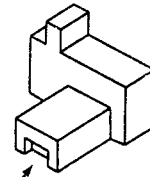
66. Problem Figure



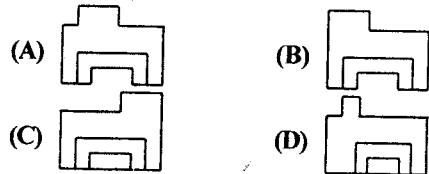
Answer Figures



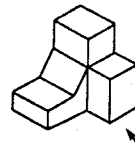
67. Problem Figure



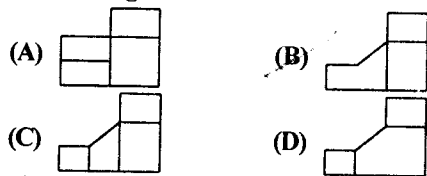
Answer Figures



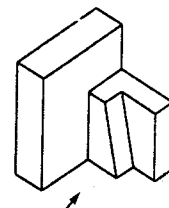
68. Problem Figure



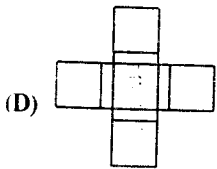
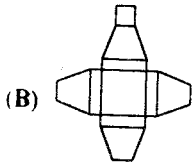
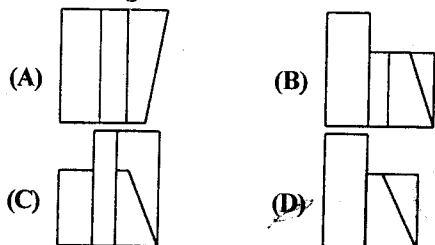
Answer Figures



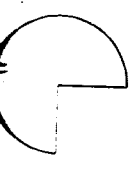
69. Problem Figure



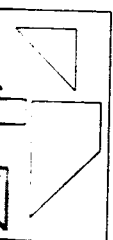
Answer Figures



62). One of the following answer figures is the mirror image of the problem figure in the direction of arrow. Select that one.

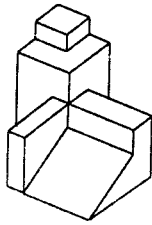


Some geometrical figures are shown in the problem figure. After assembling them, a cube can be formed, from amongst the answer figures.

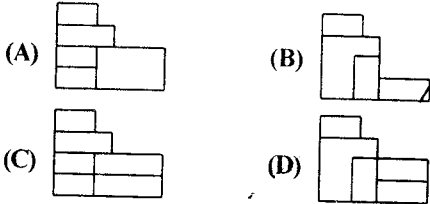




70. Problem Figure



Answer Figures



71. Which of the following city has canals as transportation channels ?  
 (A) Athens (B) Venice  
 (C) Paris (D) London
72. The parliament House, New Delhi is designed by :  
 (A) A.P. Kanvinde (B) Louis Kahn  
 (C) Le-Corbusier (D) Herbert Baker
73. Arc de Triomphe is a famous monument found in the city of :  
 (A) Athens (B) Paris  
 (C) London (D) Rome
74. On the top of Rashtrapati Bhawan, New Delhi, one will find a :  
 (A) Gopuram form (B) Pagoda form  
 (C) Shikhara form (D) Stupa form
75. Eiffel Tower is built in :  
 (A) Bronze (B) Brick and Mortar  
 (C) Steel (D) Concrete
76. Which learned text did ancient Indian architects use for their profession ?  
 (A) Kamsutra (B) Kalpsutra  
 (C) Upanishad (D) Vastushastra
77. Statue of Liberty is situated at :  
 (A) France (B) England  
 (C) America (D) Germany
78. HUDCO is an organisation for :  
 (A) Hotel Development  
 (B) Horticulture Development  
 (C) Hills Area Development  
 (D) Housing Development
79. Which of these is not a residential building ?  
 (A) Buckingham Palace  
 (B) 10, Downing Street  
 (C) Rashtrapati Bhavan  
 (D) House of Commons
80. Madhya Pradesh Vidhan Sabha is designed by :  
 (A) Charles Correa (B) Raj Rewal  
 (C) Le-Corbusier (D) Uttam C. Jain
81. Which of the following colours does not occur in a rainbow ?

- (A) Yellow (B) Green  
 (C) Red (D) Black

82. The stair handrail should be :  
 (A) Abrasive (B) Smooth  
 (C) Rough (D) Corrugated
83. Which secondary colour will you get when red and yellow colours are mixed together ?  
 (A) Orange (B) Purple  
 (C) Green (D) Pink
84. The marble used for the construction of Taj Maha is :  
 (A) Venetian marble (B) Italian marble  
 (C) French marble (D) Makrana marble
85. Which of the following does not possess a smooth texture ?  
 (A) Polished Kotah stone  
 (B) Mica  
 (C) Sandpaper  
 (D) Photo print
86. Gold colour matches with :  
 (A) Aluminium (B) Titanium  
 (C) Brass (D) Copper
87. Which one of the following is a complementary colour scheme ?  
 (A) Orange and yellow (B) Red and green  
 (C) Orange and blue (D) Violet and yellow
88. A red rose viewed through a green coloured glass will appear :  
 (A) Orange (B) Purple  
 (C) Black (D) Blue
89. Plaster of Paris is used for :  
 (A) Walls (B) Structural frame  
 (C) False Ceiling (D) Flooring
90. Maximum insulation is offered by :  
 (A) Timber (B) Glass  
 (C) Metal (D) Wool

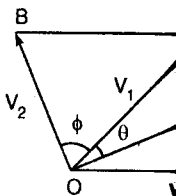
ANSWERS

1. (D) 2. (C) 3. (B) 4. (B) 5. (C)  
 6. (A) 7. (D) 8. (C) 9. (D) 10. (C)  
 11. (C) 12. (A) 13. (C) 14. (C) 15. (A)  
 16. (D) 17. (D) 18. (D) 19. (A) 20. (A)  
 21. (C) 22. (B) 23. (D) 24. (B) 25. (C)  
 26. (B) 27. (A) 28. (C) 29. (B) 30. (C)  
 31. (D) 32. (A) 33. (D) 34. (C) 35. (A)  
 36. (A) 37. (D) 38. (A) 39. (D) 40. (B)  
 41. (C) 42. (C) 43. (A) 44. (C) 45. (A)  
 46. (B) 47. (D) 48. (A) 49. (D) 50. (C)  
 51. (A) 52. (A) 53. (D) 54. (C) 55. (B)  
 56. (C) 57. (C) 58. (C) 59. (B) 60. (A)  
 61. (B) 62. (A) 63. (B) 64. (C) 65. (A)  
 66. (C) 67. (D) 68. (B) 69. (D) 70. (D)  
 71. (B) 72. (B) 73. (B) 74. (D) 75. (C)  
 76. (D) 77. (C) 78. (D) 79. (D) 80. (A)  
 81. (D) 82. (C) 83. (A) 84. (D) 85. (C)  
 86. (C) 87. (B) 88. (C) 89. (C) 90. (B)

HINTS

1. (D), Area  
 Diameter  
 Equation of circle  
 $(x-2)^2 + y^2 = 4$   
 $x^2 + y^2 - 4x + 4 = 4$   
 $x^2 + y^2 - 4x = 0$   
 2. (C), Mean deviation increment.  
 3. (B), Condition of

4. (B),  $\int_0^{1.5} [x^2] f'(x) dx$   
 $= \int_0^1 [x^2] f'(x) dx + \int_1^{1.5} [x^2] f'(x) dx$   
 $= \int_0^1 0 \times f'(x) dx + \int_1^{1.5} 1 \times f'(x) dx$   
 $= 0 + [f(x)]_1^{1.5} = 2[f(1.5)] - 2[f(1)]$   
 $= 2f(1.5) - 2f(1)$   
 5. (C),  $\therefore$



Also  $\angle BOC = \angle OCA$   
 In  $\triangle OCD$