SOLUTIONS

1. Ans. (d)
$5^{17} + 5^{18} + 5^{19} + 5^{20}$
$= 5^{17}(1 + 5 + 5^2 + 5^3)$
$= 5^{17}(156)$
156 is divisible by 13, and not by 7, 9 or 11. Hence the correct option is 13.

2. Ans. (c)
Given equation: a + b = 2c
Let the values of a =0, b= 1, c =1/2 to satisfy the above equation
Now, putting the value of a, b, c in the equation given in question
a/(a-c) + c/(b-c)
= 0/ (0-1/2) + ½/ (1-1/2)
= 0 + ½/ (1/2)
= 1

3. Ans. (b)
$X = y^{1/a}$, $y = z^{1/b}$, $z = x^{1/c}$
Taking log in the above given equations;
Log x = 1/a log y, logy = 1/b log z, log z=1/c log x
Calculating the values of a, b and c
a = log y/ log x
b= log z/ log y
c= log x/ log z
Now, a*b*c = 1

4. Ans. (c)
2b = a + c and $y^2 = xz$
Let the value of a. b and c to satisfy the equation be a = b = c = 1
Also, let the values of x, y and z
x = y = z = 2
$X^{b-c}\ y^{c-a}\ z^{a-b}$
$= 2^{1-1}\ 2^{1-1}\ 2^{1-1}$
$= 2^0\ 2^0\ 2^0$
= 1*1*1
=1

5. Ans. (d)
Decimal expansion of an irrational number is non-terminating and non-repeating.

6. Ans. (b)
Let the roots be x and 1/x.
Use the property of quadratic equations
{x+y = -b/a , xy = c/a};
x*1/x = r/p
1 = r/p; r = p

7. Ans. (a)
65x -33y = 97 => equation 1
33x – 65y = 1 => equation 2
We have 2 equations and 2 variables, solve them to evaluate the values of x & y. Multiplying equation 1 by 33 & equation 2 by 65.
(65x -33y = 97) *33 i.e. 2145x – 1089y = 3201 => equation 1
(33x – 65y = 1) *65 i.e. 2145x – 4225y = 65 => equation 2
Subtracting equation 2 from equation 1:
(2145x – 1089y) – (2145x – 4225y) = 3201 – 65
- ⇨ 3136y = 3136
- ⇨ y = 1
- ⇨ Substitute value of y in any one equation to evaluate the value of x:
- ⇨ 33x – 65*1 = 1
  Or, 33x = 66
  or x = 2
- ⇨ Thus, xy = 1*2 = 2

8. Ans. (a)
From eq 1
b/y + z/c = 1
z/c = 1- b/y
z/c = (y-b)/y …..(i)
from eq 2
c/z =1-x/a
z/c =a/ a-x…… (ii)
equating equations (i) & (ii)
(y-b)/y =a/(a-x)
Cross-multiplying
(ay – ab – xy + xb) = ay
Xb = ab + xy
(ab+xy)/xb = 1

9. Ans. (c)
$(a^2-1)/a = 5$
a -1/a = 5 …..(i)
cube both the sides
$a^3 - 1/a^3 - 3*a*1/a*(a-1/a) = 125$
$a^3 - 1/a^3 - 3*5 = 125$ (using equation (i))
$a^3 - 1/a^3 = 140$
or, $(a^6 - 1)/a^3 = 140$

10. Ans. (d)
x + y + z = 0
From this,
y + z = -x
z + x = -y
x + y = -z
Putting these values on eq
$(y + z - x)^3 + (z + x - y)^3 + (x + y - z)^3$
$=(-x-x)^3+(-y-y)^3+(-z-z)^3$
$= (-2x)^3+(-2y)^3+(-2z)^3$
$= -8(x^3+y^3+z^3)$ {using identity for $(x + y + z)^3$ when (x + y + z) =0}
=-8*3xyz
= -24xyz

11. Ans. (a)
If (x+3) is a factor of $x^3 + 3x^2 + 4x + k$
So, equation will be completely divided by (x+3)
x+3) x^3+3x^2+4x+k (x^2+4
x^3+3x^2
4x+k
4x+12 if k =12 so equation completely divided by x+3
0
From this we find that k = 12
12. Ans. (b)
$32^2 = 1024$
13. Ans. (b)
$3x^3 +4x^2-7$
Putting x =1;
3+4-7 = 0
Hence the correct answer is 1.
14. Ans. (a)
Let the numbers be x and y
x*y = LCM *HCF
xy = 21*3003
xy = 21* 273*11
According to the question both the numbers are greater than 21, hence the two numbers are:
xy = 231*(21*11), i.e. xy = 231*273
x + y = (231+273) = 504
15. Ans. (c)
$ax^2+ bx +c = 0$; roots of this equation are α and β
Thus, α + β = -b/a and α β = c/a
Now, (α+1)(β+1) = α β+ α +β+1
Putting the values;
= c/a –b/a +1
= (c – b + a)/ a
16. Ans. (d)
$3x^3 + kx^2 + 5x - 6$ divided by (x+1)
x+1) $3x^3+kx^2+5x-6$ ($3x^2+(k-3)$ x+(8-k)
$3x^3+3x^2$
$(k-3)x^2+5x$
$(k-3)x^2 +(k-3)x$
(8-k)x -6
(8-k)x+(8-k)
If remainder is -7 so,
-6 - 8 – k = -7
Thus, K = 7
17. Ans. (a)
Greater than min (p, q)
18. Ans. (a)
{(√5-√3)/ √5+√3} – {(√5+√3)/ √5-√3}
= $\{(\sqrt{5}-\sqrt{3})^2 - (\sqrt{5}+\sqrt{3})^2\}/5-3$
=-4√5*√3/2
= -2√15
19. Ans. (c)
$1/(1+x^{b-a}+x^{c-a}) + 1/(1+x^{a-b}+x^{c-b}) + 1/(1+x^{a-c}+x^{b-c})$
Assume the value of x=1
=1/3 + 1/3+1/3
=3/3
=1

20. Ans. (a)
Let the numbers are x and x^2
$x^2 + x = 20$
$x^2 +x - 20 = 0$
Solving this quadratic equation;
x= -5 and 4
21. Ans. (b)
Old price x and new price 1.25x
x * y = k (where y is the total consumption and 'k' is the budget)
1.25x * y' = k (y' is the new consumption)
Equating both the equations:
y' = 100/125 y
y' = 4/5 y
i.e. the new consumption of 4/5 of the original consumption. If original consumption was 100, new consumption = 4/5 of 100 i.e. 80. So, the consumption must be reduced by 20%.
22. Ans. (b)
Total registered students = 2000
Students who did not appear = 2000/25 = 80
Total students who appeared = 2000 - 80 = 1920
Total students who passed = 1920*11/20 = 1056
23. Ans. (b)
0.9999 - 0.9 = .099
24. Ans. (c)
A:B = 1:2 → 3:6
B:C = 3:4 → 6:8
C:D = 2:3 → 8:12
D:E = 3:4 → 12:16
B:E = 6:16
B:E = 3:8
25. Ans. (c)
10W * 12
= 8 * 5M
M = 3W
Let total days required to complete the complete work by 6 women and 3 men be 'y'.
(6W+3M) y = 10W*12
(10W*12 is equal to the total work)
(6W+9W) y = 10W *12
15Wy = 10W *12
Y = 8 days
26. Ans. (c)
Let total work = X
200M *150 = X
After 50 days
200M *50 = X/4
Remaining work = 3X/4
After 50 days, let 'y' workers be added to complete the work on time.
(200+y) M*100= 3X/4
(200+y) M *100 = 3 *200M *50
200+y = 300
Y = 100 men

27. Ans. (c)
Speed =60 km/hr = 60*5/18 m/sec
Time = Distance / Speed (distance is a length of train)
30 = L/ 60*5/18
L = 500m
28. Ans. (c)
A + B + C = 120
According to the question
B = A – 20
C = A + 20
Also, A+B+C = 120
Solving the above 3 equations;
A + A – 20 + A + 20 = 120
3A = 120
A = 40
Thus, B = 20
And C = 60
29. Ans. (a)
M ∝ 1/N
MN = K (CONSTANT)
15*-4 = -6*A
6A = 60
A = 10
Similarly,
-6*10 = 2B
B = -30
Similarly,
2*-30 = C*60
C = -1
30. Ans. (b)
Total gain by the person
= {5000*2 * 5.5 / 100} – {5000*2*5/100}
= {5000*2/100} * {5.5-5}
= 5000*2 *5/1000
= Rs. 50
31. Ans. (c)
Total age of father and son = 25*2 = 50
After 7 years,
Son's age = s+7 = 17
Present age of son = 10
Present age of father = 40
After 10 years, Age of father = 50 years (40 + 10)
32. Ans. (c)
M *D/W = M'*D'/W'
5*5/5 = M'*50/100
M' = 10 tractors
33. (a)
Let the certain capital = x
x * 125/100 *125/100 *125/100 = 10000
x * 5/4 *5/4 *5/4 = 10000
x = 10000*4*4*4/125
x = 5120
34. (a)
0.459459459……
= 459/999
= 51/111
= 17/37
35. Ans. (c)
Let the annual income = x
As per the conditions given in the question,
(x*1*4/100) – (x *1*3.75/100) = 64
x/100 *(4-3.75) = 64
x= 64*100/.25
x = Rs. 25600
36. Ans. (a)
If m's value lies between 0 and 1
Let the value of m = ½
m^2 = 1/4
m^{-1} = 2
log1/2 =-3010
now taking the value of m =1/4\
m^2 = 1/16
m^{-1} = 4
log1/4 = -6020
so, option a is true
log m < m^2 < m < m^{-1}
37. Ans. (a)
Total sum = Rs. 39000
Let the share of wife = x
So, share of each daughter = 2x
Share of each son = 6x
As per question,
5(6x) + 4(2x) + x = 39000
30x + 8x + x = 3900
39x = 39000
X = Rs. 1000
38. Ans. (d)
Let the numbers be = p, q and r
Now, p*q = 286 = 2 *13 * 11 (After factorization)
q*r = 770 = 11 * 7 *5 *2
Since the numbers are co-prime, so,
q = 2*11 = 22
p = 13
r = 35
Sum of the three numbers = 22 + 13 + 35 = 70
39. Ans. (b)
Let the age of women = 10x + y
The age of husband = 10y +x
According to question
(10y+x) – (10x +y) = 1/11 (10x+y+10y+x)
9y-9x = 1/11 (11x+11y)
9y - 9x = x + y ……(a)
8y = 10x
x = 8y/10
x= 4/5 y
Difference of their ages
9y - 9x = 4y/5 +y
9y - 9x = 9y/5
So, the difference of their ages is multiple of 9.
Hence, option (b) is correct.
40. Ans. (a)
Let the length of train A be l_1 and the length of train B be l_2. Let their respective speeds be U_a & U_b
Now, according to the question,
$3\{(l_1+l_2)/(U_a+U_b)\} = (l_1 + l_2)/U_a - U_b$

On solving the above equation,
$2U_a = 4U_b$
$U_a/U_b = 2/1$
41. Ans. (c)
In all odd prime numbers, the unit digits are 1, 3, 5, 7, 9
So after multiplying these numbers, we get = 945
Hence, the unit's digit is 5.
42. Ans. (b)
Ratio of copper and tin in alloy A = 2:3
Ratio of copper and tin in alloy B = 3:4
20 kg taken from A:
Copper = 8 kg and tin = 12 kg
28 kg taken from B:
Copper = 12 kg and tin =16 kg
This is mixed with some pure cooper = x kg
Ratio of copper and tin in alloy C = 6:7
Total copper in alloy C/ total tin in alloy C = 6/7
(8 + 12 + x)/ (12 + 16) = 6/7
(20 + x)/ 28 = 6/7
x = 4 kg
43. Ans. (a)
$ax^2 + bx + c$
When divided by x, dividend=ax + b & reminder=c
So, the value of c = 3
When divided by (x-1), dividend = ax + b + a & reminder => c + a + b = 6
Thus, a + b = 3 (since c = 3)
44. Ans. (c)
Let the integers be x, x+1, x+2, x+3, x+4, x+5, x+6, x+7, x+8
Now, as per question,
(x + x+1+ x+2 + x+3 + x+4 + x+5 + x+6 + x+7 + x+8)/ 9 = 55
9x + 36 = 55*9
x = 51
Largest integer = x+8 = 59
45. Ans. (a)
Total age of 15 students = 19*15 = 285
After 5 new students added, total age
= 20*18.5 = 370
Sum of the ages of 5 new students
= 370 -285 = 85
Average age of the 5 new students = (85/5) = 17
46. Ans. (b)
Speed in still water, $V_b = x$
Speed in flowing water, $V_s = y$
Total time taken by the man to row to & fro = z
Thus, z = d/ (x + y) + d/ (x - y) (where d is the distance between the two places)
$z = d\{x - y + x + y\}/x^2-y^2$
$d = z(x^2-y^2)/2x$
47. Ans. (c)
P= 12
Q =10
R= -6
Taking S1 or S2
P + Q – R = 12 + 10 - 6 = 16lt/min
5 hours 45 min = 345 min
Volume of tank = 16*345 = 5520 liters
Now taking S1 and S3
15 hrs. 20 min = 920 min
Volume of tank = 6*920 = 5520 liters
Now taking S2, S3
Let the volume of tank v
v= [10+12 – v/920] *345
v = 22 * 345 – 345v/920
v + 69v/184 = 22*345
253v/184 = 22*345
V = 22*345*184/253
V = 5520 liters
Thus, any two of S1, S2 and S3 are sufficient.
48. Ans. (c)
Total distance = 2d
So according to the question
2d/48 = d/60 + d/y
1/24 = 1/60 + 1/y
1/24 = (y+60)/60y
5y = 2y +120
3y = 120
y = 40 km per hour
49. Ans. (a)
Let CP of the article = Rs. 100
Then, SP = 100 * 132/100 = 132
According to question,
CP is increased by 20% and SP remains same
New CP = 100 *120/100 = 120
Profit % = (132 – 120)/ 120 * 100 = 12/120*100 = 10%
50. Ans. (b)
Let D's share = x
E = 3x/2
B= x/2
C= 2x
A=3x
Shares of A+D+E = 3x + x + 3x/2 = 11x/2
Shares of B+C = 2x +x/2 = 5x/2
Difference = 3x = 13500
x= 4500
Shares of B+C+E = 4x = 4 * 4500 = 18000
51. Ans. (c)
100% corresponds to 360^0
16.1% corresponds to $360^0/100 * 16.1 = 57.96^0 = 58^0$
52. Ans. (c)
Let the two numbers be a and b
(a + b)/2 = 10
a + b = 20
Also, $\sqrt{ab} = 8$
ab = 64
a=64/b

Solving the above 2 equations,
a = 16 and b = 4

53. Ans. (c)
Sum of 11 observation = 11*11 = 121
Sum of first 6 observation = 10.5*6 = 63
Sum of last 6 observation = 11.5 *6 = 69
Sum of first 6 & last 6 observations = 63 + 69 = 132
Thus, Sixth observation = 132-121 = 11

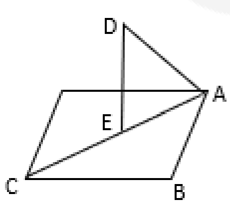
54. Ans. (d)
$\sin^4\theta - \cos^4\theta$
$= (\sin^2\theta - \cos^2\theta) * (\sin^2\theta + \cos^2\theta)$
$= -\cos 2\theta * 1$
$= 1 - 2\cos^2\theta$

55. Ans. (b)
cot 1® cot 23° cot 45® cot 67° cot 89°
$\cot 1^0 \cot 89^0 = 1$
$\cot 23^0 \cot 67^0 = 1$
$\cot 45^0 = 1$
Thus, cot 1® cot 23° cot 45® cot 67° cot 89° = 1

56. Ans. (b)
The hour hand completes 360^0 in (60*12) i.e. 720 minutes
Thus, it completes $½^0$ in a minute.
So, in 10 minutes it covers 5^0

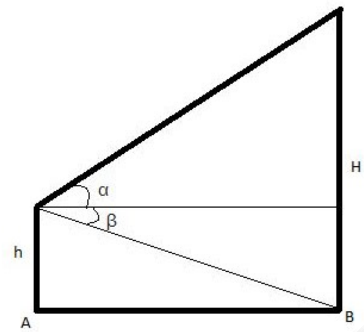
57. Ans. (b)
Taking statement 1:
$(\sec^2\theta - 1) * (1 - \text{cosec}^2\theta) = 1$
$(1 + \tan^2\theta - 1) * (-\cot^2\theta) = 1$
$\tan^2\theta * (-\cot^2\theta) = 1$
-1 = 1 is not possible, Hence, statement 1 is wrong.
Taking statement 2,
$\sin\theta (1 + \cos\theta)^{-1} + (1 + \cos\theta)(\sin\theta)^{-1} = 2\,\text{cosec}\,\theta$
$\sin\theta / (1 + \cos\theta) + (1 + \cos\theta)/\sin\theta$
$= (\sin^2\theta + 1 + \cos^2\theta + 2\cos\theta)/ (\sin\theta + \sin\theta\cos\theta)$
$= 2(1 + \cos\theta)/ \sin\theta (1 + \cos\theta)$
$= 2\,\text{cosec}\,\theta$
So, statement 2 is true

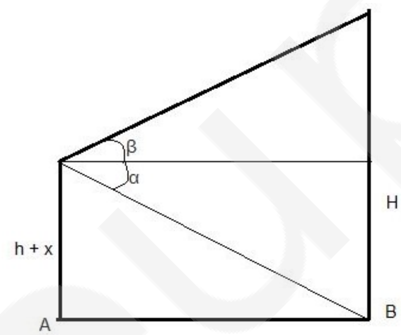
58. Ans. (c)
Diagonal of the square => $AC^2 = 2l^2$ (where l is the side of the square)
$AC = \sqrt{2}l$



AE (Base of the triangle formed by the vertex of the square with the tip of the tower) = ½AC = $\sqrt{2}l/2$
Also, angle DAE = 60^o
In triangle ADE, $\tan 60 = h/(\sqrt{2}l/2)$
$h = \sqrt{2}/2 * \sqrt{3} * l$
$h^2 = 3/2\, l^2$

59. Ans. (b)





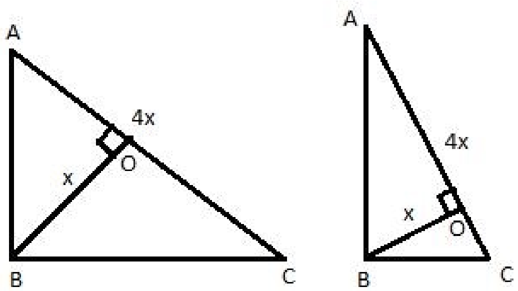
In the initial figure, $\tan\alpha = (H - h)/AB$, $\tan\beta = h/AB$
From 2^{nd} figure
$\tan\alpha = (h + x)/AB$
Equating both the values of tan α
$(H - h)/AB = (h + x)/AB$
$x = H - 2h$

60. Ans. (a)
sec x cosec x = 2
let the value of x = 45^0
Putting this value in the above equation,
$\sqrt{2} * \sqrt{2} = 2$
$\tan^n x + \cot^n x$
$\tan^n 45 + \cot^n 45$
$= 1^n + 1^n$
$= 2$

61. Ans. (a)
$\cos x + \cos^2 x = 1$........(a)
$\sin^2 x + \cos^2 x = 1$
From both equations
$\cos x = \sin^2 x$
Putting this value in equation
$\cos x + \cos^2 x = 1$
$\sin^2 x + \sin^4 x = 1$

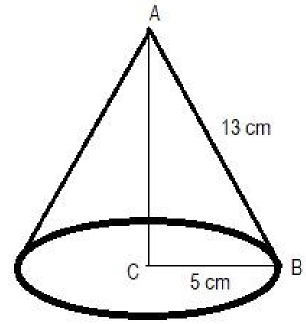
62. Ans. (c)
Sin A + Cos A = p
Squaring both sides
$\sin^2 A + \cos^2 A + 2\sin A\cos A = p^2$
$1 + 2\sin A\cos A = p^2$
$\sin A\cos A = (p^2 - 1)/2$
Sin A + Cos A = p
Cubing both sides;
$(\sin A + \cos A)^3 = \sin^3 A + \cos^3 A + 3\sin A\cos A\,(\sin A + \cos A)$

$P^3 = q + 3(p^2-1)/2 * p$
$P^3 = q + 3p^2/2 - 3p/2$
$2p^3 - 3p^3 + 3p - 2q = 0$
$P^3 - 3p + 2q = 0$
63. Ans.
If $x = (\sec^2\theta - \tan\theta)/(\sec^2\theta + \tan\theta)$
Let the values of $\theta = 45$
So, $x = (2-1)/(2+1) = 1/3$
Since this holds true only for option 4, hence, it's the correct answer.
(1st in incorrect since it states that the value of x lies between 1/3 & 3, excluding 1/3, hence it is not correct)
64. Ans. (a) or (c)

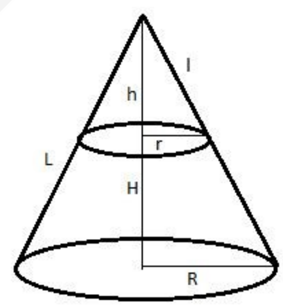


Let AB = a and BC = b. Now, 2 cases may be possible in this question
Case I: a>b
Case II: a<b
In triangle ABC, Area = ½ AB*BC = ½ * OB*AC
$\Rightarrow$ ½ ab = ½ x*4x
$\Rightarrow ab = 4x^2 \Rightarrow 2ab = 8x^2$
Applying Pythagoras theorem in this triangle,
$a^2 + b^2 = (4x)^2 = 16x^2$
Now, $(a + b)^2 = a^2 + b^2 + 2ab \Rightarrow (a + b)^2 = 16x^2 + 4x^2 = 26x^2$
Thus, $(a + b) = 2\sqrt{6}\,x$
Similarly, $(a - b)^2 = a^2 + b^2 - 2ab$
Thus, $(a - b) = 2\sqrt{2}\,x$ and $-2\sqrt{2}\,x$ (Considering Case I & II mentioned above)
Now,
Case I: $(a + b) + (a - b) = 2\sqrt{6}\,x + 2\sqrt{2}\,x$ & $(a + b) - (a - b) = 2\sqrt{6}\,x - 2\sqrt{2}\,x$
$\Rightarrow a = (\sqrt{6} + \sqrt{2})\,x$ & $b = (\sqrt{6} - \sqrt{2})\,x$
Case II: $(a + b) + (a - b) = 2\sqrt{6}\,x - 2\sqrt{2}\,x$ & $(a + b) - (a - b) = 2\sqrt{6}\,x + 2\sqrt{2}\,x$
$\Rightarrow a = (\sqrt{6} - \sqrt{2})\,x$ & $b = (\sqrt{6} + \sqrt{2})\,x$
Now, Tan C = a/b
So, Tan c = $(\sqrt{6} - \sqrt{2})\,x/(\sqrt{6} - \sqrt{2})\,x$ (Case I)
On rationalizing, Tan C = $2 + \sqrt{3}$
For Case II, Tan C = $2 - \sqrt{3}$
Thus, both options (a) & (c) are correct.
65. Ans. (a)
Area of $\triangle ABC$ = ½ * a*b
Also Area of $\triangle ABC = 1/2 * p * \sqrt{(a^2+b^2)}$, $AB = \sqrt{(a^2+b^2)}$
$1/2ab = ½ * p * \sqrt{(a^2+b^2)}$
$a^2b^2 = p^2(a^2+b^2)$

66. Ans. (a)



Height of cone = $\sqrt{(169-25)} = 12$
Volume of cone = $1/3\,\pi r^3 * h$
$= 1/3*22/7*125*12$
$= 100\,\pi$
67. Ans. (a)
Area of a circle A = πr^2
Area of greatest possible circle A' = $\pi r^2/4$
A-2A' = $\pi r^2/2$ = A/2
68. Ans. (d)
r =1
l =3
Ratio of total surface area to curved surface rea = $(\pi r^2 + \pi rl)/\pi rl = \pi r^2/\pi rl + 1$
= r/l +1
= 1/3 + 1
= 4/3
Required ratio = 4:3
69. Ans. (b)



For small cone,
radius = r, height = h, slant height = l
For big cone,
radius = R, height = H, slant height = L
The triangles formed in the smaller and bigger cones are similar, hence,
r/R = h/H = l/L --- eq (1)
Now, (Volume of small cone/ Volume of Frustum) = 64/61 = k(constant)
Thus, volume of big cone = 64k + 61k = 125k
Volume of small come; V_1/ Volume of big cone, V_2 = $(1/3\,\pi r^2h)/(1/3\,\pi R^2H)$
Also, V_1/V_2 = 64m/125m = 64/125
So, $r^2h/R^2H = 64/125$
From eq (1), $r^3/R^3 = 64/125$; r/R = 4/5
Now, Ratio of curved surface area of small cone/ Ratio of curved surface area of big cone = $\pi rl/\pi RL$
= (4/5)*(4/5) (from eq 1) = 16/25 = k constant

So, Curved surface area of frustum=25k – 16k=9k
Thus, Ratio of curved surface area of small cone/ Ratio of curved surface area of frustum =16k/9k=16:9

70. Ans. (c)
Total area of room = 100 m^2
Area of triangular table = $\sqrt{3}$
Area of 4 book shelves = 4*4*1 = 16
Area of rest of room = 100 – ($\sqrt{3}$ - 16) = 82.268
Half of this area = 41.134
Cost of carpeting = 41.134 *100 = Rs. 4113

71. Ans. (b)
$p_m = (r_m + 1)/r_m = 1 + 1/r_m$
For m=1, $p_1 = 1 + 1/r_1$
For m=2, $p_1 = 1 + 1/r_2$
For m=3, $p_1 = 1 + 1/r_3$
Also, $r_3 > r_2 > r_1$
Thus, $1/r_1 > 1/r_2 > 1/r_2$
or, $1 + 1/r_1 > 1 + 1/r_2 > 1 + 1/r_2$
or, $p_1 > p_2 > p_3$
Thus, when m increases, value of p decreases.
Hence, Option b is correct

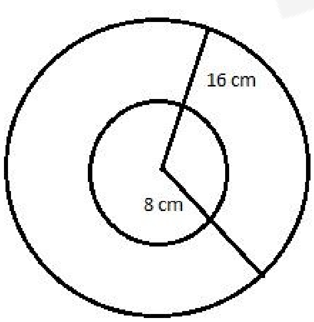
72. Ans. (c)
Edge of cube = 2a
So, height of cone = 2a
Radius of cone = a (for maximum volume)
Volume of cone = 1/3 π a^2 *2a = 2 πa^3/3

73. Ans. (c)
Length of transverse common tangent = √ {center distance^2 – $(r_1 + r_2)^2$}
= √ (100 - 64) = √36 = 6 cm

74. Ans. (b)
According to question
4 πr^2 = 4/3 πr^3
r = 3 cm

75. Ans. (d)
AB line segment is divided into two parts at point C, let AC = x
BC = 2-x
As per equation given in the statement
(AC^2 = AB * CB)
x^2 = 2 * (2-x)
x^2 = 4-2x
x^2 +2x - 4 = 0
on solving this equation; x = -1 + √5

76. Ans. (a)

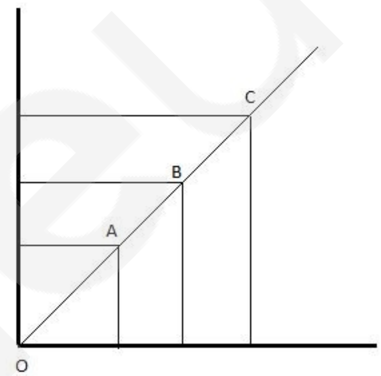


The locus of the mid-points of the radii of length 16 cm of a circle is a concentric circle of radius 8 cm
Hence Option 'a' is correct.

77. Ans. (d)
πrl =1.76 * 10^4 cm^2
22/7 * 70*l = 1.76 * 10^4
l = 80 cm
l^2 = 6400
Also, $l^2 = r^2 + h^2$
h^2 = 6400 - 4900 = 1500
h = 10 √15

78. Ans. (c)
Among the given statements, Sentence 2 (The centroid of a triangle always lies inside the triangle) and statement 3 (The orthocenter of a right-angled triangle lies on the triangle) are correct. Hence, Option (c) is correct.

79. Ans. (a)

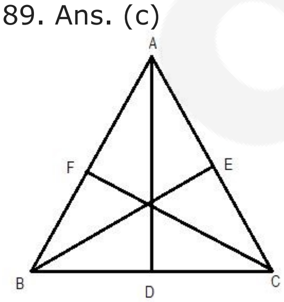


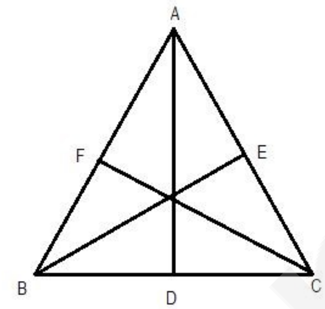
The locus of a point equidistant from two intersecting lines is a straight line. Hence, option (a) is correct

80. Ans. (d)
There are three conditions of congruency. These are:
(a) Side-Angle-Side
(b) Angle-Side-Angle
(c) Side-Side-Side
Statement 1 says Angle-Angle-Angle property, which is not true. Statements 2,3,4 are correct.
Hence the answer is option (d).

81. Ans. (c)
The given statement is; The angles of the polygon are all equal and each angle is 90°.
This means that it is either a rectangle or a square.
This makes statement 1 correct (i.e. the polygon has exactly 4 sides).
Sum of interior angles of a polygon having 'n' sides is (n – 2) * 180° = (n-2) * 2 * 90°
i.e. sum of interior angles of a polygon having n sides is (2n – 4) right angles.
Hence only statement 1 is correct

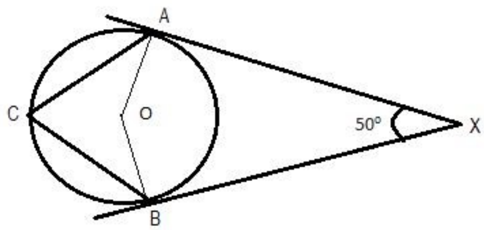
82. Ans. (b)
Let side of square = x
Area = x^2
After increasing; $(X+8)^2 = x^2 + 120$
On solving this equation, we get, x = 3.5 cm

83. Ans. (d)
The highest power of 10 which would divide 25! Is greater than 5, hence, option (d) is correct.
84. Ans. (c)
Area of one room to be painted
$= 2(bh + hl) = 2((4*2.5) + (2.5*6)) = 50\ m^2$
Area of 5 rooms $= 50*5 = 250m^2$
For painting $20m^2 = 1$ can is used
So, for painting $250m^2$, number of cans used:
$= 250/20 = 12$, i.e., approximately 13 cans
85. Ans. (d)
Side of tiles = 50cm
Area of each tile $= 50*50 = 2500\ cm^2$
Area of rectangular pathway $= (1000*450)\ cm^2$
Total tiles required for the pathway = 450000/2500 = 180 tiles.
Cost of 20 tiles = Rs. 100
Cost of 18- tiles = 100 * 180 / 20 = Rs. 900.
86. Ans. (c)
For cube to be of maximum volume, Diagonal of cube = Diameter of sphere
$\sqrt{3}\mathbf{a} = 2r$
$r = \sqrt{3}\mathbf{a}/2$
According to question,
Volume of Cube / Volume of sphere $= a^3/(4/3\ \pi r^3)$
Putting the value of r;
$= \mathbf{a}^3 / (4/3\ \pi(\sqrt{3}\mathbf{a}/2)^3)$
On solving this ratio, we get $2/\sqrt{3\pi}$
87. Ans. (d)
According to question
$2\ \pi r/h = 3/1$
$h = 2/3\ \pi r$
Curved surface area of cone $= \pi rl = \pi r\ \sqrt{(h^2+r^2)}$
$= \pi r\ \sqrt{(4/9*\pi^2\ r^2 + r^2)}$
$= \{\pi r^2 \sqrt{4\ \pi^2+9}\}/3$
88. Ans. (c)
$2\pi r = 4a$
$\pi r = 2a$
$22/7 *98 = 2a$
a = 154 cm
89. Ans. (c)


As per question, AB = a; BC = b; CA = c; AD = p; BE = q and CF = r
AB+BD > AD
BC + CE > BE
CA +AF > CF
Adding the above 3 equations:
AB + BC + CA + (BC/2 +AC/2 +AB/2) > AD + BE + CF
3/2(AB + BC + CA) > (AD + BE + CF)
$3(a + b + c) > 2(p + q + r)$
90. Ans. (b)


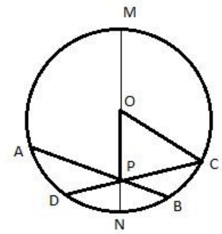
As per question, AB = a; BC = b; CA = c; AD = p; BE = q and CF = r. Let G be the mid-point/ intersection point of the 3 medians.
Now, in triangle AGC, using the triangle inequality property:
$2/3r + 2/3p > c$ ---- eq (1)
In triangle BGC; $2/3q + 2/3\ r > b$ ----- eq (2)
In triangle AGB, $2/3p + 2/3q > a$ ----- eq (3)
Adding (1), (2) & (3):
$2/3r + 2/3p + 2/3q + 2/3\ r + 2/3p + 2/3q > a + b + c$
$4\ (p + q + r) > 3\ (a + b + c)$
Hence option (b) is correct.
91. Ans. (b)
Side of square; $a = 2/\sqrt{\pi}$
For largest circular disc; Side of square = Diameter of disc
i.e., a = 2r
Area of circle; $\pi r^2 = \pi(a/2)^2$
$= \pi*1/\ \pi = 1$
92. Ans. (b)
$D_1 *D_2 = 50$
Area of square $= a^2 = ½\ D_1*D_2$ (where 'a' is the side of the square)
$a^2 = ½ * 50 = 25$
a = 5 units
93. Ans. (b)
Surface area of Cylindrical box $= 2\pi rh + 2\pi r^2$
$= 2*\ \pi/4 *d^2 + \pi dh = 352$ (where d is the diameter = 2r)
$d^2 +2d *10 = 352/\ \pi * 2$
$d^2 +20d = 352/22 *7 *2 = 224$
$d^2 + 20d - 224 = 0$
d = 8 cm
94. Ans. (d)
Let Side of triangle = a & Side of Square = b
According to question,
3a =4b (Since their perimeters are same)
Diagonal of square $= b\sqrt{2} = 6\sqrt{2}$
Hence, b= 6
So, a = 8
Area of triangle $= \sqrt{3}/4\ a^2$

= $\sqrt{3}/4 * 64$
$=16\sqrt{3}$
95. Ans. (d)
In this case, Diagonal of square = Diameter of circle
$\sqrt{2}a = 2r$
Area of required region = $\pi r^2 - a^2$
$= \pi(\sqrt{2}a/2)^2 - a^2$
$= \pi a^2/2 - a^2$
$= (\pi-2)\, a^2/2$
96. Ans. (b)



Let O be the center of the circle.
Now, angle OAX = angle OBX = 90^{o}
In polygon AOBX,
Angles (AOB + OBX + BXA + XAO) = 360^{o}
Thus, angle AOB = 360 – (90 + 90 + 50) = 130^{o}
angle ACB = ½ angle AOB = ½ of 130 = 65^{o}
97. Ans. (c)

Both the given properties of lines are correct.
Hence, option (c) is correct.
98. Ans. (a)
AD =DB = l/2 (since AB = l, given in the question)
Area of shaded region = Area of triangle (ABC – ADE) \
$= (\sqrt{3}l^2/4) - (\sqrt{3}/4 * (l/2)^2)$
$= 3\sqrt{3}l^2/16$
99. Ans. (b)
∠ QPT = α, ∠ OPT = 90^{o}
∠ OPQ = ∠OQP = 90 - α (isosceles triangle)
∠ POQ = 180 – (90- α + 90 - α) (Sum of all the angles of triangle OPQ is 180^{o})
= 2 α
Hence, option (b) is correct
100. Ans. (d)



AB = CD = 10 cm, PB = 3 cm; AP = (10-3) = 7 cm, OC = 13 cm
Extending line MN, such that it is the diameter of the circle.
Since MN is the diameter; MN
= 2OC = 2*13 = 26 cm
As per theorem of chords intersecting each other in a circle:
AP*PB = MP*PN
=> 7*3 = (MN – PN) *PN
=> 21 = (26 – PN) * PN
=> $PN^2 - 26\,PN + 21 = 0$
Applying formula,
$PN = \{-(-26) (+/-) \sqrt{(-26)^2 + (4*21)}\}/ 2$
(Discarding the negative root)
$PN = 13 + 2\sqrt{37}$ or $13 - 2\sqrt{37}$
Now, OP = ON – PN = $13 - (13 + 2\sqrt{37})$ or $13 - (13 - 2\sqrt{37})$
Since the first case will yield a negative value, so we will discard it.
Thus, OP = $2\sqrt{37}$

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