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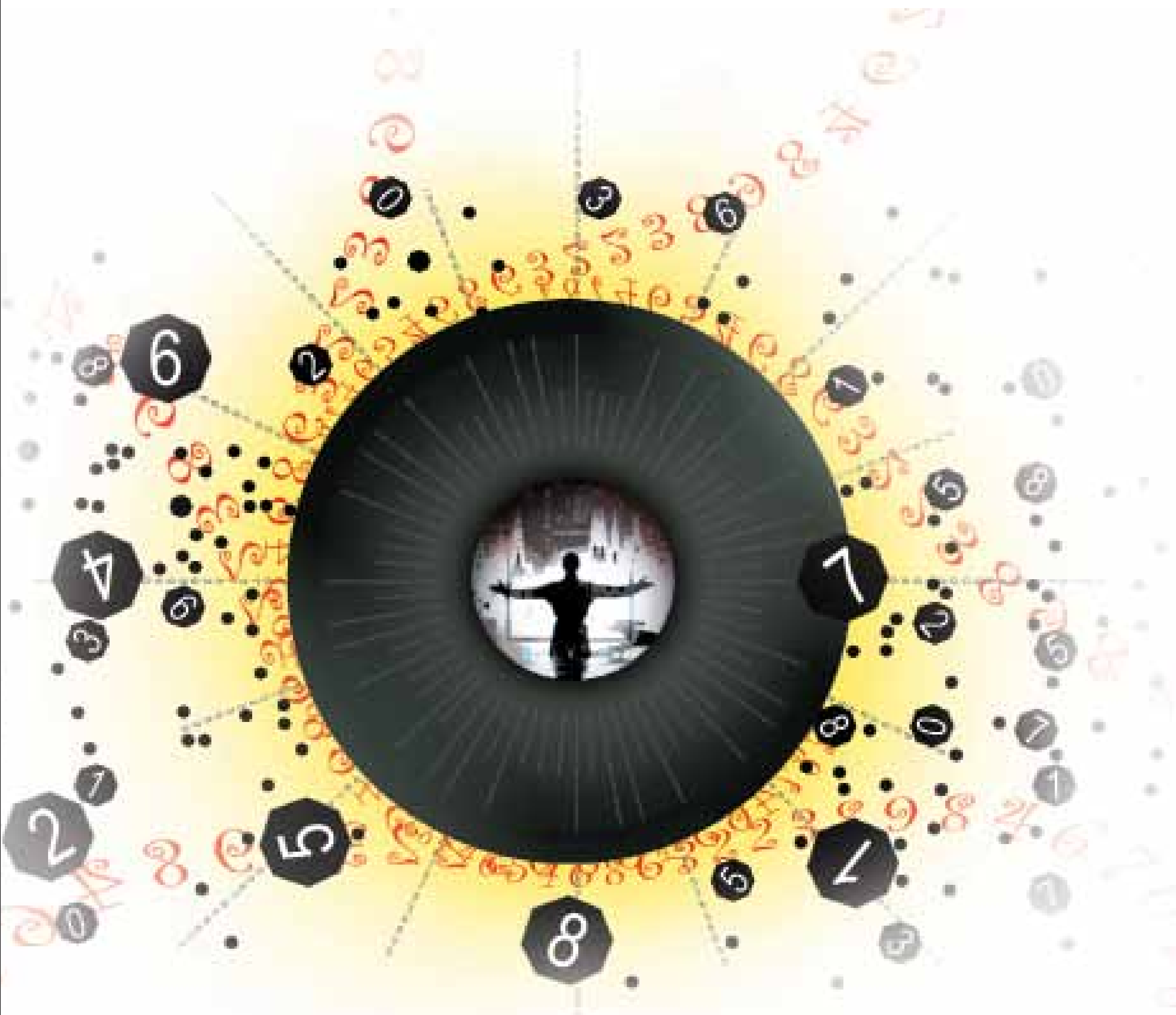
CAT

CAT Quantitative Aptitude



QA Sectional Test

1. Given that $S_n = 126 + 120 + 114 + ... + T_n$. Find the value of n for which S_n is maximum.
   a. 21 b. 23 c. 22
   d. Either (a) or (b) e. Either (a) or (c)

2. If 3 apples, 4 oranges and 5 bananas cost Rs. 22, and 2 apples, 3 oranges and 4 bananas cost Rs. 16, then how much will 1 orange and 2 bananas cost?
   a. Rs. 4 b. Rs. 5 c. Rs. 6 d. Rs. 3 e. Rs. 7

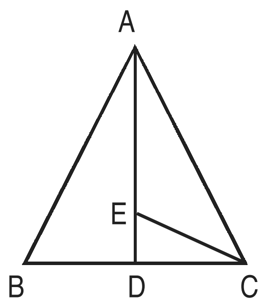
3. There are nine distinct numbers of which five numbers are positive and four numbers are negative. Three numbers are chosen at random and the product of these numbers is found. How many of these products are positive?
   a. 30 b. 50 c. 70 d. 60 e. 40

4. In a triangle, the longest side has length 20 units and another of its sides has length 10 units. Its area is 80 square units. What is the exact length of its third side?
   a. $\sqrt{260}$ units b. $\sqrt{250}$ units c. $\sqrt{240}$ units d. $\sqrt{270}$ units e. Cannot be determined

5. Two non-intersecting circles with radii 'r' units and '2r' units have their centres at a distance of $2\sqrt{3}\,r$ units. Find the length of the direct common tangent to the circles.
   a. 3r units b. $\sqrt{13}\,r$ units c. $3\sqrt{2}\,r$ units d. $\sqrt{10}\,r$ units e. $\sqrt{11}\,r$ units

6. For which of the following values of p, the equation $|x-2|+|x-5|+|x-7|=p$ does not have a real solution if $x \geq 7$?
   a. 5 b. 7 c. 8 d. 9 e. 10

7.



In the given ΔABC, if AB = AC = 10 cm, DE : EA = 1 : 3 and BD = DC = 8 cm. Find the length of CE.

a. $\frac{\sqrt{235}}{2}$ cm b. $\frac{\sqrt{265}}{2}$ cm c. $\frac{\sqrt{225}}{2}$ cm d. $\frac{\sqrt{245}}{2}$ cm e. $\frac{\sqrt{275}}{2}$ cm

8. $\frac{1}{(n-1)!\,1!} + \frac{1}{(n-2)!\,2!} + \frac{1}{(n-3)!\,3!} - - - + \frac{1}{(n-1)!\,1!}$ will be equal to

a. $\frac{1}{n!}\left(2^n - 1\right)$ b. $\frac{1}{n!}\left(2^n - 2\right)$ c. $\frac{1}{n!}2^{n-1}$ d. $\frac{2^{n-1}-1}{n!}$ e. $\frac{2^n - 2}{(n-1)!}$

9. The population of the lost continent Atlantis is 18,000. Atlantis has three cities A, B and C. Every year the entire population of each city moves to the other two cities, half going to one of them and the remaining half going to the other. The current population of A, B and C is 2000, 6000 and 10000 respectively. Then the population of A four years from now will be

a. 5000 b. 6500 c. 6000 d. 5500 e. 5750

10. In an exhibition, some paintings were kept for sale. On the first day, 1 painting plus $\frac{1}{7}$th of the remaining paintings were sold. On the second day, 2 paintings plus $\frac{1}{7}$th of the remaining paintings were sold. A similar pattern continued till the kth day, when 'k' paintings were sold and no painting was left after that. If the exhibition ran for exactly k days (k > 1), then what is the minimum number of paintings sold during the exhibition?

a. 36 b. 42 c. 99 d. 100 e. 81

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QA Sectional Test
Answers and Explanations

1. e The given series is an AP with common difference d = –6.
If we sum up all the terms which are positive (i.e. greater than 0) or all the terms that are non-negative (i.e. greater than or equal to 0) we will get the maximum sum.

$126-6(n-1)\geq 0$

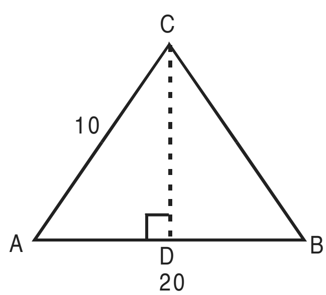
$\Rightarrow n\leq 22$

If n = 22, $T_n = 0$ and If n = 21, $T_n = 6$.
Sum in both the cases is equal and the maximum.

2. a $3x + 4y + 5z = 22$ ... (Given) ... (i)
$2x + 3y + 4z = 16$ ... (Given) ... (ii)
Subtracting (ii) from (i) we get
$x + y + z = 6$ ... (iii)
By subtracting 2 × (iii) from (ii), we get $y + 2z = 4$.

3. e There are 5 positive numbers and 4 negative numbers. If we select 3 positive numbers (or) 1 positive number and 2 negative numbers, their product will be positive. This can be done is ${}^5C_3 + {}^5C_1 \times {}^4C_2 = 10 + 30 = 40$ ways.

4. a



Let's assume AB be the longest side of 20 unit and another side AC is 10 unit. Here CD $\perp$ AB.

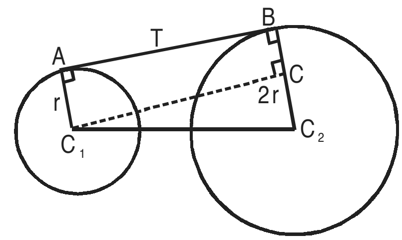
Since area of $\Delta ABC = 80 = \frac{1}{2}AB\times CD$

So $CD=\frac{80\times 2}{20}=8$. In ΔACD; $AD=\sqrt{10^2-8^2}=6$

Hence DB = 20 – 6 = 14.

So $CB=\sqrt{14^2+8^2}=\sqrt{196+64}=\sqrt{260}$ unit

5. e



Length of the common tangent is T.
$BC = AC_1 = r$

$\Rightarrow$ in the right Δc_1cc_2,

$c_1c = T$
$cc_2 = r$

$c_1c_2 = (2\sqrt{3})r$

$\Rightarrow T=\sqrt{(2\sqrt{3}r)^2-(r)^2}$

$\therefore\ T=\sqrt{11}\,r$ units

6. a Here $|x-2|+|x-5|+|x-7|=p$

For $x\geq 7$,

$3x-14=p\Rightarrow x=\frac{p+14}{3}\quad\Rightarrow\frac{p+14}{3}\geq 7\Rightarrow p\geq 7$

7. b If AB = AC, then it is isosceles triangle.
If BD = DC, then AD is the altitude to BC.

Hence, $AD = \sqrt{10^2-8^2} = 6$ cm.
So, ED = 1.5 cm.

Hence, $CE=\frac{\sqrt{265}}{2}$ cm.

8. b $\frac{1}{n!}\left[\frac{n!}{(n-1)!\,1!}+\frac{n!}{(n-2)!\,2!}+\ldots.\frac{n!}{(n-1)!\,1!}\right]$

$=\frac{1}{n!}\left({}^nC_1+{}^nC_2+\ldots{}^nC_{n-1}\right)$

$=\frac{1}{n!}\left(1+{}^nC_1+{}^nC_2+\ldots+{}^nC_{n-1}+{}^nC_n-2\right)$

$=\frac{1}{n!}\left(2^n-2\right)=\frac{\left(2^n-2\right)}{n!}$

9. e

A	B	C
2000	6000	10000
8000	6000	4000
5000	6000	7000
6500	6000	5500
5750	6000	6250

Hence, the population of A four years from now will be 5750.

10. a $\frac{1}{7}$th of the remaining paintings are sold

$\Rightarrow \frac{6}{7}$th of the paintings are carried over to the next day.

$\Rightarrow$ Last kth day, since k paintings were sold, k should be a multiple of 6.

Thus, minimum k = 6 and hence, number of paintings = (1 + 5) + (2 + 4) + (3 + 3) + (4 + 2) + (5 + 1) + 6 = 36