TCS Placement paper (Conducted at JNTUK on 13.9.12)

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If f(x) = $(1+x+x^2+x^3+.....x^{2012})^2 - x^{2012}$
g(x) = $1+x+x^2+x^3+.....x^{2011}$
Then what is the remainder when f(x) is divided by g(x)

Let us multiply g(x) with x on the both sides
x.g(x) = $x+x^2+x^3+.....x^{2012}$
add 1 on both sides
x. g(x) + 1 = $1+x+x^2+x^3+.....x^{2012}$
Substitute this value in f(x)
then f(x) = $(x.g(x)+1)^2 - x^{2012}$
f(x) = $x^2.g(x)^2 + 2.g(x) + 1 - x^{2012}$
Now f(x) is divisible by g(x) first two terms are exactly divisible by g(x) and we get 1 - x^{2012}
But 1 - x^{2012} = (1 - x)$(1+x+x^2+x^3+.....x^{2011})$
if this expression is divisible by g(x) we get 0 as remainder.

A number has exactly 3 prime factors, 125 factors of this number are perfect squares and 27 factors of this number are perfect cubes. overall how many factors does the number have?
We know that the total factors of a number N = $a^p.b^q.c^r$ ....
Now the total factors which are perfect squares of a number N = $\left(\left[\frac{p}{2}\right]+1\right).\left(\left[\frac{q}{2}\right]+1\right).\left(\left[\frac{r}{2}\right]+1\right)....$
where [x] is greatest intezer less than that of x.
Given $\left(\left[\frac{p}{2}\right]+1\right).\left(\left[\frac{q}{2}\right]+1\right).\left(\left[\frac{r}{2}\right]+1\right).... = 125$
So $\left[\frac{p}{2}\right]+1 = 5$; $\left[\frac{q}{2}\right]+1 = 5$; $\left[\frac{p}{2}\right]+1 = 5$
$\left[\frac{p}{2}\right] = 4 \Rightarrow$ p = 8 or 9, similarly q = 8 or 9, r = 8 or 9
Given that 27 factors of this number are perfect cubes
so $\left(\left[\frac{p}{3}\right]+1\right).\left(\left[\frac{q}{3}\right]+1\right).\left(\left[\frac{r}{3}\right]+1\right).... = 27$
So $\left[\frac{p}{3}\right]+1 = 3 \Rightarrow = \left[\frac{p}{3}\right] = 2$
$\Rightarrow$ p = 6, 7, 8
By combining we know that p = q = r = 8
So the given number should be in the format = $a^8.b^8.c^8$ ....
Number of factors of this number = (8+1).(8+1).(8+1) = 729

In a class there are 60% of girls of which 25% poor. What is the probability that a poor girl is selected is leader?
Assume total students in the class = 100
Then Girls = 60% (100) = 60
Poor girls = 25% (60) = 15
So probability that a poor girls is selected leader = Poor girls / Total students = 15/100 = 15%

A and B are running around a circular track of length 120 meters with speeds 12 m/s and 6 m/s in the same direction. When will they meet for the first time?
A meets B when A covers one round more than B.
A's relative speed = (12 - 6) m/s. So he takes 120 / 6 seconds to gain one extra round.
So after 20 seconds A meets B.

A completes a work in 20 days B in 60 days C in 45 days. All three persons working together on a project got a profit of Rs.26000 what is the profit of B?
We know that profits must be shared as the ratio of their efficiencies. But efficiencies are inversely proportional to the days. So efficiencies of A : B : C = 1/20 : 1/60 : 1/45 = 9 : 3 : 4
So B share in the total profit = 3 / 13 X 26000 = Rs.6000

A completes a piece of work in 3/4 of the time in B does, B takes 4/5 of the time in C does. They got a profit of Rs. 40000 how much B gets?
Assume C takes 20 Days. Now B takes 4/5 (20) = 16 days. A takes 3/4(16) = 12
Now their efficiencies ratio = 1/20 : 1/16 : 1/12 = 12 : 15 : 20
B's share in the profit of Rs.40000 = 15/47 (40000) = Rs.12765

An empty tank be filled with an inlet pipe 'A' in 42 minutes. After 12 minutes an outlet pipe 'B' is opened which can empty the tank in 30 minutes. After 6 minutes another inlet pipe 'C' opened into the same tank, which can fill the tank in 35 minutes and the tank is filled. Find the time taken to fill the tank?

Assume total tank capacity = 210 Liters

Now capacity of pipe A = 210/42 = 5 Liters

Capacity of B = 210 / 30 = - 7 Liters

Capacity of C = 210 / 35 = 6 min

Assume tank gets filled in x min after the third pipe got opened.

So $x \times 5 + 6 \times (-2) + 4x = 210$

$\Rightarrow 48 + 4x = 210 \Rightarrow 4x = 162 \Rightarrow x = 40.5$

Total time taken to fill the tank = 40.5 + 12 + 6 = 51.5

Mother, daughter and an infant combined age is 74, and mother's age is 46 more than daughter and infant. If infant age is 0.4 times of daughter age, then find daughters age.

Assume M + D + I = 74; .....(1)

Also given M - D - I = 46 $\Rightarrow$ M = D + I + 46

Also I = 0.4 D $\Rightarrow$ I = 2/5 D

Substituting M and I values in the first equation we get D - $\frac{2}{5}$D - 46 + D + $\frac{2}{5}$D = 74

Solving D = 10

A Grocer bought 24 kg coffee beans at price X per kg. After a while one third of stock got spoiled so he sold the rest for $200 per kg and made a total profit of twice the cost. What must be the price of X?

Total Cost price = 24×X

As 1/3rd of the beans spoiled, remaining beans are 2/3 (24) = 16 kgs

Selling price = 200 × 16 = 3200

Profit = Selling price - Cost price = 3200 - 24×X

Given Profit = 2 × Cost price

3200 - 24×X = 2 × (24×X)

Solving X = 44.44

Bhanu spends 30% of his income on petrol on scooter 20% of the remaining on house rent and the balance on food. If he spends Rs.300 on petrol then what is the expenditure on house rent?

Given 30% (Income) = 300 $\Rightarrow$ Income = 1000

After having spent Rs.300 on petrol, he left with Rs.700.

His spending on house rent = 20% (700) = Rs.140

Let exp(m,n) = m to the power n. If exp(10, m) = n exp(2, 2) where to and n are integers then n =

Given $10^m = n.2^2$

$\Rightarrow 2^m \times 5^m = n.2^2 \Rightarrow 2^{m-2} \times 5^m = n$

For m = 2 we get least value of n = 25, and for m > 2 we get infinite values are possible for n.

How many kgs. of wheat costing Rs. 5 per kg must be mixed with 45 kg of rice costing Rs. 6.40 per kg so that 20% gain may be obtained by selling the mixture at Rs. 7.20 per kg ?

If the selling price of the mixture is Rs.7.2 when sold at 20% profit then

CP × $\frac{120}{100}$ = 7.2 $\Rightarrow$ CP = Rs.6

Now by applying weighted average formula = $\frac{K \times 5 + 45 \times 6.4}{K + 45} = 6$

$\Rightarrow$ K = 18 kgs

The diagonal of a square is twice the side of equilateral triangle then the ratio of Area of the Triangle to the Area of Square is?

Let the side of equilateral triangle = 1 unit.

We know that area of an equilateral triangle = $\frac{\sqrt{3}}{4} a^2$

As side = 1 unit area of the equilateral triangle = $\frac{\sqrt{3}}{4}$

Now Diagonal of the square = 2 (side of the equilateral triangle) = 2

We know that area of the square = $\frac{1}{2} D^2$ where D = diagonal

So area of the square = $\frac{1}{2}(2^2) = 2$

Ratio of the areas of equilateral triangle and square = $\frac{\sqrt{3}}{4}$: 2 $\Rightarrow \sqrt{3} : 8$

Raj tossed 3 dices and there results are noted down then what is the probability that raj gets 10?

Always remember when 3 dice are rolled the number of ways of getting n (where n is the sum of faces on dice)

= $(n-1)C_2$ where n = 3 to 8

= 25 where n = 9, 12

= 27 where n = 10, 11

= $(20-n)C_2$ where n = 13 to 18

The required probability = $\frac{27}{6^3}$ = $\frac{27}{216}$

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