Effectively, we are given 3 modular congruence equations with 2 unknowns (g and password (say X) ), of the form g^{a\_i} \cdot X \equiv o\_i \mod p *gai*​⋅*X*≡*oi*​mod*p*. Also, p gives rise to a multiplicative group, the existence of a multiplicative inverse is always guaranteed. We make use of this fact to perform indirect divisions or substitutions in the above equations (i.e. division \equiv≡ multiplication by multiplicative inverse). So, we eliminated X and formed 2 equations by substituting it from one into the other as: X \equiv o\_1 \cdot g^{-a\_1}*X*≡*o*1​⋅*g*−*a*1​ --> putting into eq 2 gives --> g^{a\_2-a\_1} \equiv o\_2 o\_1^{-1} \mod p*ga*2​−*a*1​≡*o*2​*o*1−1​mod*p* . Similarly, obtain g^{a\_3-a\_1} \equiv o\_3 o\_1^{-1} \mod p*ga*3​−*a*1​≡*o*3​*o*1−1​mod*p*. Now we noticed that the hcf of the 2 powers of g in these equations is 1. So we can find x,y such that x(a\_2-a\_1)+y(a\_3-a\_1)=1*x*(*a*2​−*a*1​)+*y*(*a*3​−*a*1​)=1 (Using the extended Euclidean algorithm). Finally, using the exponentiation property of modular congruences, we can get the equation g^{x(a\_2-a\_1)+y(a\_3-a\_1)} \equiv g \equiv o\_2^{x}o\_3^{y}o\_1^{-(x+y)} \mod p*gx*(*a*2​−*a*1​)+*y*(*a*3​−*a*1​)≡*g*≡*o*2*x*​*o*3*y*​*o*1−(*x*+*y*)​mod*p*. So we found the exact value of g by comparing the digits already given. From eq 1 we obtained X = password.

Answer Password: 3608528850368400786036725