Note: These are not sample questions, but questions that explore some of the concepts that
may be used. The intention is that you should get prepared with the concepts rather than just
focusing on a set of questions.

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1. What are the total number of divisors of 600(including 1 and 600)?

a. 24

b. 40

c. 16

d. 20

Sol: Option a

If $N=a_p \times b_q \times c_r \ldots$. then the number of factors of N = (p+1)(q+1)(r+1) ....

600 = $2^3 \times 3 \times 5^2$

So number of factors of 600 = (3+1)(1+1)(2+1) = 24

2. What is the sum of the squares of the first 20 natural numbers (1 to 20)?

a. 2870

b. 2000

c. 5650

d. 44100

Sol: Option a

Use formula $n(n+1)(2n+1)6$

3. What is $\sum_{K=0}^{28} K^2 (^{28}K C)$ where $^{28}K C$ is the number of ways of choosing k items from 28 items?

a. 406 * $2^{27}$

b. 306 * $2^{26}$

c. 28 * $2^{27}$

d. 56 * $2^{27}$

Sol: A

Consider $(1+x)^n = C_0 + C_1 x + C_2 x^2 + \ldots\ldots + C_n x^n$ .....(1)

Differentiating w.r.t x we get

$n(1+x)^{n-1}=C_1+2C_2x+3C_3x^2+.....+nC_nx^{n-1}$

Multiplying by x on both sides,

$x.n(1+x)^{n-1}=x.C_1+2C_2x^2+3C_3x^3+.....$

Now again differentiating w.r.t to x

$n(1+x)^{n-1}+n(n-1)x(1+x)^{n-2}=C_0+2^2C_1x+3^2C_2x^2+4^2C_3x^3.....$

Putting x = 1, we get

$n(n+1)2^{n-2}=C_1+2^2C_2+3^2C_3+4^2C_4$

Now substituting n = 28

$28(28+1)2^{28-2} = 812.2^{26} = 406.2^{27}$

4. What is $\sum_{K=0}^{28}3^K(^{28}_KC)$ where $^{28}_KC$ is the number of ways of choosing k items from 28 items?

a. $2^{56}$

b. $3* 2^{27}$

c. $3^{29}$

d. $3* 4^{27}$

Sol: Option A

We know that $C_0+3C_1+3^2C_2+.....+3^nC_n=4^n$

Substitute n = 28

We get $\sum_{K=0}^{28}3^K(^{28}_KC) = 4^{28}= 2^{56}$

5. A call center agent has a list of 305 phone numbers of people in alphabetic order of names (but she does not have any of the names). She needs to quickly contact Deepak Sharma to convey a message to him. If each call takes 2 minutes to complete, and every call is answered, what is the minimum amount of time in which she can guarantee to deliver the message to Mr Sharma.

a. 18 minutes

b. 610 minutes

c. 206 minutes

d. 34 minutes

Sol: Option A

6. The times taken by a phone operator to complete a call are 2,9,3,1,5 minutes respectively. What is the average time per call?

a. 4 minutes

b. 7 minutes

c. 1 minutes

d. 5 minutes

Sol: Option A

7. The times taken by a phone operator to complete a call are 2,9,3,1,5 minutes respectively. What is the median time per call?

a. 5 minutes

b. 7 minutes

c. 1 minutes

d. 4 minutes

Sol: NO option is correct. Median is 3

8. Eric throws two dice, and his score is the sum of the values shown. Sandra throws one die, and her score is the square of the value shown. What is the probability that Sandra's score will be strictly higher than Eric's score?

a. 137/216

b. 17/36

c. 173/216

d. 5/6

Sol: A

9. What is the largest integer that divides all three numbers 23400,272304,205248 without leaving a remainder?

a. 48

b. 24

c. 96

d. 72

Sol: Option B

Find GCD

10. Of the 38 people in my office, 10 like to drink chocolate, 15 are cricket fans, and 20 neither like chocolate nor like cricket. How many people like both cricket and chocolate?

a. 7

b. 10

c. 15

d. 18

Sol: Option A

11. If f(x) = 2x+2 what is f(f(3))?

a. 18

b. 8

c. 64

d. 16

Sol: Option A

12. If f(x) = 7 x +12, what is f-1(x) (the inverse function)?

a. (x-12)/7

b. 7x+12

c. 1/(7x+12)

d. No inverse exists

Sol: Option A

13. A permutation is often represented by the cycles it has. For example, if we permute the numbers in the natural order to 2 3 1 5 4, this is represented as (1 3 2) (5 4). In this the (132) says that the first number has gone to the position 3, the third number has gone to the position 2, and the second number has gone to position 1, and (5 4) means that the fifth number has gone to position 4 and the fourth number has gone to position 5. The numbers with brackets are to be read

cyclically. If a number has not changed position, it is kept as a single cycle. Thus 5 2 1 3 4 is represented as (1345)(2). We may apply permutations on itself If we apply the permutation (132)(54) once, we get 2 3 1 5 4. If we apply it again, we get 3 1 2 4 5 , or (1 2 3)(4) (5) If we consider the permutation of 7 numbers (1457)(263), what is its order (how many
times must it be applied before the numbers appear in their original order)?

a. 12

b. 7

c. 7! (factorial of 7)

d. 14

Sol: Not yet solved

14. What is the maximum value of x3y3 + 3 x*y when x+y = 8?

a. 4144

b. 256

c. 8192

d. 102

Sol: Option A

The question probably be $x_3.y_3+3x*y$

Sustitute x = 4 and y = 4

15. Two circles of radii 5 cm and 3 cm touch each other at A and also touch a line at B and C. The distance BC in cms is?

a. $60--\sqrt{}$

b. $62--\sqrt{}$

c. $68--\sqrt{}$

d. $64--\sqrt{}$

Sol: Option A

$d_2-(r_1-r_2)_2----------\sqrt{}$

d = distance between centers

16. In Goa beach, there are three small picnic tables. Tables 1 and 2 each seat three people. Table 3 seats only one person, since two of its seats are broken. Akash, Babu, Chitra, David, Eesha, Farooq, and Govind all sit at seats at these picnic tables. Who sits with whom and at which table are determined by the following constraints:

a. Chitra does not sit at the same table as Govind.
b. Eesha does not sit at the same table as David.
c. Farooq does not sit at the same table as Chitra.
d. Akash does not sit at the same table as Babu.
e. Govind does not sit at the same table as Farooq.

Which of the following is a list of people who could sit together at table 2?

a. Govind, Eesha, Akash
b. Babu, Farooq, Chitra
c. Chitra, Govind, David.
d. Farooq, David, Eesha.

Sol: Option A

17. There are a number of chocolates in a bag. If they were to be equally divided among 14 children, there are 10 chocolates left. If they were to be equally divided among 15 children, there are 8 chocolates left. Obviously, this can be satisfied if any multiple of 210 chocolates are added to the bag. What is the remainder when the minimum feasible number of chocolates in the bag is divided by 9?

a. 2
b. 5
c. 4
d. 6

Sol: Option B

18. Let f(m,n) =45*m + 36*n, where m and n are integers (positive or negative) What is the minimum positive value for f(m,n) for all values of m,n (this may be achieved for various values of m and n)?

a. 9
b. 6
c. 5
d. 18
Sol: Option A

19. What is the largest number that will divide 90207, 232585 and 127986 without leaving a remainder?
a. 257
b. 905
c. 351
d. 498
Sol: Option A

20. We have an equal arms two pan balance and need to weigh objects with integral weights in the range 1 to 40 kilo grams. We have a set of standard weights and can place the weights in any pan. . (i.e) some weights can be in a pan with objects and some weights can be in the other pan. The minimum number of standard weights required is:
a. 4
b. 10
c. 5
d. 6
Sol: Option A

21. A white cube(with six faces) is painted red on two different faces. How many different ways can this be done (two paintings are considered same if on a suitable rotation of the cube one painting can be carried to the other)?
a. 2
b. 15
c. 4
d. 30

Sol: Option A

22. How many divisors (including 1, but excluding 1000) are there for the number 1000?

a. 15

b. 16

c. 31

d. 10

Sol: Option A

23. In the polynomial f(x) =2*x^4 - 49*x^2 +54, what is the product of the roots, and what is the sum of the roots (Note that x^n denotes the x raised to the power n, or x multiplied by itself n times)?

a. 27,0

b. 54,2

c. 49/2,54

d. 49,27

Sol: Option A

24. In the polynomial f(x) = x^5 + a*x^3 + b*x^4 +c*x + d, all coefficients a, b, c, d are integers. If 3 + sqrt(7) is a root, which of the following must be also a root?(Note that x^n denotes the x raised to the power n, or x multiplied by itself n times. Also sqrt(u) denotes the square root of u, or the number which when multiplied by itself, gives the number u)?

a. 3-sqrt(7)

b. 3+sqrt(21)

c. 5

d. sqrt(7) + sqrt(3)

Sol: Option A