MOCK TEST PAPER -2

1. What is the number of distinct terms in the expansion $(a+b+c)^{20}$?

A. 231

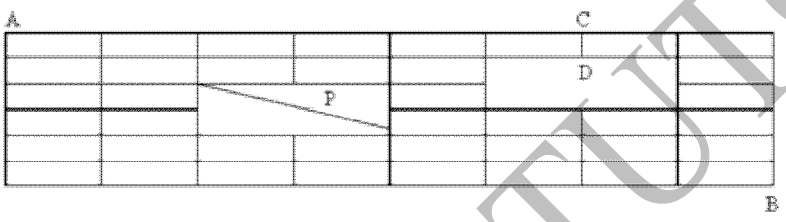
B. 253

C. 242

D. 210

E. 228

Directions (Qs.2&3): The figure below shows the plan of a town. The streets are at right angles to each other. A rectangular park(p) is situated inside the town with a diagonal road running through it.There is also a prohibited region(D) in the town.



2. Neelam rides her bicycle from her house at A to her office at B, taking the shortest path. Then the number of possible shortest paths that she can choose is

A. 60

B. 75

C. 45

D. 90

E. 72

3. Neelam rides her bicycle from her house at A to her club at C,via B taking the shortest path. Then the number of possible shortest paths that she can choose is

A. 1170

B. 630

C. 792

D. 1200

E. 936

4. Suppose, the seed of any positive integer n is defined as follows: seed(n) = n, if n <10 =seed(s(n)), otherwise, where s(n) indicates the sum of digits of n. For example, seed(7)=7,seed(248)= seed(2+4+8)=seed(14)=seed(1+4)=seed(5) =5 etc. How many positive integers n, such that n< 500, will have seed

A. 39

B. 72

C. 81

D. 108

E. 55

5. The integers 1, 2, …. , 40 are written on the blackboard. The following operation is then repeated 39 times: In eachrep etition, any two numbers, say a and b, currently on the blackboard are erased and a new number a+b-1, is written. What will be the number left on the board at the end ?

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A. 820

B. 821

C. 781

D. 819

E. 780

Directions (Qs.6&7): mark-

(A) If question can be answered from A alone but not from B alone.

(B) If question can be answered from B alone but not from A alone.

(C) If question can be answered from A alone as well as from B alone.

(D) If question can be answered from A and B together but not from any of them alone.

(E) If question can not be answered even from A and B together.

In a single elimination tournament, any player is eliminated with a single loss. The tournament is played in multiple rounds subject to the followings rules:

(a) If the number of the players, say n, in any round is even, yhen the players are grouped into n/2 pairs. The players in each each pair play a match against each other and the winner moves on to the next round.

(b) If the number of the players, say n, in any round is odd, then one of them is given a bye, that is, he automatically moves on to the next round. The remaining (n-1) players are grouped into (n-1)/2 pairs. The players in each pair play a match against each other and the winner moves on to the next round. No players gets more than one bye in the entire tournament

Thus, if n is even, then n/2 players move on to the next round while if n is odd, then (n+1)/2 players move on to the next round. The process is continued toll the final round, which obviously is played between two players. The winner in the final round is the champion of the tournament.

6. What is the number of matches played by the champion?

a. The entry list for the tournament consists of 83 players.

b. The champion received one bye.

7. If the number of the players, say n, in the first round was between 65 and 128, then what is the exact value of n ?

A. Exactly one player received a bye in the entire tournament.

B. One player received a bye while moving on to the fourth round from the third round.

8. A shop stores x kg of rice. The first customer buys half this amount plus half a kg of rice. The second customer buys half the remaining amount plus half a kg of rice. Then the third customer also buys half the remaining amount plus half a kg of rice. Thereafter, no rice is left in the shop. Which of the following best describes the value of x?

A. $2 \le x \le 6$

B. $5 \le x \le 8$

C. $9 \le x \le 12$

D. $11 \le x \le 14$

E. $13 \le x \le 18$

9. Consider a right circular cone of base radius 4 cm and height 10cm. A cylinder is to be placed inside the cone with one of the flat surfaces resisting on the base of the cone. Find the largest possible total surface area (in sq cm) of the cylinder.

A. $\frac{100\pi}{3}$

B. $\frac{80\pi}{3}$

C. $\frac{120\pi}{7}$

D. $\frac{130\pi}{9}$

E. $\frac{110\pi}{7}$

10. Consider obtuse-angled triangles with sides 8 cm, 15 cm and x cm. If x is an integer, then how many such triangles exist?

A. 5

B. 21

C. 10

D. 15

E. 14

11. Three consecutive positive integers are raised to the first, second, and third powers respectively and then added. The sum so obtained is a perfect square whose square root equals the total of the three originals integers. Which of the following best describes the minimum, say m, of these three integers?

A. $1 \le m \le 3$

B. $4 \le m \le 6$

C. $7 \le m \le 9$

D. $10 \le m \le 12$

E. $13 \le m \le 15$

12. How many integers, greater than 999 but not greater than 4000, can be formed with the digits 0, 1, 2, 3, and 4, if repetition of digits is allowed?

A. 499

B. 500

C. 375

D. 376

E. 501

13. Find the sum $\sqrt{1+\frac{1}{1^2}+\frac{1}{2^2}}+\sqrt{1+\frac{1}{2^2}+\frac{1}{3^2}}+\ldots\ldots\ldots+\sqrt{1+\frac{1}{2007^2}+\frac{1}{2008^2}}$

A. $2008-\frac{1}{2008}$

B. $2007-\frac{1}{2007}$

C. $2007-\frac{1}{2008}$

D. $2008-\frac{1}{2007}$

E. $2008-\frac{1}{2009}$

14. In a triangle ABC, the lengths of the sides AB and AC equal 17.5 cm and 9 cm respectively. Let D be a point on the line segment BC such that AD perpendicular to BC. If AD= 3 cm, then what is the radius (in cm) of the circle circumscribing the triangle ABC ?

A. 17.05

B. 27.85

C. 22.45

D. 32.25

E. 26.25

15. Let f(x) be a function satisfying f(x)f(y) = f(xy) for all real x, y. If f(2) = 4, then what is the value of f(1/2)?

A. 0

B. 1/4

C. 1/2

D. 1

E. Cannot be determined

16. What are the last two digits of 7^{2008}

A. 21

B. 16

C. 01

D. 41

E. 31

17. Consider a square ABCD with mid points E, F, G, H of AB, BC, CD and DA respectively. Let L denote the line passing through F and H. Consider points P and Q, on L and inside ABCD, such that the angles APD and BQC both equal120°. What is the ratio of the area of ABQCDP to the remaining area inside ABCD?

A. $\frac{4\sqrt{2}}{3}$

B. $2+\sqrt{3}$

C. $\frac{10-3\sqrt{3}}{9}$

D. $1+\frac{1}{\sqrt{3}}$

E. $2\sqrt{3}-1$

18. If the root of the equation $x^3-ax^2+bx-c=0$ are three consecutive integers, then what is the smallest possible value of b?

A. $-\frac{1}{\sqrt{3}}$

B. -1

C. 0

D. $\frac{1}{\sqrt{3}}$

E. 1

Directions (Qs. 19& 20): Let , where a, b and c are certain constants and . It is known that

f(5) =-3f(2) and that 3 is a root of f(x) = 0.

19. What is the other root of f(x) =0?

A. -7

B. -4

C. 2

D. 6

E. Cannot be determined

20. What is the value of a+ b+ c?

A. 9

B. 14

C. 13

D. 37

E. Cannot be determined

21. Rahim plans to drive from city A to station C, at the speed of 70 km per hour, to catch the train arriving there from B. He must reach C at least 15 minutes before the arrival of the train. The train leaves B located 500 km south of AA.
6:15 AM

B. 6: 30 AM

C. 6: 45 AM

D. 7: 00 AM

E. 7: 15 AM

22. Two circles, both of radii 1 cm, intersect such that the circumference of each one passes through the centre of the other. What is the area (in sq cm) of the intersecting region?

A. $\frac{\pi}{3}-\frac{\sqrt{3}}{4}$

B. $\frac{2\pi}{3}+\frac{\sqrt{3}}{2}$

C. $\frac{4\pi}{3}-\frac{\sqrt{3}}{2}$

D. $\frac{4\pi}{3}+\frac{\sqrt{3}}{2}$

E. $\frac{2\pi}{3}-\frac{\sqrt{3}}{2}$

Directions (Qs. 23 &24): Five horses, Red, White, Grey, Black and spotted participated in a race. As per rules of the race, the persons betting on the winning horse get four times the bet amount. Moreover, the bet amount is returned to those betting on the horse that came in third, and the rest lose the bet amount. Raju bets Rs.3000, Rs.2000 and Rs.1000 on Red, White and Black horses, respectively and ends up with no profit and no loss.

23. Which of the following cannot be true?

A. At least two horses finished before Spotted

B. Red finished last

C. There were three horses between Black and Spotted

D. There were three horses between White and Red

E. Grey cam ein second

24. Suppose, in addition, it is known that Grey came in fourth. Then which of the following cannot be true?

A. Spotted came in first

B. Red finished last

C. White came in second

D. Black came in second

E. There was one horse between Black and White

25. The number of common terms in the two sequences 17, 21, 25,…417 and 16, 21, 26, …, 466 is