

## TCS Placement Papers 2013

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1. If  $3y + x > 2$  and  $x + 2y \leq 3$ , What can be said about the value of  $y$ ?

- A.  $y = -1$
  - B.  $y > -1$
  - C.  $y < -1$
  - D.  $y = 1$
- Answer: B

Multiply the second equation with -1 then it will become  $-x - 2y \geq -3$ . Add the equations. You will get  $y > -1$ .

2. If the price of an item is decreased by 10% and then increased by 10%, the net effect on the price of the item is

- A. A decrease of 99%
  - B. No change
  - C. A decrease of 1%
  - D. An increase of 1%
- Answer: C

If a certain number is increased by  $x\%$  then decreased by  $x\%$  or vice versa, the net change is always decrease. This change is given by a simple formula  $-\left(\frac{x}{10}\right)^2 = -\left(\frac{10}{10}\right)^2 = -1\%$ . Negative sign indicates decrease.

3. If  $m$  is an odd integer and  $n$  an even integer, which of the following is definitely odd?

- A.  $(2m+n)(m-n)$
- B.  $(m + n^2) + (m - n^2)$
- C.  $m^2 + mn + n^2$
- D.  $m + n$

Answer: C and D (Original Answer given as D)

You just remember the following  $\text{odd} \pm \text{odd} = \text{even}$ ;  $\text{even} \pm \text{even} = \text{even}$ ;  $\text{even} \pm \text{odd} = \text{odd}$   
Also  $\text{odd} \times \text{odd} = \text{odd}$ ;  $\text{even} \times \text{even} = \text{even}$ ;  $\text{even} \times \text{odd} = \text{even}$ .

4. What is the sum of all even integers between 99 and 301?

- A. 40000
  - B. 20000
  - C. 40400
  - D. 20200
- Answer: D

The first even number after 99 is 100 and last even number below 301 is 300. We have to find the sum of even numbers from 100 to 300. i.e.,  $100 + 102 + 104 + \dots + 300$ .

Take 2 Common.  $2 \times (50 + 51 + \dots + 150)$

There are total 101 terms in this series. So formula for the sum of  $n$  terms when first term and last term is known is  $n^2(a+1)$

So  $50 + 51 + \dots + 150 = 1012(50+150)$

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So  $2 \times 1012(50+150) = 20200$

5. There are 20 balls which are red, blue or green. If 7 balls are green and the sum of red balls and green balls is less than 13, at most how many red balls are there?

- A. 4
- B. 5
- C. 6
- D. 7

Answer: B

Given  $R + B + G = 17$ ;  $G = 7$ ; and  $R + G < 13$ . Substituting  $G = 7$  in the last equation, We get  $R < 6$ .  
So maximum value of  $R = 6$

6. If  $n$  is the sum of two consecutive odd integers and less than 100, what is greatest possibility of  $n$ ?

- A. 98
- B. 94
- C. 96
- D. 99

Answer : C

We take two odd numbers as  $(2n + 1)$  and  $(2n - 1)$ .  
Their sum should be less than 100. So  $(2n + 1) + (2n - 1) < 100 \Rightarrow 4n < 100$ .  
The largest 4 multiple which is less than 100 is 96

7.  $x^2 < 1/100$ , and  $x < 0$  what is the highest range in which  $x$  can lie?

- A.  $-1/10 < x < 0$
- B.  $-1 < x < 0$
- C.  $-1/10 < x < 1/10$
- D.  $-1/10 < x$

Answer: A

Remember:

$(x - a)(x - b) < 0$  then value of  $x$  lies in between  $a$  and  $b$ .

$(x - a)(x - b) > 0$  then value of  $x$  does not lie inbetween  $a$  and  $b$ . or  $(-\infty, a)$  and  $(b, -\infty)$  if  $a < b$

$x^2 < 1/100 \Rightarrow$

$(x^2 - 1/100) < 0 \Rightarrow (x^2 - (1/10)^2) < 0 \Rightarrow (x - 1/10)(x + 1/10) < 0$

So  $x$  should lie inbetween  $- 1/10$  and  $1/10$ . But it was given that  $x$  is -ve. So  $x$  lies in  $-1/10$  to  $0$

8. There are 4 boxes colored red, yellow, green and blue. If 2 boxes are selected, how many combinations are there for at least one green box or one red box to be selected?

- A. 1
- B. 6
- C. 9
- D. 5

Answer: 5

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Total ways of selecting two boxes out of 4 is  $4C_2 = 6$ . Now, the number of ways of selecting two boxes where none of the green or red box included is only 1 way. (we select yellow and blue in only one way). If we subtract this number from total ways we get 5 ways.

9. All faces of a cube with an eight - meter edge are painted red. If the cube is cut into smaller cubes with a two - meter edge, how many of the two meter cubes have paint on exactly one face?

- A. 24
- B. 36
- C. 60
- D. 48

Answer : A

If there are  $n$  cubes lie on an edge, then total number of cubes with one side painting is given by  $6 \times (n-2)^2$ . Here side of the bigger cube is 8, and small cube is 2. So there are 4 cubes lie on an edge. Hence answer = 24

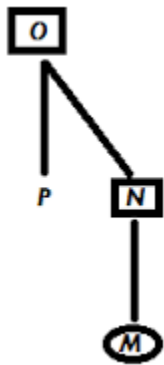
10. Two cyclists begin training on an oval racecourse at the same time. The professional cyclist completes each lap in 4 minutes; the novice takes 6 minutes to complete each lap. How many minutes after the start will both cyclists pass at exactly the same spot where they began to cycle?

- A. 10
- B. 8
- C. 14
- D. 12

Answer: D

The faster cyclist comes to the starting point for every 4 min so his times are 4, 8, 12, ..... The slower cyclist comes to the starting point for every 6 min so his times are 6, 12, 18, ..... So both comes at the end of the 12th min.

11. M, N, O and P are all different individuals; M is the daughter of N; N is the son of O; O is the father of P; Among the following statements, which one is true?



- A. M is the daughter of P
- B. If B is the daughter of N, then M and B are sisters
- C. If C is the granddaughter of O, then C and M are sisters

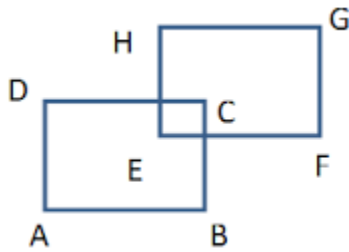
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D. P and N are bothers.

Answer: B

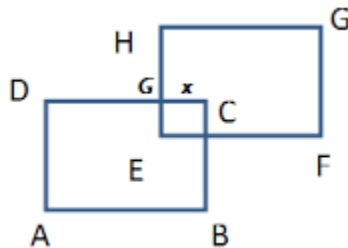
From the diagram it is clear that If B is the daughter of N, then M and B are sisters. Rectangle indicates Male, and Oval indicates Female.



12. In the adjoining diagram, ABCD and EFGH are squares of side 1 unit such that they intersect in a square of diagonal length  $(CE) = 1/2$ . The total area covered by the squares is

- A. Cannot be found from the information
- B.  $1 \frac{1}{2}$
- C.  $1 \frac{7}{8}$
- D. None of these

Answer: C



Let  $CG = x$  then using pythogerous theorem  $CG^2 + GE^2 = CE^2$

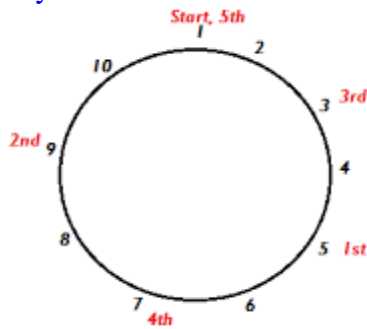
$$\Rightarrow x^2 + x^2 = (1/2)^2 \Rightarrow 2x^2 = 1/4 \Rightarrow x^2 = 1/8$$

Total area covered by two bigger squares =  $ABCD + EFGE - \text{Area of small square} = 2 - 1/8 = 15/8$

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13. There are 10 stepping stones numbered 1 to 10 as shown at the side. A fly jumps from the first stone as follows; Every minute it jumps to the 4th stone from where it started - that is from 1st it would go to 5th and from 5th it would go to 9th and from 9th it would go to 3rd etc. Where would the fly be at the 60th minute if it starts at 1?



A. 1

B. 5

C. 4

D. 9

Answer : A

Assume these steps are in circular fashion.

Then the fly jumps are denoted in the diagram. It is clear that fly came to the 1st position after 5th minute. So again it will be at 1st position after 10th 15th .....60th. min.

So the fly will be at 1st stone after 60th min.

14. What is the remainder when  $617+1176$  is divided by 7?

A. 1

B. 6

C. 0

D. 3

Answer: C

$$617 = (7-1)17 =$$

$$17C0.717-17C1.716.11.....+17C16.71.116-17C17.117$$

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If we divide this expansion except the last term each term gives a remainder 0. Last term gives a remainder of - 1.

Now From Fermat little theorem,  $[a^{p-1}] \text{Rem} = 1$

So  $[1767] \text{Rem} = 1$

Adding these two remainders we get the final remainder = 0

15. In base 7, a number is written only using the digits 0, 1, 2, .....6. The number 135 in base 7 is  $1 \times 7^2 + 3 \times 7 + 5 = 75$  in base 10. What is the sum of the base 7 numbers 1234 and 6543 in base 7.

A. 11101

B. 11110

C. 10111

D. 11011

Answer: B

$$\begin{array}{cccc}
 a & b & c & d \\
 | & | & | & \\
 1 & 2 & 3 & 4 \\
 \hline
 6 & 5 & 4 & 3 \\
 | & | & | & 0
 \end{array}$$

In base 7 there is no 7. So to write 7 we use 10. for 8 we use 11..... for 13 we use 16, for 14 we use 20 and so on.

So from the column d,  $4 + 3 = 7 = 10$ , we write 0 and 1 carried over. now  $1 + 3 + 4 = 8 = 11$ , then we write 1 and 1 carried over. again  $1 + 2 + 5 = 8 = 11$  and so on

16. The sequence  $\{A_n\}$  is defined by  $A_1 = 2$  and  $A_{n+1} = A_n + 2n$  what is the value of  $A_{100}$

A. 9902

B. 9900

C. 10100

D. 9904

Answer: A

We know that  $A_1 = 2$  so  $A_2 = A_1 + 1 = A_1 + 2(1) = 4$

$A_3 = A_2 + 2 = A_2 + 2(2) = 8$

$A_4 = A_3 + 3 = A_3 + 2(3) = 14$

So the first few terms are 2, 4, 8, 14, 22, .....

The differences of the above terms are 2, 4, 6, 8, 10...

and the differences of differences are 2, 2, 2, 2. all are equal. so this series represents a quadratic equation.

Assume  $A_n = an^2 + bn + c$

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$$\text{Now } A1 = a + b + c = 2$$

$$A2 = 4a + 2b + c = 4$$

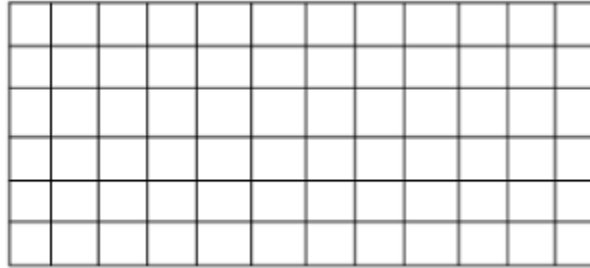
$$A3 = 9a + 3b + c = 8$$

Solving above equations we get  $a = 1$ ,  $b = -1$  and  $C = 2$

So substituting in  $An = n^2 + bn + c = n^2 - n + 2$

Substitute 100 in the above equation we get 9902.

17. Find the number of rectangles from the adjoining figure (A square is also considered a rectangle)



- A. 864
- B. 3276
- C. 1638
- D. None

Answer: C

To form a rectangle we need two horizontal lines and two vertical lines. Here there are 13 vertical lines and 7 horizontal lines. The number of ways of selecting 2 lines from 13 vertical lines is  ${}^{13}C_2$  and the number of ways of selecting 2 lines from 7 horizontals is  ${}^7C_2$ . So total rectangles =  ${}^7C_2 \times {}^{13}C_2$

18. A, B, C and D go for a picnic. When A stands on a weighing machine, B also climbs on, and the weight shown was 132 kg. When B stands, C also climbs on, and the machine shows 130 kg. Similarly the weight of C and D is found as 102 kg and that of B and D is 116 kg. What is D's weight

- A. 58kg
- B. 78 kg
- C. 44 kg
- D. None

Answer : C

$$\text{Given } A + B = 132; B + C = 130; C + D = 102, B + D = 116$$

Eliminate B from 2nd and 4th equation and solving this equation and 3rd we get D value as 44.

19. Roy is now 4 years older than Erik and half of that amount older than Iris. If in 2 years, Roy will be twice as old as Erik, then in 2 years what would be Roy's age multiplied by Iris's age?

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- A. 28
- B. 48
- C. 50
- D. 52

Answer: 48

20.  $X, Y, Z$  and  $W$  are integers. The expression  $X - Y - Z$  is even and the expression  $Y - Z - W$  is odd. If  $X$  is even what must be true?

- A.  $W$  must be odd
- B.  $Y - Z$  must be odd
- C.  $W$  must be even
- D.  $Z$  must be odd

Answer: A or C (But go for C)

21. Mr and Mrs Smith have invited 9 of their friends and their spouses for a party at the Waikiki Beach resort. They stand for a group photograph. If Mr Smith never stands next to Mrs Smith (as he says they are always together otherwise). How many ways the group can be arranged in a row for the photograph?

- A.  $20!$
- B.  $19! + 18!$
- C.  $18 \times 19!$
- D.  $2 \times 19!$

Answer: C

22. In a rectangular coordinate system, what is the area of a triangle whose vertices have the coordinates  $(4,0)$ ,  $(6, 3)$  and  $(6, -3)$

- A. 6
- B. 7
- C. 7.5
- D. 6.5

Answer: A

23. A drawer holds 4 red hats and 4 blue hats. What is the probability of getting exactly three red hats or exactly three blue hats when taking out 4 hats randomly out of the drawer and immediately returning every hat to the drawer before taking out the next?

- A.  $1/2$
- B.  $1/8$
- C.  $1/4$
- D.  $3/8$

Answer: B



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24. In how many ways can we distribute 10 identical looking pencils to 4 students so that each student gets at least one pencil?

- A. 5040
- B. 210
- C. 84
- D. None of these

Answer: C

25. The prime factorization of integer  $N$  is  $A \times A \times B \times C$ , where  $A$ ,  $B$  and  $C$  are all distinct prime integers. How many factors does  $N$  have?

- A. 12
- B. 24
- C. 4
- D. 6

Answer: A

26. Tim and Elan are 90 km from each other. They start to move each other simultaneously. Tim at speed 10 and Elan 5 kmph. If every hour they double their speed, what is the distance that Tim will pass until he meets Elan?

- A. 45
- B. 60
- C. 20
- D. 80

Answer: B

27. A father purchases dresses for his three daughters. The dresses are of the same color but of different sizes. The dresses are kept in a dark room. What is the probability that all three will not choose their own dresses?

- A.  $\frac{2}{3}$
- B.  $\frac{1}{3}$
- C.  $\frac{1}{6}$
- D.  $\frac{1}{9}$

Answer: B

28.  $N$  is an integer and  $N > 2$ , at most how many integers among  $N + 2$ ,  $N + 3$ ,  $N + 4$ ,  $N + 5$ ,  $N + 6$ , and  $N + 7$  are prime integers?

- A. 1
- B. 3
- C. 2

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D. 4

Answer: C

29. A turtle is crossing a field. What is the total distance (in meters) passed by turtle? Consider the following two statements

(X) The average speed of the turtle is 2 meters per minute

(Y) Had the turtle walked 1 meter per minute faster than his average speed it would have finished 40 minutes earlier

A. Statement X alone is enough to get the answer

B. Both statements X and Y are needed to get the answer

C. Statement Y alone is enough to get the answer

D. Data inadequate

Answer: B

30. Given the following information, who is youngest?

C is younger than A; A is taller than B

C is older than B; C is younger than D

B is taller than C; A is older than D

A. D

B. B

C. C

D. A

Answer: B

31. If  $P(x) = ax^4 + bx^3 + cx^2 + dx + e$  has roots at  $x = 1, 2, 3, 4$  and  $P(0) = 48$ , what is  $P(5)$

A. 48

B. 24

C. 0

D. 50

Answer: A