1. 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 ✓

   D. 4

Answer: C

By hit and trial method, we get no. of prime numbers in that range = 2.

2. If 3y+x>2 and x+2y≤3, what can be said about the value of y?

   A. $y = -1$

   B. $y > -1$ ✓

   C. $y < -1$

   D. $y = 1$

Answer: B

$$3y + x > 2 \qquad x + 2y \leq 3$$
$$x > 2 - 3y \qquad x \leq 3 - 2y$$
$$x > 2 - 3y \text{ and } x \leq 3 - 2y$$
$$2 - 3y < x \leq 3 - 2y$$
$$2 - 3y < 3 - 2y$$
$$\boxed{y > -1}$$

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

   A. A decreased of 99%

   B. No change

   C. A decreased of 1% ✓

   D. An increased of 1

Answer: C

$$x = -10\%, \quad y = 10\%$$
$$\text{Overall change} = x + y + \frac{xy}{100}$$
$$= -10 + 10 + \frac{(-100)}{100}$$
$$= -1\%$$

4. What is the sum of all even integers between 99 and 301?
   A. 40000
   B. 20000
   C. 40400
   D. 20200 ✓

Answer: D

$n =$ no. of terms
$a =$ 1st term
$l =$ last term
n^{th} term $= a + (n-1)d \Rightarrow 300 = 100 + (n-1)2$
Sum $= \frac{n}{2}[a+l] \qquad \Rightarrow 2n - 2 = 200 \Rightarrow n = 101$
$\Rightarrow$ Sum $= \frac{101}{2}[100 + 300]$

$\qquad = 20200$

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

$r + b + g = 20$
$g = 7$
$r + g < 13$
$\Rightarrow r < 6$
So $r_{max} = 5$

6. If n is the sum of two consecutive odd integers and less than 100, what is the greatest possibility of n ?
   A. 98
   B. 94
   C. 96 ✓
   D. 99

Answer: C

By hit and trial method,
$47 + 49 = 96$

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

A. 1   C. 9

B. 6   D. 5 ✓

Answer: D

Total ways of selecting 2 boxes out of 4 is $^4C_2 = 6$.

Now the no. of ways of selecting two boxes where none of the green or red box included is only 1 way.

If we subtract this no. from total ways, we get **5 ways**.

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

A. $-1/10 < x < 0$ ✓   C. $-1/10 < x < 1/10$

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

Answer: A

$$x^2 < \frac{1}{100} \Rightarrow x < \pm \frac{1}{10}$$

$$-\frac{1}{10} < x < \frac{1}{10}, \quad x < 0$$

Combining both, $-\frac{1}{10} < x < 0$

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 ✓   C. 60

B. 36   D. 48

Answer: A

Exactly one side

$$1cp = \frac{6(a-2x)^2}{x^2} \qquad a = 8$$
$$\qquad\qquad\qquad\qquad x = 2$$

$$= \frac{6(8-4)^2}{4}$$

$$= \frac{6 \times 4 \times 4}{4} = 24$$

10. In a sequence of integers, $A(n) = A(n-1) - A(n-2)$, where $A(n)$ is the nth term in the sequence, n is an integer and $n \geq 3$, $A(1)=1$, $A(2)=1$, calculate $S(1000)$, where $S(1000)$ is the sum of the first 1000 terms.

A. 2

C. 4

B. 1

D. 0

Answer: B

$A(1)=1 \quad A(2)=1 \quad A(3)=0 \quad A(4)=-1 \quad A(5)=-1 \quad A(6)=0$

The same cycle is repeated so sum of any six consecutive term = 0.

∴ 1st 996 term = 0

Sum of thousand = $1+1+0-1 = \underline{\underline{1}}$

11. If $x^2 - 16 > 0$, which of the following must be true?

A. $-4 > x > 4$

C. $-4 < x < 4$

B. $-4 > x < 4$

D. $4 < x$

Answer: A

$x^2 > 16$

$x > 4$

$x < -4$

$-4 > x > 4$

12. 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 starts will both cyclists pass at exactly the same spot where they began to cycle?

A. 10

C. 14

B. 8

D. 12

Answer: D

LCM (6 min, 4 min)

= 12 min

LCM gives the minimum time required to meet the cyclist for 1st time at the starting point.

13. 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 statement which one is true?
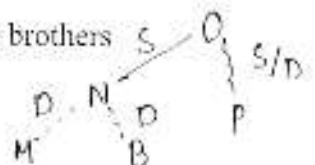
A. M is the daughter of P
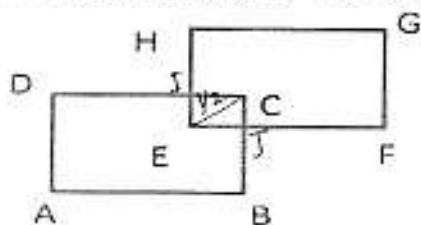
C. If C is the granddaughter of C and M are sisters

B. If B is the daughter of N, then M and B are sister ✓

D. P and N are brothers

Answer: B

14. In the adjoining diagram, ABCD and EFGH are squares of side 1 unit such that they intersect in a square of diagonal length (CE) = ½. The total area covered by the squares is

A. Cannot be found from the information

B. 1

C. 15/8

D. 2

Answer: C

$$CE = \frac{1}{2} \quad , \quad CJ = \frac{1}{2}\left(\frac{1}{\sqrt{2}}\right) = \frac{1}{2\sqrt{2}}$$

$$Area\,(CJEI) = a^2 = \left(\frac{1}{2\sqrt{2}}\right)^2 = \frac{1}{8}$$

$$Area_{ABCD} + Area_{EFGH} - Area_{CJEI} = Area\ ADIHGFJBA$$

$$= 1 + 1 - \frac{1}{8} = 15/8$$

15. 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 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?
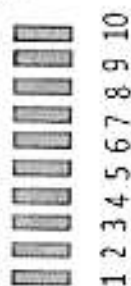
A. 2

B. 1

C. 3

D. 4

Answer: B

$$60\,MIN = 60 \times 4 = 240\ STEPS$$

Starting with the 1st he will be again at 1st step.

16. What is the reminder when $6^{17} + 17^6$ is divided by 7?

A. 1

B. 6

C. 0

D. 3

Answer: C

$6^2 = 1 \mod 7 \ [6^2 = 36, \text{ divided by 7 gives reminder 1}]$

$6^{2 \times 8} = 1^8 \mod 7$

$\Rightarrow 6^{16} = 1 \mod 7 \ [\text{all even power also gives 1 mod 7}]$

$\Rightarrow (6^{16}) \times 6 = 1 \times 6 \mod 7$

so $6^{17} = 6 \mod 7$

like wise.

$17^2 = 2 \mod 7$

$\Rightarrow 17^{2 \times 3} = 2^3 \mod 7$

$\Rightarrow 17^6 = 8 \mod 7 \ (\text{simplify 8 i's one time})$

so $17^6 = 1 \mod 7$

Then $(6^{17} + 17^6)/7$

$\Rightarrow ((6 \mod 7) + (1 \mod 7))/7 = ((6+1) \mod 7)/7 = (7 \mod 7)/7$

Hence the reminder is $\boxed{0}$.

17. In base 7, a number is written only using the digits 0, 1..............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

$$\begin{array}{r} (1\ 2\ 3\ 4)_7 \\ + (6\ 5\ 4\ 3)_7 \\ \hline 1\ 1\ 1\ 1\ 0 \end{array}$$

18. The sequences $\{A_n\}$ 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

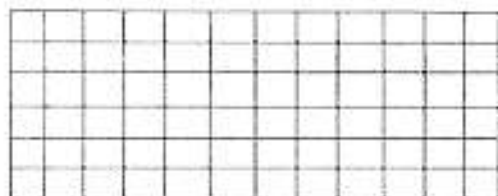$A_1 = 2 \qquad A_2 = A_1 + 2 \times 1 \Rightarrow A_2 = 4$

$A_3 = 4 + 2 \times 2 = 8$

$A_4 = 8 + 2 \times 3 = 14$

By observation,

$A_1 = (1)^2 - (-1) \quad A_2 = 2^2 - 0 \quad A_3 = 3^2 - 1 \quad A_4 = 4^2 - 2$

$A_{100} = 100^2 - 98 = \boxed{9902}$

19. Find the number of rectangles in the adjoining figure(a square is also considered a rectangle):

A. 864

B. 3276

C. 1638

D. None of these

Answer: C

13 vertical line.

7 Horizontal line

No. of rectangles $= {}^{13}C_2 \times {}^{7}C_2$

$= \dfrac{13 \times 12}{2} \times \dfrac{7 \times 6}{2} = 78 \times 21 = 1638$

20. 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 132kg. When B stands, C also climbs on, and the machine shoes 130kg. Similarly the weight of C and D is found as 102 kg and that of B and D is 116kg. What is D's weight?

A. 58kg

B. 78kg

C. 44kg

D. None of these

Answer: C

$A + B = 132$

$B + C = 130$

$\left.\begin{array}{l} C + D = 102 \\ B + D = 116 \end{array}\right\}$ $B + C + 2D = 218$

$\Rightarrow 130 + 2D = 218$

$\Rightarrow 2D = 88 \Rightarrow \boxed{D = 44 Kg}$

21. 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?

A. 28

B. 48

C. 50

D. 52

Answer: B

$R = E + 4 \longrightarrow A$

$R = I + 2 \longrightarrow B$

$R + 2 = 2(E + 2) \longrightarrow C$

$(E + 4) + 2 = 2(E + 2)$

$\Rightarrow E + 6 = 2E + 4$

$\Rightarrow E = 2$

$R = 6 \quad (R + 2) = 8$

$I = 4 \quad (I + 2) = \underline{6}$

$ 48$

22. 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 odd
D. Z must be odd

Answer: C

$$X - (Y+Z) = Even$$
$$(Even)$$
$$\therefore Y+Z = Even$$
$$(Y+Z) - W = ODD$$
$$Even$$
$$W \text{ must be ODD.}$$

23. Given the following information, which option must be true?

I.   A occurs only if either B or C occurs
II. B occurs only if both D and E occur
III. F occurs only if C does not occur
IV. G occurs only if both A and F occur

A. A occurs whenever F occurs
B. F never occurs

C. G does not occur if D does not occur
D. None of these

Answer: C

24. Mr. And Mrs. Smith has 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 × 19!
D. 2 × 19!

Answer: C   Total photo if Mr & Mrs Smith stand together = $\lfloor 120$

No. of Couple = $\dfrac{}{1}\ \dfrac{}{2}\ \dfrac{}{3}\ \dfrac{}{4}\ \boxed{\dfrac{Mr\&MrsSmith}{5}}\ \dfrac{}{6}\ \dfrac{}{7}\ \dfrac{}{8}\ \dfrac{}{9}$ = $\lfloor 18+1 \times \lfloor 2$
= $\lfloor 19 \times \lfloor 2$

∴ No. of photos not together = $\lfloor 20 - \lfloor 19 \times 2$
= $18 \times \lfloor 19$

25. Tim and Élan are 90km away from one another. They are starting to move towards each other simultaneously, Tim at a speed of 10 km/hr and Élan at a speed of 5 km/hr. If every hour they double their speeds,
What is the distanced that Tim will pass until he meets Élan.

A. 45km

B. 60km

C. 30km

D. 80km

Answer: B

$$\text{Ratio of their speed} = 2:1$$
$$\text{Ratio of distances covered} = 2:1$$
$$\text{Tim will cover} = 90 \times 2/3$$
$$= 60 \text{Km}.$$

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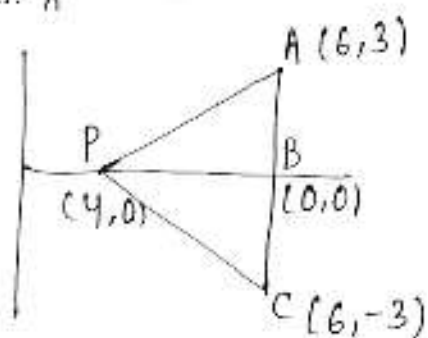
A. 6

B. 7

C. 7.5

D. 6.5

Answer: A

$$\text{Area } \triangle ABD = \frac{1}{2} \times \text{base} \times \text{height}$$
$$= \frac{1}{2} \times 2 \times 3$$
$$= 3$$
$$\text{Total Area} = 2 \times 3 = 6$$

27. 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 of the next?

A. 1/2

B. 1/8

C. 1/4

D. 3/8

Answer: A

$$\underline{R} \ \underline{R} \ \underline{R} \ \underline{B}$$
or
$$\underline{B} \ \underline{B} \ \underline{B} \ \underline{R}$$

$$\text{Probability (Red Hat)} = \left[\frac{4c_1 \times 4c_1 \times 4c_1 \times 4c_1}{8c_1 \times 8c_1 \times 8c_1 \times 8c_1} \right] \times 4$$

one blue ball can be at 4 place.

$$= \left(\frac{1}{2}\right)^4 \times 4 = 1/4$$

$$\text{Probability (Blue Hat)} = 1/4$$

$$\text{Total Probability} = \frac{1}{4} + \frac{1}{4} = \frac{1}{2}.$$

C. Statement Y alone is enough to get the answer

D. None of these

Answer: β

$$D = speed \times time$$
$$= 2 \times T = 3 \times (T-40)$$

32. 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
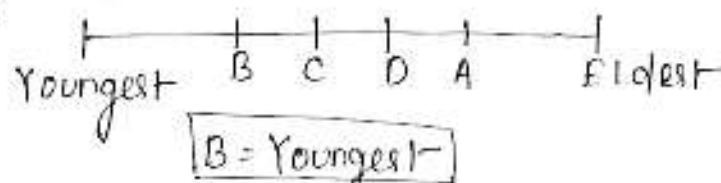B is taller than C;   A is older than D

A. D
B. B
C. C
D. A

Answer: β

Youngest   B   C   D   A   Eldest

$$B = Youngest$$

33. Given the following information, which option must be true?

I.   A occurs only if either B or C occurs
II. B occurs only if both D and E occurs
III. F occurs only if C does not occurs
IV. G occurs only if both A and F occurs

A. A occurs whenever F occurs
B. F never occurs
C. G does not occur if D does not occur
D. None of these

Answer: C   Go Through options.

34. If $P(X) = ax^4 + bx3 + cx2 + dx + e$ has roots at $x = 1, 2, 3$ and 4, and $P(O) = 48$, what is $P(5)$?

A. 48
B. 24
C. 0
D. 50

Answer: A

Roots are 1, 2, 3, 4.

$$a(x-1)(x-2)(x-3)(x-4) = P(x)$$

Comparing the two,

$$a[x^4 - 10x^3 + 35x^2 - 50x + 24]$$
$$= ax^4 + bx^3 + cx^2 + dx + e$$

$P(0) = 48$ $a \times 24 = 48 \Rightarrow a = 2.$

$$2x^4 - 20x^3 + 70x^2 - 100x + 48 = P(x) \quad \boxed{P(5) = 48}$$

35. How many workers does factory W employ? Consider the following two statements to get the answer.

(X) 220 workers at W install batteries, and 300 Workers knit socks.
(Y) Every worker of W either installs batteries or knits socks, or both.

A. Statement X alone is enough to get the answer

B. Statement X and Y are together not enough to get the answer, and additional data is needed ✓

C. Statement Y alone is enough to get the answer

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

Answer:
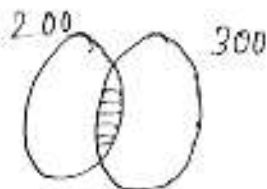
$$n(A \cap B) = ?$$

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

$$= 220 + 300 - X$$

X is not unknown.