A N S W E R S

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■■■ **Section Test 1**

Q. No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Answer	(b)	(b)	(c)	(d)	(c)	(b)	(a)	(d)	(c)	(c)	(c)	(a)	(c)	(b)	(b)	(d)	(b)	(d)	(b)	(a)
Q. No.	21	22	23	24	25	26	27	28	29	30										
Answer	(b)	(c)	(d)	(d)	(a)	(a)	(c)	(c)	(c)	(b)										

HINTS AND SOLUTIONS

1. First of all we should understand that we cannot solve this question by taking different values of N and checking if its prime or not. We need to devise some alternative method.

   $N^4 + 4 = (N^2 + 2)^2 - (2N)^2 = (N^2 + 2 + 2N)(N^2 + 2 - 2N)$

   Since N is a natural number, each of the above factors will also be a natural number.

   We can conclude that $N^4 + 4 = (N^2 + 2 + 2N)(N^2 + 2 - 2N)$ is product of two natural numbers. Hence it cannot be a prime number except for the value N = 1 for which the values are as follows:

   $(N^2 + 2 + 2N) = 5$ and $(N^2 + 2 - 2N) = 1$, So $(N^2 + 2 + 2N)(N^2 + 2 - 2N) = 5 \times 1 = 5$

   (For N = 1, value can be obtained using $N^4 + 4$. Though for higher values of N, calculating the value and checking if its prime of not is difficult).

2. BC, CD and BD constitute a right-angled triangle $(13 \times 3, 13 \times 4$ and $13 \times 5)$. If BD = 65, then it satisfies the other set of values of AB and AD also.

3. Let us assume that the quotient is Q and divisor is D. Using the condition given in question, $1997 = QD + 41 \Rightarrow QD = 1956$. Now we will factorize 1956 in two parts such that D (divisor) is more than 41.

4. The minimum possible value of first 10 consecutive odd numbers = 100 and next value of sum would be obtained as 102(by replacing 19 by 21). And so on all the other even values from 100 to 1900 will be a value of sum. There are 901 even numbers from 100 to 1900.

5. Go through hit and trial.

6. Assume any one vertex of the triangle to be the point of the circum-circle and then solve.

7. Here we need to find out the solution of $2 \leq x + y \leq 20$

   We know that the integral solutions possible of $x + y = n$, where zero solutions are not possible is $^{n-1}C_{r-1}$. So, total points = $19 \times 20 / 2 = 190$

8. Since their speeds are consecutive natural numbers, there will be just one meeting point and that is the starting point. So, answer = 0. Hence option (D) is the answer.

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Let us make a table for the time taken:

	Patna	Mumbai	Calcutta	Chennai	Bangalore
Patna		4	5	3.75	10
Mumbai	4	–	6.666667	10	12.5
Calcutta	5	6.666667		12.5	12
Chennai	3.75	10	12.5		4
Bangalore	10	12.5	12	4	–

14. Minima of $f(x) = |x - 2| + |2.5 - x| + |3.6 - x|$ at one of the critical points.

   $F(x)_{x=2} = 0 + 0.5 + 1.6 = 2.1$
   $F(x)_{x=2.5} = 0.5 + 0 + 1.1 = 1.6$
   $F(x)_{x=3.6} = 1.6 + 1.1 + 0 = 2.7$

   Obviously, minima is obtained at x = 2.5. Hence option (B) is the answer.

15. 2.10^8 is a nine-digit number. So, all the numbers which are of less than 9 digits will be smaller than 2.10^8.
   Total number of numbers of 1 digit = 2
   Total number of numbers of 2 digit = 2^2
   Total number of numbers of 3 digit = 2^3
   Total number of numbers of 4 digit = 2^4

Total number of numbers of 5 digit = 2^5
Total number of numbers of 6 digit = 2^6
Total number of numbers of 7 digit = 2^7
Total number of numbers of 8 digit = 2^8
Total number of numbers of less than 9 digits = 510
Total number of numbers of 9 digits less than $2.10^8 = 2^8$
Total number of numbers of less than 2×10^8 = 510 + 256 = 766
Hence option (B) is the answer.

16. Value of p cannot be calculated, so p × q × r cannot be determined.

17. Ar($\triangle$BCD) = ½ ar(ABCD) = ½ ar (BDQP)
So, ar(ABCD) = ½ ar (BDQP) = 60 sq. units
Hence option (B) is the answer.

18. Statement (A): $|2x-19| < 7$, implies that $-7 < |2x-19| < 7$
Implies that x > 13 or x < 13
Hence statement (A) alone is not sufficient.
Statement (B):- $x^2 - 4x = 0$ implies that x = 0 or x = 4
Statement (B) alone is also not sufficient.
Even by using both the statements together, no definite conclusion can be drawn.
Hence option (D) is the answer.

19. Statement (A):- 3x + 5y = 11
We will assume some values of x to check the inequality.
If x = 2; y = 1 implies that x > y
If x = –2; y = 7 implies that x > y
If x = 3; y = 4 implies that x < y

Statement (A) alone is not sufficient to give the answer of the question.
Statement (B):- $x^5 > y^5$ implies that x > y (as from the $x^n > y^n$ implies that x > y if n is odd)
Therefore, Statement (B) alone is sufficient.

20. Using statement (A) alone:
Since m – n is a multiple of 22, m – n is a multiple of 11 and of 2 because 22 = 11 × 2
If both m and n are multiples of 11, the sum m + n will also be a multiple of 11. Consider the following examples:
44 – 22 = 22 {which is a multiple of 11 and of 22}
44 + 22 = 66 {which is a multiple of 11 and of 22}
88 – 66 = 22 {which is a multiple of 11 and of 22}
88 + 66 = 154 {which is a multiple of 11 and of 22}
However, if m and y are not individually divisible by 11, it is possible that m – n is a multiple of 22 (and 11) while m + n is not a multiple of 11. For example:
78 – 56 = 22 but 78 + 56 = 134 is not a multiple of 11.

Hence statement (A) alone is not sufficient to answer the question.
Using statement (B) alone:
Since the tens digit and the units digit of m are the same, the range of possible values for m includes:
11, 22, 33, 44, 55, 66, 77, 88, 99
Since each of these values is a multiple of 11, m must be a multiple of 11.
Since the tens digit and the units digit of n are the same, the range of possible values for n includes:
11, 22, 33, 44, 55, 66, 77, 88, 99
Since each of these values is a multiple of 11, n must be a multiple of 11.
Now if both m and n are multiples of 11, (m + n) and (m – n) will be a multiple of 11.
Statement (B) alone is sufficient.
Hence option (A) is the answer.

21. Boy's share = 180(5/9) = Rs 100
Girl's share = 180(4/9) = Rs 80
Given that (100/3x) + (80/2x) = 66   implies that x = 10/9
Therefore, number of boys in the class = (100 x 9)/30 = 30
Hence option (B) is the answer.

22. Best way of solving this question is - Assume values. Assume 1, 2, 3, 4 and 5. Sum of these five numbers = 15 = A. Now next five numbers are 6, 7, 8, 9, 10. Sum of these five numbers = 40.
40 = A + 25. Hence option (C) is the answer.

27. Following is the profit figure:

	2007	2008	2009
Estimated Profit	295	401	204
Actual Profit	338	210	384

Hence option (C) is the answer.

28. Following is the ratio:

2007	2008	2009
0.966063	1.129082	0.84573

Hence option (C) is the answer.

29. Max(Estimate, Actual(Sales Revenue))

2007	2008	2009
1326	1452	1452

Min(Estimate, Actual(Cost))
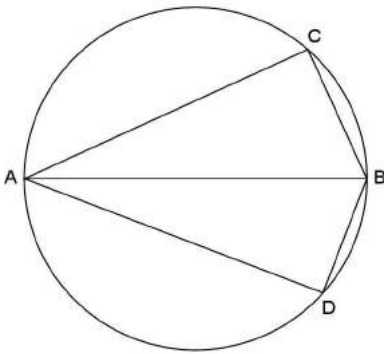
2007	2008	2009
986	1051	1024

Maximum possible profit = 428 crores (in 2009)
Hence, option (C) is the answer.

Section Test 1

Section Test 2

Q.1. AB is the diameter of the given circle, while points C and D lie on the circumference as shown. If AB is 15 cm. AC is 12 cm and BD is 9 cm, find the area of the quadrilateral ABCD.

(a) 54 sq. cm   (b) 216 sq. cm
(c) 162 sq. cm   (d) None of these

Q.2. An employee pays 1% of his salary or Rs 75 which-ever is higher as professional tax per month. He also pays 20% of the balance per year as income tax where first Rs 30,000 is tax free. If the salary is Rs 6000 per month, how much amount does he pay per year as income tax?
(a) Rs 8220   (b) Rs 9120
(c) Rs 8256   (d) Rs 9156

Q.3. Radha can do 3/4th of a work in 12 days. After working for 8 days Mira joins her and both works together for three days after which Radha leaves. If Mira takes 12 more days to complete the work then how many days Mira will take alone to do it?
(a) 16   (b) 12
(c) 48   (d) 24

Mark (a): If the question can be answered by using one of the statements alone, but cannot be answered by using other statement alone.

Mark (b): If the question can be answered by using either statement alone.

Mark (c): If the question can be answered by using both statements together, but cannot be answered by using either statement alone.

Mark (d): If the question cannot be answered even by using both the statements together.

Q.4. The base of a triangle is 60cm and one of the base angles is 60^0. What is the length of the shortest side of the triangle?
Statement A: The sum of the lengths of the other two sides is 80 cm
Statement B: The other base angle is 45^0

Q.5. A, B, C, D, E & F are six integers such that E < F, B > A, A < D < B. C is the greatest integer. Is A the smallest integer?
Statement A: E + B < A + D
Statement B: D < F

Q.6. If w, x, y, and z are the digits of the four-digit number N, a positive integer, what is the remainder when N is divided by 9?
Statement A: w + x + y + z = 13
Statement B: N + 5 is divisible by 9

Q.7. Ram runs 7/4 times as fast as Sham. If Ram gives Sham a start of 300m, how far must the winning post be if both Ram and Sham have to end the race at the same time?
(a) 1400m   (b) 700m
(c) 350m   (d) 210m

Q.8. A certain sum is lent out at a certain rate of interest for a certain period and the amount is 3.6 times as the principle. Had it been lent out on 60% higher rate of

interest for 40% less time period the amount would have been how many times the principle?
(a) 2.75 times   (b) 3.5 Times
(c) 3.7 Times   (d) 3.4 times

Q.9. The areas of the three adjacent faces of a rectangular box which meet in a point are known. The product of these areas is equal to:
(a) The volume of the box
(b) twice the volume of the box
(c) the square of the volume of the box
(d) the cube root of the volume of the box

Q.10. The area of the square ABCD is 64. Let E, F and G be mid points of DC, AD and BC respectively. If P is any point inside the rectangle ABGF and if X is the area of the triangle DPE, then which one of the following is true?
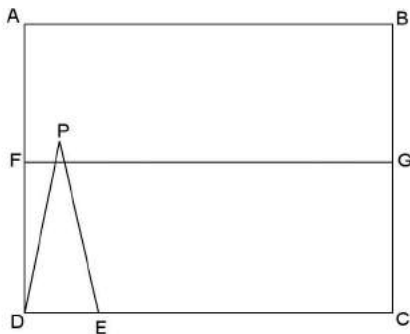
(a) $8 < x < 16$ (b) $8 < x < 32$
(c) $16 < x < 32$ (d) $16 < x < 64$

Q.11. Find the number of divisors of 5400 which are exactly divisible by 135?
(a) 12   (b) 8
(c) 16   (d) 14

Q.12. There are 10 types of chocolates in a shop; in how many ways can a person buy 18 chocolates?
(a) $^{28}C_{10}$ (b) $^{27}C_{11}$
(c) $^{27}C_{9}$ (d) $^{28}C_{9}$

Q.13. Let $S = \dfrac{1}{3} + \dfrac{1}{3^2} + \dfrac{1}{3^3} + \ldots\ldots \infty$; then $(0.25)\log_2 s$ is?
(a) 2   (b) 4
(c) 8   (d) 1

Q.14. In a test, Ram scored 25% of the maximum number of marks and fails by 60 marks, but Sham candidate who scores 42% of the maximum number of marks gets 8 marks more than necessarily passing marks. What is the maximum mark in the test?
(a) 500   (b) 300
(c) 400   (d) 600

Q.15. PQ is the diameter of a circle with center O. Point R on the circumference of the circle is equidistant from P and Q. A and B are two points in the opposite segment such that (arc AB) is 1/3 times the circumference; also AP = BQ. The ration of area of $\triangle$ PRQ to $\triangle$ AOB is:
(a) $4/\sqrt3$ (b) $\sqrt3/4$
(c) $\sqrt3/2$ (d) $2/\sqrt3$

The following diagram could be drawn: $\angle AOB = 120°$, $\angle PRQ - 90°$. $PQ = 2r$, where is the radius of the circle.
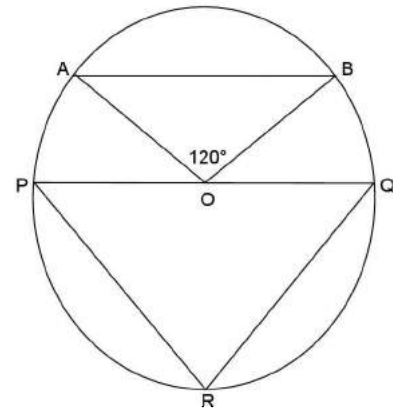
	S1	S2	S3	S4	S5	Total
A1	97	99	98		99	491
A2	92	95		94		
A3	86	89		90	93	443
A4	78		76		85	405
A5		69	64	75		349
A6	49	53	48	60	55	
Total	468		463	502	505	

Q.16. How much did A2 score in S5?
(a) 98   (b) 96
(c) 94   (d) 95

Q.17. What were the marks scored by A4 in S4?
(a) 80   (b) 88
(c) 85   (d) 75

Q.18. What is the average of the total marks scored by all six students?
(a) 304   (b) 436
(c) 336   (d) 404

Q.19. What is the sum of the marks scored by all the six students in S2?
(a) 576   (b) 486
(c) 586   (d) 476

Direction for questions 20 to 22

Table given below provides information about the percentage sales share of four companies A, B, C and D in the four states of Tamilnadu, Karnataka, Kerala and Arunachal Pradesh for four of their products E, F, G, H. Last column also provides the total size of the market in four states for the four products in million Rs.

Product ↓	Company A	Company B	Company C	Company D	Market size Rs. Million
	TN KT KL AP	TN KT KL AP	TN KT KL AP	TN KT KL AP	TN KT KL AP
E	15 36 20 14	20 30 25 22	35 30 15 36	15 0 30 18	60 48 42 72
F	30 28 16 16	18 32 14 20	24 40 18 40	23 0 42 20	22 18 20 24
G	12 40 15 20	28 44 20 20	30 10 25 20	18 0 35 30	48 50 36 44
H	24 18 10 22	25 24 08 14	28 18 07 24	23 30 55 20	84 96 90 72

TN- Tamilnadu, KT- Karnataka, KL- Kerala and AP- Arunachal Pradesh

Q.20. What is the turnover in Rs million for company C from product H?
(a) 64.38 million
(b) 58.08 million
(c) 43.72 million
(d) 34.68 million

Q.21. In AP what is the sales of product E of companies other than A, B, C, D?
(a) Rs 8 million
(b) Rs 7.2 million
(c) Rs 0.8 million
(d) Cannot be determined

Q.22. The sales of product G for Company A is lowest in which of the four states?
(a) Tamilnadu
(b) Kerala
(c) Arunachal Pradesh
(d) Karnataka

Q.23. If a = 2009, b = 2010 and c = 2011, then find the value of $a^3 + b^3 + c^3 - 3abc$.
(a) 12,030
(b) 18,090
(c) 15,100
(d) 16,060

Q.24. Natural numbers are written as following in the shape of pyramid:

```
                    1
              2           3
          4       5       6
        7     8       9     10
      11   12   13   14    15
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Find the sum of all the numbers in the nth row?

(a) $\dfrac{n(n+1)}{2}$
(b) $\dfrac{n^2+1}{2}$
(c) $\dfrac{n(n^2+1)}{2}$
(d) $\dfrac{n(n^2+1)}{6}$

Q.25. A quadratic function attains the maximum value 3 at x = −1. The value of the function at x = 0 is 1. What is the value of the function at x = 5?
(a) −159
(b) −29
(c) −19
(d) −119

Q.26. The surface area of cuboids is 24 cm². Find the maximum volume of the cuboids?
(a) 4 cm³
(b) 6 cm³
(c) 10 cm³
(d) 8 cm³

Q.27. If the roots of the equation $x^2 + px + q = 0$ differ from the roots of the equation $x^2 + qx + p = 0$ by the same quantity, then what is the value of (p + q)?
(a) 4
(b) −4
(c) 0
(d) 8

Q.28. If a, b, c and d are real numbers such that b > 0, d > 0 and $\dfrac{a}{b} < \dfrac{c}{d}$, then which of the following is true?

(a) $\dfrac{a}{b} < \dfrac{a-c}{b+d} < \dfrac{c}{d}$

(b) $\dfrac{a}{b} < \dfrac{a+c}{b+d} < \dfrac{c}{d}$

(c) $\dfrac{a}{b} < \dfrac{a-c}{b-d} < \dfrac{c}{d}$

(d) $\dfrac{a}{b} < \dfrac{a+c}{b-d} < \dfrac{c}{d}$

Q.29. Tops of two poles of height 20m and 14m of are connected by a wire. If the wire makes an angle 30° with the horizontal, then the length of the wire is
(a) 12m (b) 10 m
(c) 8 m (d) None of these

Q.30. A survey shows that 63% of the Americans like cheese whereas 76% like apples. If x% of the Americans like both cheese and apples then find the range of x?

(a) $0\% \le x \le 23\%$
(b) $0\% \le x \le 39\%$
(c) $4\% \le x \le 35\%$
(d) $39\% \le x \le 63\%$

My performance in this Test

Attempts	Right	Wrong	Net Marks	% Accuracy

ANSWERS

■■■

■■■ Section Test 2

Q. No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Answer	(a)	(a)	(c)	(a)	(a)	(b)	(b)	(b)	(c)	(a)	(b)	(c)	(b)	(c)	(a)	(a)	(c)	(d)	(b)	(a)

Q. No.	21	22	23	24	25	26	27	28	29	30
Answer	(b)	(b)	(b)	(c)	(b)	(d)	(b)	(b)	(a)	(d)

HINTS AND SOLUTIONS

1. Since AB is the diameter of the circle, $\angle$ ACB would be right angle. In this triangle, we know AB = 15 and AC = 12. So, we can find BC. Since 3 – 4 – 5 forms a triplet, $3 \times (3 - 4 - 5)$ also forms a triplet.

   So, 9 – 12 – 15 forms a triplet. Hence, BC = 9. Since BC = BD, AD – AC (similar triangles).

   Hence, area of $\triangle$ ABC = Area of $\triangle$ ABD = 1/2 AC $\times$ CB = $1/2 \times 12 \times 9 = 54$.

   So, area of quadrilateral ABCD = $2 \times 54 = 108$ sq. cm. Hence option (D) is the answer.

2. Total annual salary = 6000 x 12 = 72000
   1% of 6000 = Rs 60
   So, professional tax per month = Rs 75
   Therefore, total professional tax = 75 x 12 = Rs 900
   Salary after professional tax deduction = Rs 71,100
   First Rs 30000 in tax free, so, the taxable income = Rs 71100 – 30000 = 41100
   Therefore, Payable income tax = 20% of 41100 = Rs 8220
   Hence, option (A) is the answer.

3. Radha can do 3/4th of a work in 12 days, she completes the work in 16 days and she does the 11/16th of work in (8 +3) days.
   Mira does 5/16th of work in (3 + 12) days.
   Therefore, she will completed the work alone in (16/5 x 15) = 48 days
   Hence option (C) is the answer.

4. Statement (II):- Since two given angles are 60^0 and 45^0.
   Therefore, Third angle will be 75^0
   So, adjacent side of angle of 60^0 will be the shortest because opposite side of the largest angle will be the shortest.
   So, statement (II) alone is sufficient
   Hence, option (A) is the answer.

5. Statement (II):- E < F, B > A, A < D < B
   So, A < B, A < D < B
   A < D < B < C
   Since, D < F
   Therefore, A will be the smallest integer.
   Hence, option (A) is the answer.

6. Question can be solved by using either of the statement alone. Hence, option (B) is the answer.

7.
	Ram	:	Sham
Speed	7	:	4
Time	4	:	7
Distance	4	:	7

Now, $7x - 4x = 300$
Means $x = 100$
Therefore, the wining post is $7 \times 100 = 700$m away from the starting point
Hence, option (B) is the answer.
Alternatively, question can be done with the help of options too.

9. Let length = l, breadth = b and height = h. Then,
Product of areas of 3 adjacent faces = $(lb \times bh \times lh)$ = $(lbh)^2$ = $(Volume)^2$.
Hence, option (C) is the answer.

10. Given DE = 4 units. Let PQ be the altitude of the triangle DPE $\therefore$ $4 < PQ << 8 \rightarrow \frac{1}{2} \times 4 \times 4 <$ Area of triangle DPE $< \frac{1}{2} \times 4 \times 8 \rightarrow 8 <$ Area < 16. Hence option (A) is the answer.

11. As $5400 = 2^3 \times 3^3 \times 5^2$ and $135 = 3^3 \times 5$
Required number of factors will contains at least 3^3 and 5
Therefore, required number of factors is $4 \times 2 \times 1 = 8$
Hence, option (B) is the answer.

12. The required number of ways is the number of non-negative integral solution of
$A_1 + A_2 + \ldots\ldots A_{10} = 18$
Therefore, number of ways is $^{18+10-1}C_{10-1} = {}^{27}C_9$
Hence, option (C) is the answer.

13. $S = \dfrac{1/3}{1-1/3} = \frac{1}{2}$

$(0.25)^{\log_2 s} = (0.5)^{-2\log_2 2} = (0.5)^{-2} = 4$
Hence, option (B) is the answer.

14. Let maximum marks is X. So according to the question,
25% of X + 60 = 42% of X – 8. So X = 400
Hence, option (C) is the answer.

15. Area $(\triangle AOB) = \frac{1}{2} \times OA \times OB \times \sin(120)$.
$PR = RQ = \sqrt{2}$. Area $(\triangle PRQ) = \frac{1}{2} \times PR \times RQ \times \sin(90)$. So ratio of areas = $(1/2 \times r \sqrt{2} \times 1) / (1/2 \sqrt{2} \times 1) / (1/2 \sqrt{r} \times \sqrt{3}/2) = 4/\sqrt{3}$. Hence option (A) is the answer.

20. The market sizes for product H in the four states are 84, 96, 90 and 72. the market share of company C for product H in these 4 markets are 28, 18, 7, 24. Therefore, the sales of product H by Company C in the four

markets = 28% of 84 + 18% of 96 + 7% of 90 and 24% of 72 = 23.52 + 17.28 + 6.3 + 17.28 = 64.38 million. Hence, option (A) is the answer.

21. The total market share grabbed by companies A, B, C and D in Arunachal Pradesh for product E is 14 + 22 + 36 + 18 = 90%. Therefore, companies other than these 4 companies will have a share of 10% of the total market size of 72 million = 7.2 million. Hence, option (B) is the answer

22. Sales of product G by company A in the four states TN, KT, KL and AP are respectively 12% of 48, 40% of 50, 15% of 36 and 20% of 44 respectively. The sales figures are 5.76, 20, 5.4 and 8.8 respectively. The lowest sales is in the state of Kerala. Hence option (B) is the answer.

23. $a^3 + b^3 + c^3 - 3abc = \frac{1}{2}(a + b + c)[(a - b)^2 + (b - c)^2 + (c - a)^2)]$
$= \frac{1}{2}(2009 + 2010 + 2011)[(2009 - 2010)^2 + (2010 - 2011)^2 + (2011 - 2009)^2] = \frac{1}{2}(6030)(6) = 18,090$.
Hence, option (B) is the answer.
Alternatively, since the tens place digit in all the options are different, we can go through only calculating the tens place digit to solve this questions.
Last two digits of $9^3 = 29$ Last two digits of $10^3 = 00$
Last two digits of $11^3 = 31$
Sum of last two digits of $9^3 + 10^3 + 11^3 = 60$
And last two digits of 3abc = 70
Hence, last two digits of the expression should be A60 – B70 = 90. This is given in only option (B).

24. Just put n = 1, find the sum of the first row i.e. 1, option 1, 2 & 3 satisfy the condition.
At n = 2, only option C satisfy the condition
And for all higher values of n, only option C is satisfied.
Hence, option (C) is the answer.

25. Suppose that the quadratic function is $f(x) = ax^2 + bx + c$
Also, $f(0) = 1$ implies that $c = 1$
As we know that, $f(x)$ attains maximum value at
$\left(\dfrac{\alpha+\beta}{2} = -b/2\alpha\right)$

Or, $\dfrac{\alpha+\beta}{2} = 1$ implies that $\alpha+\beta = -2$ implies that b $= -2a$ (only when a<0)
Or, that $f(1) = a + b + c = 3$ or a = –2 & b = 4
So, $f(x) = -2x^2 + 4x + 1$
$f(10) = -2(5)^2 + 4(5) + 1 = -50 + 20 + 1 = -29$
Hence, answer option is (B)

26. Given that $2(ab + bc + ca) = 24$; if a, b and c are the sides of the cuboids.

Applying AM-GM inequality to ab, bc, ca

$$\frac{ab + bc + ca}{3} \geq \sqrt[3]{ab.bc.ca}$$

$abc \leq 8$

Therefore, the maximum volume of the cuboids is 8 cm^3.

Hence, option (D) is the answer.

27. Let $x1$, $x2$ be the roots of the equation $x^2 + px + q = 0$ and $x3$, $x4$ be the roots of the equation $x^2 + qx + p = 0$.

Hence, $x1 + x2 = -p$, $x1 \times x2 = q$, $x3 + x4 = -q$, $x3 \times x4 = p$ --------(1)

According to the question, $x1 - x2 = x3 - x4$

Or, $(x1 - x2)^2 = (x3 - x4)^2$, or, $(x1 + x2)^2 - 4 x1 \times x2 = (x3 + x4)^2 - 4 x3 \times x4$ --------(2)

Putting the values from (1) in (2), we obtain $(p - q)(p + q + 4) = 0$

Hence, either $p = q$ (not possible otherwise both the equations will become same) or $p + q = -4$. Hence option (B) is the answer.

28. Option (B) is the answer

30. Maximum will be the lower of 63 and 76 = 63%. To obtain the minimum value, we will use the formula for two sets:

$(\text{Apples} \cap \text{Cheese})_{min} = \text{Apples} + \text{Cheese} - (\text{Apples} \cup \text{Cheese})_{max} = 63 + 76 - 100 = 39\%$

Hence option (D) is the answer.

Section Test 3

Q.1. Three persons start walking together and their steps measure 40 cm, 42 cm and 45 cm respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps?
(a) 25 m 20 cm
(b) 50 m 40 cm
(c) 75 m 60 cm
(d) 100 m 80 cm

Following is an incomplete table presenting the number of students playing different sports in a school:

	Games played			Total
	TT	Football	Basketball	
Male			44	
Female				108
Total		80		

Some more facts are also known:
(a) Half the students played either Football or basketball (but not both).
(b) 40% of the students were female.
(c) One third of the male students played TT.

Q.2. How many female players played TT?
(a) 36
(b) 81
(c) 44
(d) Cannot be determined

Q.3. What percentage of Football players are male?
(a) 20%
(b) 80%
(c) 12.5%
(d) 4%

Q.4. What proportion of the female players played basketball?
(a) 11/18
(b) 4/27
(c) 11/108
(d) 1/27

Q.5. Given that x,y,z are sides of a triangle, with x,y,z >10. Which of the following is definitely true?
i) x + 1, y + 1, z + 1 are also sides of triangles
ii) x – 1, y – 1, z – 1 are also sides of triangles
iii) x^2, y^2, z^2 are also sides of triangle
(a) i and iii
(b) i and ii
(c) i, ii and iii
(d) ii and iii

John and Abraham are playing a match stick game. There are 100 match sticks, whosoever burns 100th match stick win the game. Each player can pick up and burn any number of match sticks from 1 to 7.

Q.6. How many match sticks should John burn to ensure his winning after Abraham burns 67th match stick?
(a) 5
(b) 1
(c) 3
(d) he cannot win now

Q.7. How many match sticks should Abraham burn to ensure winning if John starts and burns 7 match sticks in his first chance?
(a) 1
(b) 4
(c) 5
(d) He cannot win now

Q.8. There are three grades of milk: 1%, 2%, and 3% fat by volume. X gallons of 1%, y gallons of 2%, and z gallons of 3% are mixed to give x + y + z gallons of 1.5%. What is x in terms of y and z?
(a) y + 3z
(b) (y + z)/4
(c) 2y + 3z
(d) 3y + z

Q.9. If M = $\sqrt{4}$ + $\sqrt[3]{4}$ + $\sqrt[4]{4}$, the value of M is
(a) < 3
(b) = 3
(c) 3 < M < 4
(d) > 4

Q.10. Company X has 6 regional offices. Each regional office must recommend two candidates, one male and one female, to serve on the corporate auditing committee. If each of the offices must be represented by exactly one member on the auditing committee and if the committee must consist of an equal number of male and female employees, how many different committees can be formed?
(a) 10　　　　　　(b) 20
(c) 40　　　　　　(d) 60

Q.11. If x is positive, which of the following could be the correct ordering of 1/x, 2x, and x^2?
i. $x^2 < 2x < 1/x$
ii. $x^2 < 1/x < 2x$
iii. $2x < x^2 < 1/x$
(a) None　　　　　(b) iii
(c) i and ii　　　　(d) i, ii, and iii

Q.12. In the arithmetic sequence $t_1, t_2, ...t_n$, $t_1 = 23$ and $t_n = t_{n-1} - 3$ for each n > 1, what is n when $t_n = -4$?
(a) −1　　　　　　(b) 7
(c) 10　　　　　　(d) 14

Q.13. P is the sum of even integers from 40 to 60 (inclusive of both the limits) and Q is the number of even integers from 40 to 60 inclusive. What is the value of P + Q?
(a) 551　　　　　(b) 560
(c) 561　　　　　(d) 572

Direction for questions 14 to 17: Go through the table given below and solve the questions based on it.

During the last IPL series, there were 7 teams – A, B, C, D, E, F and G, and each team played 3 matches with the other teams. All the matches were having a winner i.e. none of the matches played were a tie.

To decide the winner, if was finally decided to calculate a ratio called as win ratio.

Win ratio = No. of matches won/number of matches played

Following table gives the outcome of some of the matches played in the series:

	A	B	C	D	E	F	G	Win ratio
A	NA	2		3	1			0.61111
B		NA	1	0		0	1	
C	2		NA		3	2		0.7777
D			1	NA	0		2	0.389
E		2			NA	2		
F	1					NA	1	0.5
G			0		3		NA	

So, team C won 2 matches against team A and so on. As it can be seen, some of the data in the above table are missing.

Q.14. How many matches did team C won against team B?
(a) 0　　　　　　(b) 1
(c) 2　　　　　　(d) 3

Q.15. Which team won the maximum number of matches?
(a) A　　　　　　(b) B
(c) C　　　　　　(d) E

Q.16. For how many matches, the unique winner team cannot be decided?
(a) 0　　　　　　(b) 1
(c) 2　　　　　　(d) 3

Q.17. What is the total number of matches played in the whole series?
(a) 18　　　　　　(b) 21
(c) 63　　　　　　(d) None of these

Q.18. ABCD is a trapezium such that AB, DC is parallel and BC is perpendicular to them. If angle (DAB) = 45⁰, BC = 2cm and CD = 3cm, then find the length of AB?
(a) 6 cm　　　　　(b) 4 cm
(c) 3 cm　　　　　(d) 5 cm

Q.19. What is the number of positive integral solution of the equation 3x + y = 42?
(a) 12　　　　　　(b) 13
(c) 14　　　　　　(d) 15

Q.20. A number lock has three rings. Each ring has digits 0 to 9 written on it. The maximum number of trials needed to open the lock if it is known that correct combination sum is 5?
(a) $10^3 - 745$　　　(b) 21
(c) 24　　　　　　(d) 41

Q.21. Let $f(x) = x^3 - 2x^2 - x + k$. If f(1) = 0, then the roots of f(x) = 0 are
(a) 1, 2, −2　　　　(b) 1, −1, −2
(c) −1, 2, −2　　　　(d) 1, −1, 2

Q.22. The average of 26, 29, n, 35, 43 lies between 25 and 35. If n is always an integer and greater than the average of the given integers then the value of n is :
(a) 33< n <47　　　(b) 34< n <43
(c) 33< n <42　　　(d) None of these

Q.23. Three dogs are running in a park in such a way that when dog A takes 5 steps, dog B takes 6 steps and dog C takes 7 steps. But 6 steps of dog A are equal to 7 steps of dog B and 8 steps of dog C. What is the ratio of their speeds?
(a) 140:144:147　　(b) 40:44:47
(c) 15:21:28　　　　(d) 252:245:240

Q.24. Find the remainder when $6^{6^{6^{6^{.^{.^{6^{66}}}}}}}$ (100 times) when divided by 10?
(a) 6　　　　　　(b) 2
(c) 4　　　　　　(d) 8

Section Test 3 *(side label)*

Q.25. The smallest possible number which can be written as the sum of the cubes of the two natural number in the two different ways?
(a) 1000
(b) 1728
(c) 1729
(d) 2020

Q.26. Two different sides of a parallelogram are 8cm and 6cm and the ratio of the diagonals is 3 : 4. Find the difference between the lengths of the diagonals?
(a) 5cm
(b) 7 cm
(c) 6 cm
(d) $\sqrt{8}$ cm

Q.27. Find the unit digit of the expression $199^{2n} + 144^{3n}$, where n is a natural number.
(a) 5
(b) 7
(c) either 5 or 7
(d) 3

Q.28. A certain sum of money triples itself in 8 years. In how many more years will it be five times the original sum (consider Simple Interest)?

(a) 12 years
(b) 16 years
(c) 20 years
(d) 8 years

Q.29. Find the value of the expression
$$\frac{1}{1+\log_a bc} + \frac{1}{1+\log_b ac} + \frac{1}{1+\log_c ba}?$$
(a) 0
(b) 1
(c) ½
(d) abc

Q.30. A square hole of cross-sectional area 4 cm² is drilled across a cube with its length parallel to a side of the cube. If an edge of the cube measures 5 cm, what is the total surface area of the body so formed?
(a) 158 cm²
(b) 190 cm²
(c) 166 cm²
(d) 182cm²

My performance in this Test

Attempts	Right	Wrong	Net Marks	% Accuracy

ANSWERS

■■■

■■■ **Section Test 3**

Q. No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Answer	(a)	(b)	(c)	(c)	(b)	(b)	(c)	(a)	(d)	(b)	(c)	(c)	(c)	(c)	(c)	(a)	(c)	(d)	(b)	(b)

Q. No.	21	22	23	24	25	26	27	28	29	30
Answer	(d)	(c)	(a)	(a)	(c)	(d)	(c)	(d)	(b)	(d)

HINTS AND SOLUTIONS

1. Answer is LCM of 40, 42, 45 = $2^3 \times 3^2 \times 5^1 \times 7^1 = 2520$ cm = 25.2 m. Hence, option (A) is the answer.

4. Following is the solution:

	Games played			Total
	TT	Football	Basketball	
Male	54	10	44	162
Female	81	70	11	108
Total	135	80	55	270

5. Using x + y > z, statement (i) and statement (ii) satisfies. Option (iii) will not always satisfy this condition. Hence, option (B) is the answer.

6. John can always make the sum of 8 that is (max picks ie 7 + min picks ie 1). Number of remaining picks = (100 – 67) = 33. Hence he must pick up the number of sticks = remainder when 33 divided by 8.
Hence, option (B) is the answer.

7. John has burned 7 matches. Matches left = (100 – 7) = 93. Hence, John should pick remainder when 93/8 = 5.
Hence, option (C) is the answer.

9. Can be seen that $\sqrt[3]{4}$ is more than 1, similarly $\sqrt[4]{4}$ is more than 1. Hence, net is more than 4.
Hence, option (D) is the answer.

13. $P = 40 + 42 + 44 + ...+60 = 550$ and $Q = 11$. Hence $P + Q = 561$.

18.
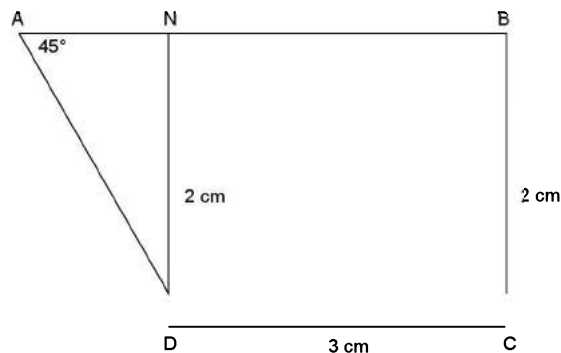
$\text{Tan}(45^0) = \dfrac{DN}{AN}$ or $1 = \dfrac{DN}{AN}$

Therefore, $AN = DN = 2cm$

$AB = AN + BN = 2cm + 3cm = 5cm$

Hence, answer option is (D)

19. The given linear equation is $3x + y = 42$

X	Y
0	42
1	39
2	36
.	..
.	..
13	3
14	0

By observation number of positive integral solutions are 13.

20. The combination that the sum 5 are $(0, 0, 5)$, $(1, 4, 0)$, $(3, 2, 0)$, $(1, 1, 3)$ and $(1, 2, 2)$
Maximum number of permutation for each case
$(0, 0, 5) \rightarrow 3!/2! = 3$
$(1, 4, 0) \rightarrow 3! = 6$
$(3, 2, 0) \rightarrow 3! = 6$
$(1, 1, 3) \rightarrow 3!/2! = 3$
$(1, 2, 2) \rightarrow 3!/2! = 3$
Therefore, total number of permutation is 21

21. Given that $f(x) = x^3 - 2x^2 - x + k$
$f(1) = 0$ means $1^3 - 2(1)^2 - 1 + k = 0$ means $k = 2$
New expression becomes $f(x) = x^3 - 2x^2 - x + 2$
$F(x) = 0$ implies that $x^3 - 2x^2 - x + 2 = 0$ is satisfied only at $x = 1, -1, 2$
Therefore, required roots of the cubic are $1, -1, 2$

22. According to the question following equation can be deduced
$25 < \dfrac{26 + 29 + n + 35 + 43}{5} < 35$
Implies that $33 < n < 42$

23. Frequency of steps of A : B : C = 5 : 6 : 7
But in terms of size of steps; $6A = 7B = 8C$
Ratio of the speeds of A : B : C = (5/6) : (6/7) : (7/8)
= 140 : 144 : 147

24. 6^n (where n is a natural number) will always leaves the remainder 6 when divide by 10.

25. $1729 = 1^3 + 12^3 = 10^3 + 9^3$

26. As for the diagonals X & Y of a parallelogram
$X^2 + Y^2 = 2(A^2 + B^2)$; where A & B are the sides of the parallelogram.
From the information given in the question; sides of a parallelogram are 8cm and 6cm
And ratio of the diagonals is 3 : 4 such that $X = 4k$ and $Y = 3k$
$16k^2 + 9k^2 = 2(8^2 + 6^2)$, so, $K = \sqrt{8}$
Therefore, the required difference is $4k - 3k = k = \sqrt{8}$ cm

27. For any n, 199^{2n} has last digit as 1,
But the last digit of 144^{3n} is 4 for odd values of n and 6 for even values of n.
Therefore, last digit of the given expression is either 5 or 7.
Hence, answer option is (C)

28. Kick yourself once if you marked option (B) as the answer. Question is asking for "How many more years" and hence it should be 8 years. Hence, option (D) is the answer.

29. The given expression
$\dfrac{1}{1 + \log_a bc} + \dfrac{1}{1 + \log_b ac} + \dfrac{1}{1 + \log_c ba}$ can be written as
$\dfrac{1}{\log_a a + \log_a bc} + \dfrac{1}{\log_b b + \log_b ac} + \dfrac{1}{\log_c c + \log_c ba}$
$= \dfrac{1}{\log_a abc} + \dfrac{1}{\log_b bac} + \dfrac{1}{\log_c cba}$
$= \log_{abc} a + \log_{abc} b + \log_{abc} c = \log_{abc} abc = 1$

30. The resultant figure will be like a square tunnel inside a cube.
Total surface area of the cube = 6 (Side)^2 = 150
New surface area added = 4 × (2 × 5) [Surfaces × side of square cross section × depth]
Total old surface area to be subtracted = 4 + 4 = 8
Hence net surface area = 150 + 40 - 8 = 182 cm^2.
Hence, option (D) is the answer.

Section Test 4

Q.1. Let T_n denotes the number of triangles which can be formed using the vertices of a regular polygon of n sides. If $T_{n+1} - T_n = 21,$ then n equals:

(a) 5   (b) 7

(c) 6   (d) 4

Q.2. When 96 is added to a N^2, it gives another perfect square. If N is a natural no., how many distinct values of N are possible?

(a) 3   (b) 4

(c) 5   (d) None of these

Q.3. For all x, $x^2 + 2ax + 10 - 3a > 0$, then the interval in which 'a' lies is:

(a) $a < -5$

(b) $-5 < a < 2$

(c) $a > 5$

(d) $2 < a < 5$

Q.4. A solid cube of side 3 cm, painted red on the outside is cut into 27 equal cubes. When all the 27 cubes are considered, what is the difference between the area that is not red and the area that is red?

(a) 27   (b) 0

(c) 54   (d) 81

Q.5. A perfect square has length n if its last n digits (in base 10) are the same and non-zero. What is the longest possible length in the set of all the natural numbers?

(a) 2   (b) 3

(c) 6   (d) Infinite

Q.6. In the figure below, the radius of the bigger circle is $\left(\sqrt{2} + 1\right)$ cm and the radius of all the smaller circles are equal. Each of the smaller circles touches two of the other three smaller circles and the larger circle as shown. Find the area (in cm^2) of the shaded portion.
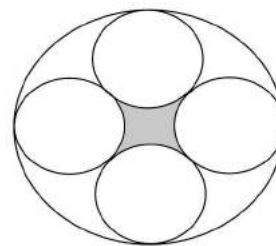

(a) $2 - \dfrac{\pi}{2}$ (b) 1

(c) $\pi/4$ (d) $(4 - \pi)$

Q.7. P is a series of natural numbers in AP with a common difference of D. If D = 1, what is the least positive integer that must be added to the product of the sixth term, eighth term, tenth term and twelfth term of P to make it a perfect square?

(a) 2   (b) 16

(c) 4   (d) Cannot to determined

Q.8. In the right-angled triangle ABC, BD divides the triangle ABC into two triangles of equal perimeters. Find the length of BD, give that AC=100, BC=80 and AB=60.
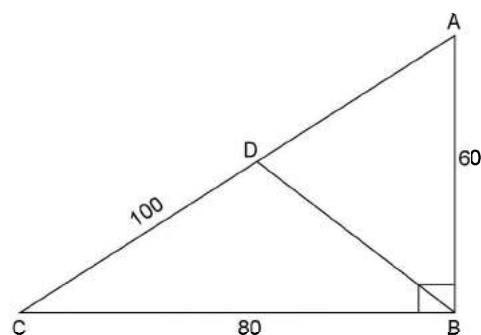
(a) 25   (b) $24\sqrt{5}$

(c) $20\sqrt{5}$ (d) None of these

Q.9. What is the greatest area(in sq. units) of a rectangle the sum of whose 3 sides is equal = 100.
(a) 625 (b) 1250
(c) 883.33 (d) 666.66

Q.10. A polygon is said to be concave if at least one of the angles of the polygon is greater than 180^0. A concave polygon is such that each of its internal angles measures either 60^0 or 300^0. If this polygon contains twenty 300^0 angles, find the number of 60^0 angles in it.
(a) 26 (b) 18
(c) 23 (d) 24

Direction for questions 11 to 13: Go through the information given below and solve the questions based on it.

You are the Quality Control manager at the restaurant McDi and facing a dilemma. Go through the case facts given below and solve the questions based on it:

McDi produces chicken nugget box (1,000 boxes at a time in a batch). McDi has to ensure that it does not supply undercooked nuggets (known as defective) to the customers. If a customer receives a defective nugget box, company has to pay a penalty of Rs 150 per nugget box. To check the level of preparedness of nuggets, any of the two tests can be used:

Test 1		Test 2	
Cost	Rs. 6 per nugget box	Cost	Rs. 9 per nugget box
Detection Rate	80%	Detection Rate	100%

McDi can re-cook undercooked nuggets at a cost of Rs 75 per nugget box. This box can be now sold to customer as it is now certainly properly cooked.

Let 'x' be the number of defective nugget boxes per batch.

Q.11. Manager should not use any quality control test, if it is expected that
(a) $x < 100$
(b) $100 < x < 200$
(c) $x > 200$
(d) None of these

Q.12. If $200 < x < 400$, then
(a) You should use Test 1
(b) You should use Test 2
(c) You can use Test 1 or Test 2
(d) None of these

Q.13. If $x = 100$, you should use
(a) Test 2
(b) Test 1 and Test 2
(c) Test 1 or No test
(d) None of these

Direction for questions 14 to 16: Go through the information given below and solve the questions based on it.

Following is known about the members of Thumbs-up holidays who might have gone to Goa or Kashmir or both.

Number of children	Total number of members	Number of members who went to	
		Goa	Kashmir
Less than 3 children	150	80	60
3 to 5 children	400	275	225
More than 5 children	50	20	30

Q.14. Minimum number of members who have 3 to 5 children and have gone to atleast one of the destinations is:
(a) 225 (b) 275
(c) 100 (d) Cannot be determined

Q.15. Minimum number of members for all the categories and have gone to atleast one of the destinations is:
(a) 385 (b) 375
(c) 305 (d) 315

Q.16. How many of the members have definitely not gone to any of the two destinations?
(a) 0 (b) 10
(c) 25 (d) Cannot be determined

Q.17. Buy 3 and get 2 free. How much is the effective discount in this case?
(a) 40% (b) 60%
(c) 66.66% (d) None of these

Q.18. In a survey of political preferences, 78% of those asked were in favour of at least one of the proposals: I, II and III. 50% of those asked favoured proposal I, 30% favoured proposal II and 20% favoured proposal III. If 5% of those asked favoured all three of the proposals, what percentage of those asked favoured more than one of the three proposals?
(a) 10 (b) 12
(c) 17 (d) 22

Q.19. Navjivan Express from Ahmedabad to Chennai leaves Ahmedabad at 6.30 am and travels at 50 kmph towards Baroda situated 100 km away. At 7.00 am Howrah-Ahmedabad Express leaves Baroda towards Ahmedabad and travels at 40kmph. At 7.30 am Mr Shah, the traffic controller at Baroda realizes that both the trains are running on the same track. How much time does he have to avert a head-on collision between the two trains?
(a) 15 min (b) 20 min
(c) 25 min (d) 30 min

Q.20. The number of employees in a nationalised bank in a small town is 10, out of which 4 are female and the rest are males. A committee of 5 is to be formed. If m be the number of ways to form such a committee in which there is atleast one female employee and n be the no. of ways to form such a committee which includes at least two male employees, then find the ratio m:n.
(a) 3:2
(b) 5:2
(c) 1:1
(d) 8:9

Q.21. Dilip ate half of a pizza on Monday. He ate half of what was left on Tuesday and so on. He followed this pattern for one week. How much of the pizza would he have eaten during the week?
(a) More than 99% but less than 100%
(b) 100%
(c) Less than 99% but more than 98%
(d) Less than 98%

Q.22. If $a \le 22$ and $b \ge 12$, then which of the following is always true?
(a) $a > b$
(b) $a - b > 10$
(c) $a - b \le 10$
(d) $a + b \ge 34$

Directions for questions 23 to 26: Answer the questions on the basis of the information given below.

Chunmun has six different types of fruits - Mangoes, Apples, Oranges, Peaches, Guavas and Litchis – with him. Following table provides information about the minimum and the maximum price of each of the mentioned fruits. The table also provides information about the number of fruits of each type and the average price of each fruit.

Assume that the price of each fruit is an integer. There is only one mango that has the minimum price and there is only one mango that has the maximum price. The same holds true for each type of fruit.

	Minimum Price	Maximum Price	Average Price	Number of Fruits
Mango	20	28	23	16
Apple	40	50	46	24
Orange	4	8	7	40
Peach	16	26	20	34
Guava	3	8	5	28
Litchi	10	18	16	30

Q.23. Find the approximate average price of fruits with Chunmun.
(a) Rs 18
(b) Rs 20
(c) Rs 23
(d) Rs 15

Q.24. The number of mangoes whose price is more than Rs 21 is at least
(a) 3
(b) 4
(c) 5
(d) 6

Q.25. Given that the price of four peaches with Chunmun is Rs 22 each and there are exactly 10 peaches whose price is Rs 18. The number of peaches with Chunmun whose price is at least Rs 25 is at most
(a) 13
(b) 12
(c) 11
(d) 9

Q.26. Total number of guavas with Chunmun whose price is less than the average price of the guavas with Chunmun is at least
(a) 17
(b) 18
(c) 19
(d) 20

Q.27. Consider S = (1,2,3, ... 10). In how many ways two numbers from S can be selected so that the sum of the numbers selected is a double digit number?
(a) 36
(b) 16
(c) 29
(d) $^9C_2 - {}^5C_2$

Q.28. Circumference of a circle and the perimeter of a pentagon and an octagon are same. Their areas are denoted by C, P and O respectively. Which of the following is true their areas?
(a) $C > P > O$
(b) $O > P > C$
(c) $O > C > P$
(d) $C > O > P$

Q.29. A man walks 10km towards west. Then which of the combinations will take him to the original starting position?
(a) left, left, right
(b) left, right, right
(c) right, left, right
(d) right, right, right

Q.30. A contractor agreeing to finish a work in 150 days, employed 75 men each working 8 hours daily. After 90 days, only 2/7 of the work was completed. Increasing the number of men by .....men will finish the work on time (Fill in the blanks).
(a) 100 men
(b) 75 men
(c) 150 men
(d) None of these

My performance in this Test

Attempts	Right	Wrong	Net Marks	% Accuracy

ANSWERS

■■■

Q. No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Answer	(b)	(b)	(b)	(c)	(b)	(d)	(b)	(b)	(b)	(c)	(a)	(b)	(c)	(b)	(a)	(b)	(a)	(c)	(a)	(c)

Q. No.	21	22	23	24	25	26	27	28	29	30
Answer	(a)	(c)	(a)	(d)	(d)	(b)	(c)	(d)	(d)	(c)

HINTS AND SOLUTIONS

1. According to given condition, $T_n = {}^nC_3$ and $T_{n+1} - T_n = 21$
So, ${}^{n+1}C_3 - {}^nC_3 = 21$
$\frac{1}{6}(n+1)(n)(n-1) - \frac{1}{6}n(n-1)(n-2) = 21$
So, n =7. Hence option (B) is the answer.

2. $N^2 + 96 = P^2$, or, $96 = P^2 - N^2$. Now factorize 96 and equate it with (P+N) (P – N).

3. $D < 0$, $4a^2 - 4(10 - 3a) < 0$. And hence the answer.

4. Let the side of each small cube be n (n = 1 unit)
Total red area = $6(9n^2) = 54$
Total area = $27(6n^2) = 54 \times 3$
Total area which is not red = 2×54
Difference of the red and non-red areas = 54

5. Largest possible length is 3, viz. 1444.

6. If the radius of smaller circle is 1 unit, then the radius of the bigger circle is $\sqrt{2} + 1$ units, and converse of this is also true.(It can be proved also)
So, the answer in this case would be the area of square – 4 quadrants of the smaller circle.

7. Let a, a+d, a+2d and a+3d be the 4 consecutive terms of an AP, as their product is $[a^2+3ad]^2 + 2[(a^2+3ad)] d^2$. If we add d^4 to the product, we get the square of $a^2 + 3ad + d^2$.

8. Let BD = x and CD = y
So, (100 – y) + 60 + x = y + x + 80, Hence y = 40
Now Cos C = 4/5 and apply cosine rule in ΔCDB to find DB.

9. Given is 2a+b = 100, and area = ab. Assuming 2a = x, we get x+b=100, and area = 1/2xb. Now area will be

maximum when x = b, or a = b/2. Thus a = 25, & b = 50, maximum area = 1250.

10. Let the no. of 60° angles be N. So, total number of angles in the triangle = 20 + N. Now, sum of interior angles = (2n – 4)90°. Sum of angles in this case = (20 + N – 2)×180°. And (20 + N – 2)×180° = N(60°) + 20 × 300

11. Only when x is < 100, then only the company should not use any test. Because for x < 100, company has to pay more in the tests than the actual costs spend on it. Hence, option (A) is the answer.

12. For n = 300 (200 < x < 400), you should use Test 2. Hence, option (B) is the answer.

13. For x = 100, you should either use Test 1 or no test. Hence, option (C) is the answer.

14. There are 275 members who have gone to Goa. We are not sure about the 225 members who have gone to Kashmir that if they are different than the members who have gone to Goa. It might be a possibility that these 225 members who have gone to Kashmir have also gone to Goa. Hence minimum number of members who have gone to atleast one of the destinations = 275.
Hence, option (B) is the answer.

15. Taking a cue from solution to Q14, answer to this question would be = 80 + 275 + 30 = 385

16. We are not sure of the members in the category '3 to 5 children' or 'more than 5 children' that any of these members have not gone to any of the destinations. Although we are sure of the fact that in the category

'Less than 3 children', there are atleast 150 – (80+60) = 10 members who have not gone to any of the destinations.

Hence, option (B) is the answer.

17. Instead of paying for 5, one is supposed to pay only for 3 and 2 are free. Hence percentage discount = $\frac{2}{5} \times 100$ = 40%. Hence, option (A) is the answer.

23. Total price of fruits with Chunmun is 23 x 16 + 46 x 24 + 7 x 40 + 20 x 34 + 5 x 28 + 16 x 30 = Rs 368 + Rs 1104 + Rs 280 + Rs 680 + Rs 140 + Rs 480 = Rs 3052. Total number of fruits with Chunmun is 16 + 24 + 40 + 34 + 28 + 30 = 172. Average price of fruits with Chunmun = (3052/172) = Rs 17.74

24. The total price of mangoes with Chunmun is 16 x 23 = Rs 368.

Total price of 14 mangoes = 368 – (20 + 28) = Rs 320

Out of the given 14 mangoes assume that maximum number of mangoes have price equal to Rs 21.

The maximum price of any mango out of these 14 mangoes is Rs 27

So, 9 x 21 + 1 x 23 + 4 x 27 = Rs 320

Therefore, the number of mangoes whose price is more than Rs 21 is 1 + 4 + 1 = 6.

25. The price of the 18 peaches with Chunmun whose price is not known to us = X

X = 20 x 34 – (16 + 26 + 4 x 22 + 10 x 18) = Rs 370

Assume that maximum number of peaches have price equal to Rs 17

370 = 25 x 8 + 17 x 10. Number of peaches with Chunmun whose price is at least Rs 25 is at most 8 + 1 = 9.

26. The total price of the guavas with Chunmun is 5 x 28 = 140

The total price of the 26 guavas whose price is not known is 140 – (3 + 8) = Rs 129.

Assume maximum number of guavas have price equal to Rs 7

129 = 8 x 7 + 1 x 5 + 17 x 4. Therefore, the number of guavas with Chunmun whose price is less than the average price of the guavas with Chunmun is at least 17 + 1 = 18.

28. For a given perimeter, area of the structure which has more number of sides will be maximum. Hence, area of circle > area of octagon > area of pentagon.

29. Go through the options.