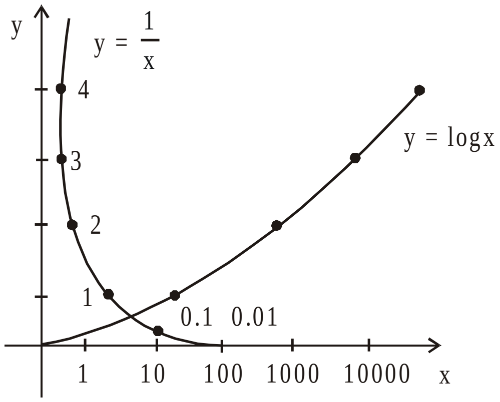
SECTION-III

101. $y = \log_{10}x \qquad y = \frac{1}{x}$

They meet at $\frac{1}{x} = \log_{10}x$



Here, we see the graph has only 1 intersection point. Hence, [2].

102. Let the A.P. be a, + a + d, a + 2d, ...
$\because\ T_n = a + (n - 1)d$
$T_3 + T_{15} = T_6 + T_{11} + T_{13}$
$2a + 2d + 14d = 3a + 5d + 10d + 12d$
$0 = a + 11d$
$0 = T_{12}$
Hence, [3].

103. Let C, w and n be the number of questions correct; wrong and not attempted respectively.
$\therefore\ c + w + n = 50$ ----- (I)

$c - \frac{w}{3} - \frac{n}{6} = 32$

$66 - 2w - n = 32 \times 6 = 192$ --- (II)
(I) + (II)
$76 - w = 242$
$w = 76 - 242$
The minimum value of w is 3
when c = 35.
Hence, [3].

104. Let the radius of the larger sphere be R.
Let the radius of the smaller sphere be r.

$$\frac{L_1\pi R^2}{L_1\pi r^2} = \frac{4}{1}$$

$\frac{R^2}{r^2} = 4 \Rightarrow R^2 = 4r^2 \Rightarrow R = 2r$

Volume of the larger sphere = $\frac{4}{3}\pi R^3$

$= \frac{4}{3}\pi 8r^3 = \frac{32}{3}\pi r^3$

Volume of smaller sphere = $\frac{4}{3}\pi r^3$

Hence, k = $\dfrac{8\left[\frac{4\pi r^3}{3}\right] - \left[\frac{4\pi r^3}{3}\right]}{8\left[\frac{4\pi r^3}{3}\right]}$

k% = $\frac{7}{8} \times 100 = 87.5\%$. Hence, [4].

105. There are 27 people in the party.
Option [1] and [2] may or may not be true.
Out of 27 people, if every 3 people form a mutual acquaintances group, there will be 9 such groups. Or it may be possible that no person is acquainted with any one else. Hence, option [4] may or may not be true. Hence, [3].

106. $100 \leq n \leq 200$
50 even integers
$\frac{50}{7} = 7$ integers are divisible by 7.

$\frac{50}{9} = 5$ integers are divisible by 9.

126 is an integer divisible by both 7 and 9
$\therefore$ Integers in the range $100 \leq n \leq 200$ divisible by 7 and 9.
= 7 + 5 – 1 = 11
Hence, number of integers not divisible.
= (50 – 11) = 39. Hence, [3].
Alternatively,

100	102	104	106	~~108~~	110
	~~112~~	114	116	118	120
	122	124	~~126~~	128	130
	132	134	136	138	140
	142	~~144~~	146	148	150
	152	~~154~~	156	158	160
	~~162~~	164	166	~~168~~	170
	172	174	176	178	~~180~~
	~~182~~	18.4	1.86	1.88	180
	192	184	~~196~~	~~198~~	200

= 38 numbers.

107. As P, $x + 2y - 3z$
$q = 2x + 6y - 11z$
$r = x - 2y + 7z$
Since, the sum of terms are required to be zero.
Let's consider with respect to one of the variable (say x).
1. $5p - 2q - r = 5x - 4x - x = 0$
Thus, [1] is satisfying the equation.
2. $5p + 2q + r = 5x + 4x + x = 10x \neq 0$
Thus, [2] does not satisfy.
3. $5p - 2q + r = 5x - 4x + x = 2x \neq 0$
Thus, [4] does not satisfy.
Hence, [1].

108. $f(x) = |x - 2| + |2.5 - x| + |3.6 - x|$
Putting the values of x in the function
when $x = 2.3$
$f(x) = 0.3 + 0.2 + 1.3 = 1.8$
when $x = 2.5$
$f(x) = 0.5 + 0 + 0.1 = 1.6$
when $x = 2.7$
$f(x) = 0.7 + 0.2 + 0.9 = 1.8$
For any values of x either lower or higher f(x) will be greater than 1.6. Hence, [2].

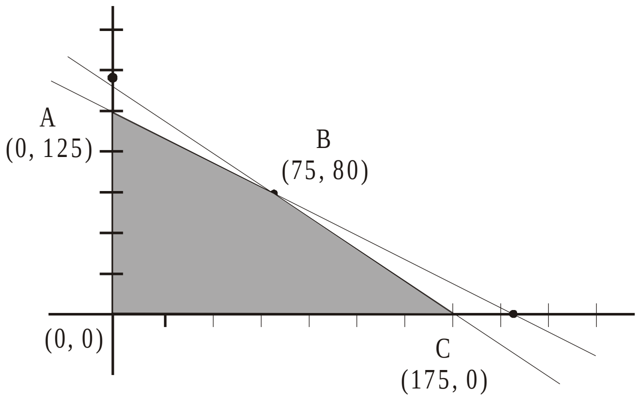
109. $g(x) = \max(5 - x, x + 2)$
The solution to the problem is the y coordinate of the intersection point of two lines $y = 5 - x$ and $y = x + 2$.
$x = 1.5$
$y = 3.5$
$\therefore$ g(x) = 3.5 (smallest possible value). Hence, [4].

110. Of the four given options 63 and 75 are multiples of 3, thus, their remainder cannot be 1. Now,
$31 = (1111)_2$
$= (1011)_3$
$= (111)_5$
and $91 = (1011011)_2$
$= (10101)_3$
$= (331)_5$
Hence, [4].

111.

	Time required (Hours/bag)		Profit
	A	B	
Standard Bag (x)	4	6	20
Deluxe Bag (y)	5	10	30
	700	1250	

$4x + 5y \leq 700$
$6x + 10y \leq 1250$



The common region is OABC.
The maximum value of profit $20x + 30y$ is at (75, 80). Hence, [1].

112. Let the speed of slower runner be ‘x’ metre/min.
and the speed of faster runner be ‘2x’ metre/min.
Thus, for the first time when they meet when slower runner will move by 1000 metres, faster runner will move by 2000 metres.

$$\frac{1000}{2x - x} = 5$$

$$x = \frac{1000}{5} = 200 \text{ m/min.}$$

Thus, time taken by faster runner to complete the race is

$$\frac{4000}{2 \times 200} = \frac{4000}{400} = 10 \text{ minutes}$$

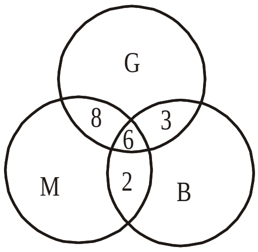
Hence, [3].

113. In year 1998, number of goats bought by Shepard is 9 dozen = 108.
In the beginning of every year, p% of the goats are added, thus, total number of goats in the beginning of the year is (100 + p)% of 108. Also, at the end of the year, q% are sold, so that the number of goats remain the same.

i.e., $$\left(\frac{100 - q}{100}\right)^2 \times \left(\frac{100 + p}{100}\right)^2 \times 108 = 108$$

$\Rightarrow (100 - q)^2(100 + p)^2 = 1$
This is possible only if $p > q$. Hence, [3].

For answers to questions 114 and 115:



G = Gyani working alone.
B = Buddhi working alone.
M = Medha working alone.
G + B = M + 16
Number of projects which involves more than 1 consultant
= 6 + 8 + 2 + 3 = 19
Total number of projects = 2 × 19 – 1 = 37
G + M + B + 19 = 37 ---- (I)
$\Rightarrow$ G + M + B = 18
G – M + B = 16 ----- (II)
Subtracting (II) from (I)
2m = 2 $\Rightarrow$ m = 1
We cannot determine the number of projects Gyani is alone involved.
The number of projects that Medha alone is involved equals 1.

114-[4] 115-[1]

116. Taking examples for different number of covex sides [angle of 90^o] (n)
Case (i): n = 1, number of concave sides [angle of 270^o] (m) = 5
Case (iii): n = 2, number of concave sides [angle of 270^o] (m) = 6
Case (iii): n = 3, number of concage sides [angle of 270^o] (m) = 7
In general, when m = 25
m = n + 4
$\Rightarrow$ n = m – 4 = 25 – 4 = 21. Hence, [3].

117. As ‘p’ and ‘q’ are roots of the quadratic equation $x^2 - (\alpha - 2)x - \alpha - 1 = 0$

$$p + q = \frac{-b}{a} = \alpha - 2$$

$$pq = \frac{c}{a} = -\alpha - 1$$

$p^2 + q^2 = (p + q)^2 - 2pq$
$= (\alpha - 2)^2 - 2(-\alpha - 1)$
$p^2 + q^2 = (\alpha - 2)^2 + 2(\alpha + 1)$
Considering different values of α:

when,	$\alpha = 0$	$p^2 + q^2 = 4 + 2 = 6$
	$\alpha = 3$	$p^2 + q^2 = 1 + 8 = 9$
	$\alpha = 4$	$p^2 + q^2 = 4 + 10 = 14$
	$\alpha = 5$	$p^2 + q^2 = 9 + 12 = 21$

Hence, [1].

118. The series a, b, b, c, c, c, d, d, d, d, e, e, e, e, e,...

1, 2, 3, 4, 5 and so on.

sum of n integers starting from 1 is given by:

$$\frac{n(n+1)}{2}$$

For $\frac{n_1(n_1+1)}{2} < 288$

$n_1(n_1 + 1) < 576$

If $n_1 = 24$, L.H.S. < 576

Thus, for $n_1 = 23$.

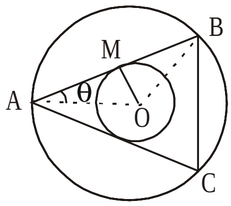
$$\frac{n_1(n_1+1)}{2} = \frac{23 \times 24}{2} = 23 \times 12 = 276$$

Thus, $n_1 = 24$ will start the series from 277^{th} terms.

Also, $n_1 = 24$ corresponds to 'x'.

Hence, [4].

119.



$$\sin\theta = \frac{OM}{OA} = \frac{r}{2r} = \frac{1}{2}$$

$\therefore \theta = 30°$

$\angle AOC = 20 = 60°$

In Δ OMB

$OB^2 = OM^2 + BM^2$

$$\frac{12}{\pi} = \left(\frac{1}{2}\sqrt{\frac{12}{\pi}}\right)^2 + BM^2$$

$$\Rightarrow \frac{12}{\pi} = \frac{1}{4} \times \frac{12}{\pi} + BM^2$$

$$\Rightarrow BM^2 = \frac{3}{4} \times \frac{12}{\pi} = \frac{9}{\pi}$$

$$\Rightarrow BM = \frac{3}{\sqrt{\pi}}$$

$$\therefore AB = 2BM = 2 \times \frac{3}{\sqrt{\pi}} = \frac{6}{\sqrt{\pi}}$$

Also, $AC = AB = \frac{6}{\sqrt{\pi}}$

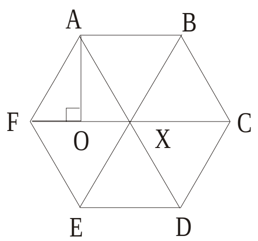
$\therefore$ Area of Δ ABC = $\frac{1}{2}AB \times AC \times \sin 60°$

$= \frac{1}{2} \times \frac{6}{\sqrt{\pi}} \times \frac{6}{\sqrt{\pi}} \times \frac{\sqrt{3}}{2} = \frac{9\sqrt{3}}{\pi}$

Hence, [3].

120. As, $a^2 + b^2 + c^2 + d^2 < (a + b + c + d)^2$
$= (4m + 1)^2$
$= 16m^2 + 8m + 1$
Now, for minimum value, m = 1
Thus, 4m + 1 = 5
Let a = 1, b = 1, c = 1 and d = 2
Also, $a^2 + b^2 + c^2 + d^2 = 1 + 1 + 1 + 4 = 7$
Which is true when $a^2 + b^2 + c^2 + d^2 = 4m^2 + 2m + 1$
$= 4 \times 1^2 + 2 \times 1 + 1 = 4 + 2 + 1 = 7$
Thus, possible minimum value of $a^2 + b^2 + c^2 + d^2 = 4m^2 + 2m + 1$. Hence, [2].

121.

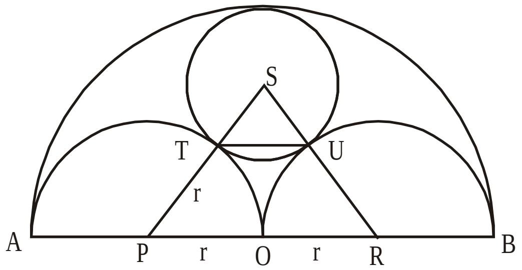


After joining all the opposite vertices (let them meet in point X), we find that right triangle AOF $\cong$ right triangle AOX.

$\Rightarrow$ A(Δ AOX) = A(Δ AFX)

$\frac{\text{A[triangle AOF]}}{\text{A[pentagon ABDCDEF]}} = \frac{\text{A[triangle AOF]}}{\text{6[A(triangle AFX)]}} = \frac{\text{A[triangle AOF]}}{\text{6[2A(triangle AOF)]}} = \frac{1}{2}$. Hence, [1].

122. $2^x - x - 1 = 0$
$2^x = x + 1$
At x = 0 $\Rightarrow$ $2^0 = 1$ and $x + 1 = 0 + 1 = 1$
At x = 1 $\Rightarrow$ $2^1 = 2$ and $1 + 1 = 2$
Hence, [3].

123. 

We can see that OP = OR

Δ STU ~ Δ PSR

TU = r

Hence, ST = $\frac{r}{2}$

Grazed area = $\pi\left(\frac{r^2}{4}\right) + \pi r^2$

Total area = $\frac{\pi(2r)^2}{2} = \frac{4\pi r^2}{2} = 2\pi r^2$

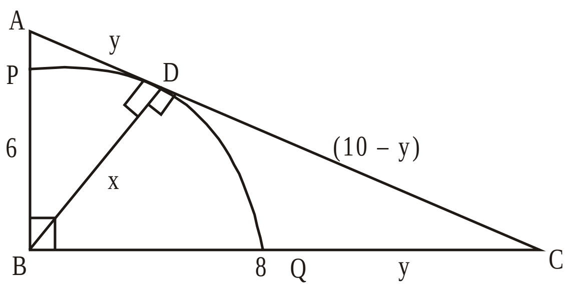
area = $\frac{8\pi r^2}{4} - \frac{5\pi r^2}{4}$

$= \frac{3\pi r^2}{4} = \frac{3\pi r^2}{4} \div 2\pi r^2 \times 100$

$= \frac{3\pi r^2}{4} \times \frac{1}{2\pi r^2} \times 100$

$= \frac{3}{8} \times 100 = 37.5$

Hence, [3].

124. 

Δ ABC is right angled at B as (10, 8, 6) is a pythagorean triplet.

Let BP = BD = BQ = x .... (radii of the same circle)

AD = y

For right angled Δ BDC

$x^2 + (10 - y)^2 = 8^2$

$6^2 - y^2 + (10 - y)^2 = 8^2$

$36 - y^2 = 64 - (100 - 20y + y^2)$

$36 - y^2 = 64 - 100 + 20y - y^2$

$\frac{72}{20} = y \qquad y = \frac{36}{10}$

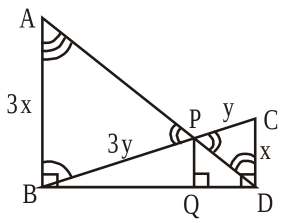
$BD^2 = 36 - \left(\frac{36}{10}\right)^2$

$BD = 4.8$

Hence, $AP = 6 - 4.8 = 1.2 = \frac{6}{5}$

$QC = 8 - 4.8 = 3.2$
$AP : QC = 1.2 : 3.2$
$= 3 : 8$. Hence, [4].

125.



Δ CPD ~ Δ APB [AAA]

Hence, $\frac{CP}{PB} = \frac{x}{3x} = \frac{1}{3}$

Let CP = y; PB = 3y

$\frac{CD}{PQ} = \frac{CB}{PB} = \frac{y+3y}{3y} = \frac{4}{3} = 1 : 0.75$. Hence, [2].

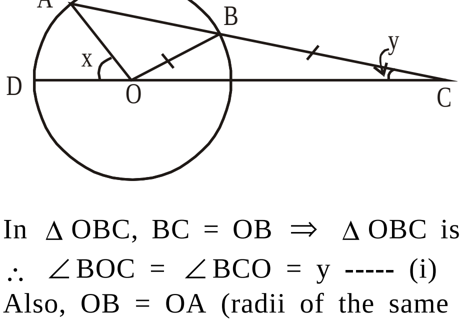
126. Since, $\log_3(2)$, $\log_3(2x - 5)$ and $\log_3\left(2^x - \frac{7}{2}\right)$

are in Average Product, we can write.

$2 \times \log_3(2x - 5) = \log_3(2) + \log_3\left(2^x - \frac{7}{2}\right)$

$\therefore \log_3(2^x - 5)^2 = \log_3(2^{x+1} - 7)$
$\therefore (2^x - 5)^2 = 2^{x+1} - 7$
If we substitute the options in above equation, we get x = 2. Hence, [3].

127.



In Δ OBC, BC = OB $\Rightarrow$ Δ OBC is isosceles triangle.
$\therefore \angle BOC = \angle BCO = y$ ----- (i)
Also, OB = OA (radii of the same circle)

$\therefore\ \Delta AOB$ is isoscles triangle.

$\Rightarrow\ \angle OAB = \angle OBA = 2y$

$\angle OBA$ is an exterior angle of ΔOBC

$\Rightarrow\ \angle OBA = \angle BOC + \angle BCO = 2y$

$\therefore$ In ΔAOB, $\angle AOB = 180 - 4y$

Now, $\angle AOD + \angle AOB + \angle BOC = 180^o$

$\therefore\ x + 180 - 4y + y = 180$

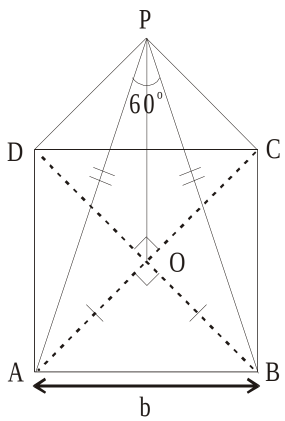
$\therefore\ x = 3y$. Hence, value of k = 3. Hence, [1].

128. $x > y < z$

$y = 9$	we can have	$8 \times 9 = 72$ ways
$y = 8$		$7 \times 8 = 56$ ways
$y = 7$		$7 \times 6 = 42$ ways
$y = 6$		$5 \times 6 = 30$ ways
$y = 5$		$4 \times 5 = 20$ ways
$y = 4$		$4 \times 3 = 12$ ways
$y = 3$		$3 \times 2 = 6$ ways
$y = 2$		$2 \times 1 = 2$ ways

Total ways = 72 + 56 + 42 + 30 + 20 + 12 + 6 + 2 = 240. Hence, [3].

129. From given data, we can draw the figure below:



Centre of square is an intersection point of its diagonals.

In right angle ΔAOB, OA = OB, hence, ΔAOB is 45^o-45^o-90^o.

$\therefore\ OA = OB = \frac{AB}{\sqrt{2}} = \frac{b}{\sqrt{2}}$ ... (i)

In ΔPAB, PA = PB, hence, ΔPAB is isosceles.

$\therefore\ \angle PAB = \angle PBA = \angle APB = 60^o$

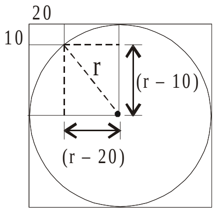
$\Rightarrow\ \Delta PAB$ is equilateral triangle.

$\therefore\ AP = b$ ... (ii)

Now, in right angle ΔAOP,

$AP^2 = OP^2 + OA^2$

$\therefore\ b^2 = h^2 + \frac{b^2}{2} \Rightarrow 2h^2 = b^2$. Hence, [2].

130. 

Let the radius of the circle be ‘r’ cm.
$\therefore$ We get $(r - 20)^2 + (r - 10)^2 = r^2$.
$\therefore$ $r^2 - 40r + 400 + r^2 - 20r + 100 = r^2$
$\therefore$ $r^2 - 60r + 500 = 0$
$\therefore$ r = 10 cm or r = 50 cm.
But r cannot be 10 cm.
$\therefore$ r = 50 cm. Hence, [3].

131. We have the sequence 1, 3, 6, 10, ...in which each n^{th} term is sum of the first ‘n’ natural numbers.

i.e., $\frac{n(n+1)}{2}$

If there are m layers, then

We should have, $\sum_{n=1}^{m} \frac{n(n+1)}{2} = 8436$

$\therefore \sum_{n=1}^{m} n^2 + n = 16872$

$\therefore \frac{m(m+1)(2m+1)}{6} + \frac{n(n+1)}{2} = 16872$

If we substitute the options one by one in above equation, we get that m = 36 satisfies it. Hence, [3].

132. Let n = 4 and the numbers be $\frac{1}{2}$, 2, $\frac{1}{3}$ and 3.

Sum = $2 + 3 + \frac{1}{2} + \frac{1}{3} = (5 + \frac{5}{6}) > 4$

Now take 3 numbers so that n = 3.
$\therefore$ Sum = 1 + 1 + 1 = 3
Thus the sum is never less than 3.
Hence, [3].

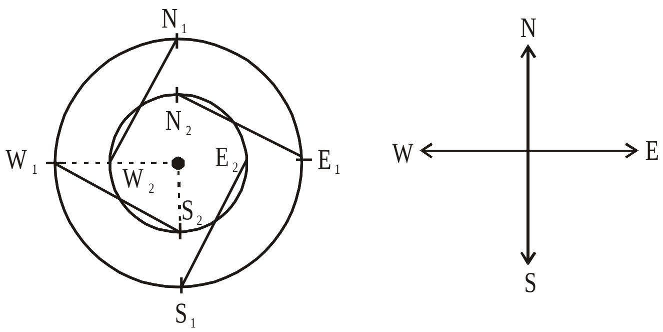
133. Put v = 1
u = –0.5
z = –2

$w = \frac{1 \times -2}{-0.5} = 4$

Which is a valid value of w. Hence, [2].

For answers to questions 134 to 136:

From the data, we get,



Speed along OR = 30π kmph
Speed along IR = 20π kmph

Speed along chord roads CR = $15\sqrt{5}$ kmph

Let R and r be the radii of OR and IR respectively.
Then, $2\pi R = 2(2\pi r) \Rightarrow R = 2r$

134. In right angle triangle W_1OS_2, $OW_1 = 2r$, $OS_2 = r$

$\therefore$ Length of each chord $= W_1S_2 = \sqrt{(2r)^2 + r^2} = \sqrt{4r^2 + r^2} = \sqrt{5}r$

$\therefore$ Required ratio $= \dfrac{4 \times \sqrt{5}r}{4\pi r} = \sqrt{5} : \pi$. Hence, [3].

135. $\dfrac{\left(\dfrac{4\pi r}{4}\right)}{30\pi} + \dfrac{\sqrt{5}r}{15\sqrt{5}} = \dfrac{90}{60}$ hours.

$\therefore \dfrac{r}{30} + \dfrac{r}{15} = \dfrac{3}{2}$ $\quad \therefore r = \dfrac{3 \times 30}{2 \times 3} = 15$ km.

$\therefore$ Radius of OR = R = 2r = 30 km. Hence, [3].

136. Path: $N_1 - W_2$ chord + W_2E_2 arc of IR

$\therefore$ Time required $= \dfrac{\sqrt{5}r}{15\sqrt{5}} + \dfrac{\pi r}{20\pi} = \dfrac{15}{15} + \dfrac{15}{20} = 1\dfrac{3}{4}$ hours = 105 minutes. Hence, [4].

137. $\dfrac{G}{1}\ \dfrac{G}{2}\ \dfrac{G}{3}\ \dfrac{G}{4}\ \dfrac{G}{5}\ \dfrac{G}{6}$

1 green balls can be arranged in ${}^6C_1 = 6$ ways
2 green balls can be arranged in ${}^5C_1 = 5$ ways
3 green balls can be arranged in ${}^4C_1 = 4$ ways

Hence, total number of ways $= \dfrac{n(n+1)}{2}$ where n = 6

Total $= \dfrac{6 \times 7}{2} = 21$ ways. Hence, [2].

Alternatively,
Atleast one box contains a green ball i.e., either 1, 2, 3, 4 or 6 boxes contain green balls. One out of 6 boxes can contain a green ball in 6 ways.
Two out of 6 boxes can contain green balls in 5 ways (as the boxes should be consecutively numbered, which can be considered as a single box).
Similarly, 3, 4, 5 and 6 boxes can contain green balls in 4, 3, 2 and 1 ways.
Hence, total number of ways = 6 + 5 + 4 + 3 + 2 + 1 = 21 ways.
Hence, [2].

138. Maximum of edges joining 12 points to each other can be calculated as ${}^{12}C_2$ (for an edge you want exactly 2 points) = $\frac{12\times11}{2}$ = 66.
To go from each point to every other point we need at least 11 edges (all points in a striaght line or a circle). Hence, $11 \leq x \leq 66$. Hence, [1].

139. If we observe the set T, we get that the sum of the first and last term is 470, the sum of the second and the second last term is 470 and so on.
Hence, only one of those two terms will be in 5. (eg. only one of 3 and 467)
i.e., we can have maximum half of the consecutive terms of T in S, starting.
Also, the terms in T are in A.P., where a = 3, d = 8
$T_n = a + (n - 1)d \Rightarrow 467 = 3 + (n - 1)8 \Rightarrow n = 59$
$\therefore$ The maximum number of terms in S = $\frac{59 + 1}{2}$ = 30. Hence, [4].

140. Curve I: $y = x^3 + x^2 + 5$
Curve II: $y = x^2 + x + 5$
Range: $-2 \leq x \leq 2$
At x = 0 for curve I: y = 5
for curve II: y = 5
At x = 1 for curve I: y = 7
for curve II: y = 7
At x = –1 for curve I: y = (–1) + 1 + 5 = 5
for curve II: y = 1 + (–1) + 5 = 5
The curves $y = x^3 + x^2 + 5$ and $y = x^2 + x + 5$ intersect in 3 at least points i.e., (0, 5), (1, 7) and (–1, 5). Hence, [4].

141. $j = n,\ 2^{n-n} = 1$ student has answered wrongly.
$j = n - 1,\ 2^{n-(n-1)} = 2$ students have answered wrongly
.
.
$j = 1,\ 2^{n-1}$ have answered wrongly.
$1 + 2 + \ldots + 2^{n-1} = 4095$

$$\Rightarrow 1\left[\frac{1-2^n}{1-2}\right] = 4095$$

$\Rightarrow 2^n - 1 = 4095$
$\Rightarrow 2^n = 4096$
$\Rightarrow n = 12$
Hence, [1].

142. The three least positive distinct real numbers are 1, 2 and 3.
Let x = 1; y = 2; z = 3

$$\therefore \frac{x^2(y+z)+y^2(x+z)+z^2(x+y)}{xyz} = \frac{1(3)+4(4)+9(3)}{6} = \frac{46}{6} > 6.$$ Hence, [3].

143. The positive integers (n) in the range $12 \le n \le 40$ such that the product $(n-1)(n-2)$ ... 3.2.1 is not divisible by n is the number of prime numbers in the given range
Those integers are 13, 17, 19, 23, 29, 31 and 37.
i.e., 7. Hence, [2].

144. $a^{44} < b^{11}$
a = 2
$\therefore 2^{44} < b^{11}$
This is only possible when $b > 2^4$
Thus, answer can be obtained using statement B only. Statement A does not give relevant information to obtain accurate answer. Hence, [1].

145. $4x^2 + bx + c = 0$
Let α and β be the roots.

$\therefore \alpha + \beta = \frac{-b}{4}$ $\qquad \alpha\beta = \frac{c}{4}$

From statement A, $\beta = \frac{1}{2}$

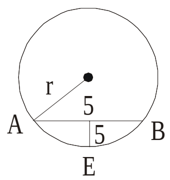
Thus, we can get b = 0 and c = –1.
From statement B, c = b.
$\therefore 4(\alpha + \beta) = -(4\alpha\beta)$

$\therefore -\frac{1}{2} + \beta = \frac{\beta}{2}$

$\therefore \beta = 1$

Thus, we can get b = –2 and c = –2. Hence, [2].

146. From statement B:



$\therefore (2.5)^2 + (r - 5)^2 = r^2$
$6.25 + r^2 - 10r + 25 = r^2$
10r = 31.25
r = 3.125 (which is not possible)
Statement A is not sufficient to answer the question. Hence, [4].

147. $\left(\frac{1}{a^2} + \frac{1}{a^4} + \frac{1}{a^6} + ...\right) > \left(\frac{1}{a} + \frac{1}{a^3} + \frac{1}{a^5} + ...\right)$

$0 > \frac{1}{a}\left(1 - \frac{1}{a}\right) + \frac{1}{a^3}\left(1 - \frac{1}{a}\right) + \ ...$

Thus if a is less than zero L.H.S > R.H.S and if a is greater than one than R.H.S > L.H.S. Thus statement A is insufficient

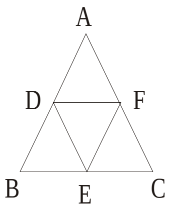
From statement B $4x^2 - 4x + 1 = 0$

$\therefore\ (2x - 1)^2 = 0$

$\therefore\ x = \frac{1}{2}$

For $a = \frac{1}{2}$ L.H.S. > R.H.S. Hence, [1].

148.



From statement A: AD = 1 = DF

Thus, BC = 2, BE = EC = 1

$\therefore$ BD = AD = 1 = FE

Thus, Δ DFE is equilateral triangle with side one. Hence, we can find the answer.

From statement B: Δ ABC is equilateral triangle.

Thus, Δ DEF equilateral triangle. Hence, we can find the answer. Hence, [2].

149. 520 Bahts per bottle.

Hence, cost for 3 bottles $= 520 + 2 \times \frac{70}{100} \times 520 = 1248$ Bahts.

They each pay 416 Bahts.

R pays	M pays	S pays
$2 \times 46 = 92$ bahts	$4 \times 46 + 27$ bahts	945 bahts

R owes S $416 - 92 = 324$ bahts.

Hence, [4].

150. M owes S $(416 - 211) = \frac{205}{41}$ bahts = 5 US Dollars. Hence, [3].