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CBSE Board
Class XI Mathematics
Sample Paper – 8

Q1. If the quadratic equations $3x^2 + ax + 1 = 0$ and $2x^2 + bx + 1 = 0$ have a common root then the value of $5ab - 2a^2 - 3b^2$, where a, b $\in$ R, is equal to

(A) Zero
(B) 1
(C) -1
(D) none of these

Sol. (B)

$3x^2 + ax + 1 = 0$, $2x^2 + bx + 1 = 0$ have a common root.

Subtracting these equations, we get

$x^2 + (a - b)x = 0$

$\Rightarrow$ $x = 0, x = (b - a)$

Clearly the common root is (b – a)

$\Rightarrow$ $3(b - a)^2 + a(b - a) + 1 = 0$

$\Rightarrow$ $3b^2 + 3a^2 - 6ab + ab - a^2 + 1 = 0$

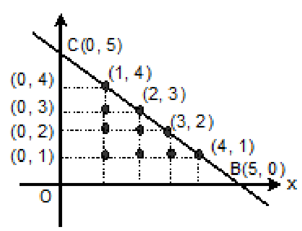
$\Rightarrow$ $5ab - 2a^2 - 3b^2 = 1$

Q2. P (x, y) is called a good point if x, y $\in$ N. Total number of good points lying inside the quadrilateral formed by the line $2x + y = 2$, $x = 0$, $y = 0$ and $x + y = 5$, is equal to

(A) 4
(B) 2
(C) 6
(D) 1

Sol. (c)

Adjacent figure indicates that there are exactly six good points inside the quadrilateral ABCD.



Q3. The equation of the ellipse with $e = \frac{3}{4}$, foci on y-axis, centre at the origin and passing through the point (6, 4) is

(A) $x^2 + 2y^2 = 16$

(B) $16x^2 + 7y^2 = 688$
(C) $16x^2 + 7y^2 = 344$
(D) none of these

Sol. (B)

$$b^2 = a^2\left(1-\frac{9}{16}\right) = \frac{7}{16}a^2$$

Then equation is $\frac{16x^2}{7a^2}+\frac{y^2}{a^2}=1$, it passes through (6, 4)

$$\Rightarrow \quad \frac{16\times 6^2}{7a^2}+\frac{16}{a^2}=1 \Rightarrow a^2=\frac{688}{7}$$

$\Rightarrow$ $16x^2 + 7y^2 = 688$ is ellipse.

Q4.

$\{a_i\}$, i = 1, 2, ...n is arithmetic sequence. If $a_7 = 9$ then value of common difference of the A.P. such that $a_1 . a_2 . a_7$ is minimum, is equal to

(A) 11/20
(B) $\frac{11}{10}$
(C) $\frac{33}{20}$
(D) None of these

Sol. (C)

$a_7 = a_1 + 6d$
$\Rightarrow \quad a_2 = a_1 + d$
$a_1\ a_2\ a_7 = a_1(a_1+d)9$
$= 9a_1\left(a_1+\frac{9-a_1}{6}\right)$
$= \frac{3}{2}a_1(5a_1+9)$
$= f(a_1)$ (say)
$\Rightarrow\ f(a_1) = \frac{3}{2}(a_1.5 + 5a_1 + 9)$
$= 15\left(a_1+\frac{9}{10}\right)$

Clearly, $a_1 = -\frac{9}{10}$ is the point of minima for $f(a_1)$

$$\Rightarrow \quad d = \frac{9+\frac{9}{10}}{6} = \frac{33}{20}$$

Q5. The sum of infinitely many terms of the series $\frac{3}{1^2}+\frac{5}{1^2+2^2}+\frac{7}{1^2+2^2+3^2}+.......$ is:

(A) 0
(B) 4
(C) 6
(D) Can't be determined

Sol. (C)

$$S_n = \frac{3}{12}+\frac{5}{1^2+2^2}+\frac{7}{1^2+2^2+3^2}+\ldots = \sum_{r=1}^{n}\frac{2r+1}{1^2+2^2+\ldots r^2} = \sum_{r=1}^{n}\frac{6(2r+1)}{r(r+1)(2r+1)}$$

$$= \sum_{r=1}^{n}\frac{6}{r(r+1)} = 6\left[\sum_{r=1}^{n}\frac{1}{r}-\frac{1}{r+1}\right] = 6\left[1-\frac{1}{n+1}\right] = \frac{6n}{n+1}$$

Now, $S_\infty = \lim_{n\to\infty} S_n = \lim_{n\to\infty}\frac{6n}{n+1} = \lim_{n\to\infty}\frac{6}{1+1/n} = 6$

Q6. The value of ${}^{2n}C_n - {}^nC_1 . {}^{2n-2}C_n + {}^nC_2 . {}^{2n-4}C_n - \cdots$ is equal to

(A) 3^n
(B) 4^n
(C) 5^n
(D) none of these

Sol. (D)

$${}^{2n}C_n - {}^nC_1\, {}^{2n-2}C_n + {}^nC_2\, {}^{2n-4}C_n - \ldots$$

= coefficient of x^n in $[{}^nC_0 (1+x)^{2n} - {}^nC_1 (1+x)^{2n-2} + {}^nC_2 (1+x)^{2n-4} - ....]$

= coefficient of x^n in $[1-(1+x)^2]^n = 2^n$

Q7. The length of the latus rectum of the parabola whose focus is (3, 3) and directrix is $3x - 4y - 2 = 0$ is

(A) 2
(B) 3
(C) 1
(D) 4

Sol. (A)

Semilatus rectum = $\frac{|3\times3-4\times3-2|}{5} = 1$, so latus rectum = 2.

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Q8. If a, b, c, d are four positive real numbers such that abcd =1, then minimum value of (1+ a) (1 + b) (1 + c) (1 + d) is

(A) 8
(B) 12
(C) 16
(D) 20

Sol. (C)

Applying AM ≥GM

$$\frac{1+a}{2} \geq (a)^{1/2},\ \frac{1+b}{2} \geq (b)^{1/2},\ \frac{1+c}{2} \geq (c)^{1/2},\ \frac{1+d}{2} \geq (d)^{1/2}$$

Multiplying all focus (1 + a) (1 + b)(1 + c)(1 + d) ≥ 16

Q9. If the normal at the end of a latus rectum of on ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, passes through one extremity of the minor axis, then the eccentricity of the ellipse is given by the equation

(A) $e^2 + e - 1 = 0$
(B) $e^2 + e + 1 = 0$
(C) $e^4 + e^2 + 1 = 0$
(D) $e^4 + e^2 - 1 = 0$

Sol. (D)

Normal at $\left(ae, \frac{b^2}{a}\right)$ is $\frac{ax}{e} - ay = a^2 - b^2$

It passes through (0, –b)

$\Rightarrow ab = a^2 - b^2 = a^2e^2 \Rightarrow b = ae^2 \Rightarrow b^2 = a^2e^4$

$\Rightarrow a^2(1 - e^2) = a^2e^4 \Rightarrow e^4 + e^2 - 1 = 0.$

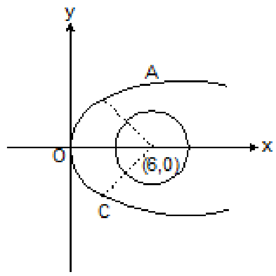
Q10.

Minimum distance between the curve $y^2 = 4x$ and $x^2 + y^2 - 12x + 31 = 0$ is equal to

(A) $\sqrt{21}$
(B) $\sqrt{26} - \sqrt{5}$
(C) $\sqrt{21} - \sqrt{5}$
(D) $\sqrt{28} - \sqrt{5}$

Sol. (C)

Shortest distance will take place along the common normal.



Equation of normal for $y^2 = 4x$ at $(at^2, 2t)$ is

$y = -tx + t + t^3$

If it passes through (6, 0), then

$t^3 - 5t = 0$

$\Rightarrow \quad t = 0, t = \pm\sqrt{5}$.

$\Rightarrow \quad A \equiv (5, 2\sqrt{5}), C \equiv (5, -2\sqrt{5})$.

Now, PA = PC = $\sqrt{1+20} = \sqrt{21}$, OP = 6

$\therefore$ Minimum distance = $(\sqrt{21} - \sqrt{5})$units.

Q11. If $\frac{1-i\alpha}{1+i\alpha} = A +$ iB, then $A^2 + B^2$ equals to

(A) 1
(B) α^2
(C) -1
(D) $-\alpha^2$

Sol. (A)

$$A + iB = \frac{1-i\alpha}{1+i\alpha} \Rightarrow A - iB = \frac{1+i\alpha}{1-i\alpha} \Rightarrow (A + iB)(A - iB) = \frac{(1-i\alpha)(1+i\alpha)}{(1+i\alpha)(1-i\alpha)} = 1$$

$\Rightarrow A^2 + B^2 = 1$.

Q12. if the normal at the point P(θ) to the ellipse $\frac{x^2}{14} + \frac{y^2}{5} = 1$ intersects it again at the point Q((2θ)), then cosθ is equal to

(A) 2/3
(B) -2/3
(C) 3/4
(D) none of these.

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Sol. (B)

$\frac{\sqrt{14}x}{\cos\theta} - \frac{\sqrt{5}y}{\sin\theta}$ = 14 – 5; as it passes through ($\sqrt{14}\cos 2\theta$, $\sqrt{5}\sin 2\theta$)

so, $\frac{14(2\cos^2\theta - 1)}{\cos\theta} - \frac{5\times 2\sin\theta\cos\theta}{\sin\theta} = 9$

$\Rightarrow 28\cos\theta - \frac{14}{\cos\theta} - 10\cos\theta = 9$

$\Rightarrow 18\cos^2\theta - 9\cos\theta - 14 = 0$

$\Rightarrow (3\cos\theta + 2)(6\cos\theta - 7) = 0 \Rightarrow \cos\theta = -\frac{2}{3}$

Q13.

If $a^4b^4 - a^4 - b^4 = 2a^2b^2$ {a, b ∈ R – {0}}, then the line $\frac{x}{a^2} + \frac{y}{b^2} = 1$, will pass through

(A) (2, 1)
(B) (1,1)
(C) (2,3)
(D) (0, 0)

Sol. (B)

Given $a^4b^4 - a^4 - b^4 = 2a^2b^2$

$\Rightarrow a^4b^4 = (a^2+b^2)^2$

$\Rightarrow a^2 + b^2 = a^2b^2$

Given line $b^2x + a^2y = a^2b^2$

$\Rightarrow b^2x + a^2y = a^2 + b^2$

$\Rightarrow (x - 1)b^2 + a^2(y - 1)$

clearly the line will be passing through (1,1).

Q14. The coefficient of x^n in $\left(1 - x + \frac{x^2}{2!} - \frac{x^3}{3!} + ... + \frac{(-1)^n x^n}{n!}\right)^2$ is

(A) $\frac{(-n)^n}{n!}$

(B) $\frac{(-2)^n}{n!}$

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(C) $\frac{1}{(n!)^2}$

(D) $-\frac{1}{(n!)^2}$

Sol. (B)

Coefficient of x^n in $\left(1-x+\frac{x^2}{2!}-\frac{x^3}{3!}+...+\frac{(-1)^n x^n}{n!}\right)^2$

Coefficient of x^n in $\left(1-x+\frac{x^2}{2!}-\frac{x^3}{3!}+...\right)^2$

Coefficient of x^n in $(e^{-x})^2$

Coefficient of x^n in $e^{-2x} = \frac{(-2)^n}{n!}$

Q15.

Let $0 < A, B < \frac{\pi}{2}$ satisfying the equalities $3\sin^2 A + 2\sin^2 B = 1$ and $3\sin 2A - 2\sin 2B = 0$. Then $A + 2B$ = :

(A) pie/4
(B) pie/3
(C) pie/2
(D) None of these

Sol. (C)

From the second equation, we have

$\sin 2B = \frac{3}{2}\sin 2A$ ...(1)

and from the first equality

$3\sin^2 A = 1 - 2\sin^2 B = \cos 2B$ ...(2)

Now $\cos(A + 2B) = \cos A . \cos 2B - \sin A . \sin 2B$

$= 3\cos A . \sin^2 A - \frac{3}{2} . \sin A . \sin 2A$

$= 3\cos A . \sin^2 A - 3\sin^2 A . \cos A = 0$

$\Rightarrow A + 2B = \frac{\pi}{2}$ or $\frac{3\pi}{2}$

Given that $0 < A < \frac{\pi}{2}$ and $0 < B < \frac{\pi}{2} \Rightarrow 0 < A + 2B < \pi + \frac{\pi}{2}$

Hence $A + 2B = \frac{\pi}{2}$.

Q16. Two like parallel forces P and 3P act on a rigid body at point A and B respectively. If the forces are interchanged in position, the resultant will be displaced through the distance of

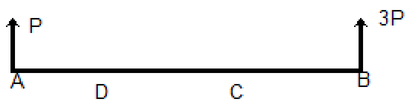
(A) $\frac{1}{2}AB$

(B) $\frac{1}{3}AB$

(C) $\frac{1}{4}AB$

(D) $\frac{3}{4}AB$

Sol. (A)



Case I: If the resultant act at C, then

$$AC = \left(\frac{AB}{P+3P}\right)3P = \frac{3}{4}AB$$

Case II: If the resultant acts at D, then

$$AD = \left(\frac{AB}{3P+P}\right)P = \frac{1}{4}AB \Rightarrow CD = AC - AD = \frac{1}{2}AB.$$

Q17. The number of solutions of the equation $x^3 + 2x^2 + 5x + 2\cos x = 0$ in $[0, 2\pi]$ is:

(A) 0

(B) 1

(C) 2

(D) 3

Sol. (A)

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Let $f(x) = x^3 + 2x^2 + 5x + 2\cos x$

$\Rightarrow f'(x) = 3x^2 + 4x + 5 - 2\sin x$

$= 3\left(x + \frac{2}{3}\right)^2 + \frac{11}{3} - 2\sin x$

Now $\frac{11}{3} - 2\sin x > 0 \ \forall x$ (as $-1 \le \sin x \le 1$)

$\Rightarrow f'(x) > 0 \ \forall x$

$\Rightarrow f(x)$ is an increasing function.

Now $f(0) = 2$

$\Rightarrow f(x) = 0$ has no solution in $[0, 2\pi]$.

Q18. If tanx = n. tany, $n \in R^+$ then maximum value of $\sec^2(x - y)$ is equal to:

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

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

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

(D) $\frac{(n+1)^2}{4n}$

Sol. (D)

tanx = n tany, cos(x – y)

= cosx. cosy + sinx.siny.

$\Rightarrow \cos(x - y) = \cos x.\cos y(1 + \tan x.\tan y)$

$= \cos x.\cos y\,(1 + n\tan^2 y)$

$\Rightarrow \sec^2(x - y) = \frac{\sec^2 x \sec^2 y}{(1 + n\tan^2 y^2)}$

$= \frac{(1+\tan^2 x)(1+\tan^2 y)}{(1+n\tan^2 y)^2}$

$= \frac{(1+n^2\tan^2 y)(1+\tan^2 y)}{(1+n\tan^2 y)^2}$

$= 1 + \frac{(n-1)^2 \tan^2 y}{(1+n\tan^2 y)^2}$

Now, $\left(\frac{1+n\tan^2 y}{2}\right)^2 \ge n\tan^2 y.$

$\Rightarrow \frac{\tan^2 y}{(1+n\tan^2 y)^2} \le \frac{1}{4n}$

$\Rightarrow \sec^2(x-y) \le 1+\frac{(n-1)^2}{4n} = \frac{(n+1)^2}{4n}$

Q19. Equation of a circle that cuts the circle $x^2 + y^2 + 2gx + 2fy + c = 0$, lines $x = -g$ and $y = -f$ orthogonally, is;

(A) $x^2 + y^2 + 2gx + 2fy + g^2 + f^2 - c = 0$

(B) $x^2 + y^2 + 2gx + 2fy + g^2 + f^2 + c = 0$

(C) $x^2 + y^2 + 2gx + 2fy - g^2 - f^2 - c = 0$

(D) none of these

Sol. (D)

Lines $x = -g$ and $y = -f$ will be diameter for the circle. Equation of circle will be

$(x+g)^2 + (y+f)^2 = r^2$. Now this intersect $x^2 + y^2 + 2gx + 2fy + c = 0$ orthogonally

Hence $2g.g. + 2f.f = c + k$

$\Rightarrow \quad k = 2g^2 + 2f^2 - c$

Q20. If i = $\sqrt{-1}$, then $4 + 5\left(-\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)^{334} + 3\left(-\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)^{365}$ equals

(A) $1 - i\sqrt{3}$

(B) $-1 + i\sqrt{3}$

(C) $i\sqrt{3}$

(D) $-i\sqrt{3}$

Sol. (C)

We have $4 + 5\left(-\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)^{334} + 3\left(-\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)^{365} = 4 + 5\omega^{334} + 3\omega^{365}$

$= 4 + 5\omega + 3\omega^2 = 4 + 5\left(-\frac{1}{2}+\frac{i\sqrt{3}}{2}\right) + 3\left(-\frac{1}{2}-\frac{i\sqrt{3}}{2}\right) = i\sqrt{3}$

Q21. Total number of 3 letters words that can be formed from the letters of the word 'SAHARANPUR', is equal to:

(A) 210

(B) 237

(C) 247

(D) 227

Sol. (C)

1S, 3A, 1H, 2R, 1N, 1P, 1U when all letters are different.

Corresponding ways = $^7C_3 . 3!$

$= {}^7P_3 = 210$

When two letters are of one kind and other is different.

Corresponding ways = $^2C_1 . {}^6C_1 . \frac{3!}{2!} = 36$

When all letters are alike, corresponding ways = 1.

Thus total words that can be formed

= 210 + 36 + 1, i.e. 247

Q22. If A = $\{\phi, \{\phi\}\}$, then the power set of a is

(A) A

(B) $\{\phi, \{\phi\}, A\}$

(C) $\{\phi, \{\phi\}, \{\{\phi\}\}, A\}$

(D) none of these

Sol. (C)

Power set means set of all the subjects

$\therefore$ power set of A = $\{\phi, \{\phi\}, \{\{\phi\}\}, A\}$

Q23. The value of $\lim_{x \to \infty} \frac{x^n + nx^{n-1} + 1}{e^{[x]}}$, when **n** is integer is:

(A) 1

(B) 0

(C) n

(D) n(n –1)

Sol. (B)

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$$\lim_{x\to\infty}[x] = \lim_{x\to\infty}\frac{[x]x}{x}$$

$$= \lim_{x\to\infty}\frac{[x]}{x}\cdot\lim_{x\to\infty}x = \lim_{x\to\infty}x\left(\text{as }\lim_{x\to\infty}\frac{[x]}{x}=1\right)$$

$$\lim_{x\to\infty}\frac{x^n+nx^{n-1}+1}{e^{[x]}}$$

$$= \lim_{x\to\infty}\frac{x^n+nx^{n-1}+1}{e^x}$$

$$= \lim_{x\to\infty}\frac{x^n+nx^{n-1}+1}{1+x+\frac{x^2}{2!}+....+\frac{x^n}{n!}+\frac{x^{n+1}}{(n+1)!}+....}$$

$$= \lim_{x\to\infty}\frac{1+\frac{n}{x}+\frac{1}{x^n}}{\frac{1}{x^n}+\frac{1}{x^{n-1}}+\frac{1}{2x^{n-2}}+....+\frac{1}{n!}+\frac{x}{(n+1)!}+\frac{x^2}{(n+2)!}+....}$$

$$= \frac{1+0+0}{0+0+.....+0+\frac{1}{n!}+\infty} = \frac{1}{\infty} = 0.$$

Q24. Maximum value of logx/x in interval [2 ,∞] is

(A) log2/2
(B) 0
(C) 1/e
(D) 1

Sol. (D)

$$f'(x) = \frac{1}{x^2}(1-\ln x)$$

Clearly f(x) increasing for $x < e$ and decreases for $x > e$

$\Rightarrow x = e$ is the point of local maxima

$\therefore$ maximum $f(x) = \frac{1}{e}$.

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Q25. Total number of four digit numbers having all different digits, is equal to
(A) 4536
(B) 504
(C) 5040
(D) 72

Sol. (A)
Let the number be x, x_2 x_3 x_4.

Then X_1 can be chosen in 9 ways. x_2 can be chosen in 9 ways. Similarly x_3 and x_4 ca be chosen in 8 and 7 ways respectively.

$\therefore$ Total number of such numbers

= 9.9 .8.7 = 4536

Q26. A and B each throw a dice. The probability that A's throw is not greater than B's is
(A) 1/6
(B) 5/12
(C) 1/2
(D) 7/12

Sol. (D)
$A \le B$

$P(A > B)$

B draw	A draw	Total numbers
1	2, 3, ……,6	5
2	3, 4, …., 6	4
3	4, 5, 6	3
4	5, 6	2
5	6	1
		Total = 15

$P(A > B) = \frac{15}{30}$

$P(A \le B) = 1 - \frac{15}{30} = \frac{7}{12}$.

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Q27. The distance of the point (1, -2, 3) from the plane x - y +z = 5 measured parallel to the line $\frac{x}{2}=\frac{y}{3}=\frac{z}{-6}$ is:

(A) 7 unit
(B) 4 unit
(C) 1 unit
(D) 2 unit

Sol. (A)

Here we are not to find perpendicular distance of the point from the plane but distance measured along with the given line. The method is as follow:

The equation of the line through the point (1, –2, 3) and parallel to given line is

$$\frac{x-1}{2}=\frac{y+2}{3}=\frac{z-3}{-6}=r\ (\text{say})$$

The coordinate of any point on it is (2r + 1, 3r – 2, –6r + 3).

If this point lies in the given plane then

$$2r+1-(3r-2)+(-6r+3)=5 \Rightarrow -7r=-1 \text{ or } r=\frac{1}{7}$$

$\therefore$ point of intersection is $\left(\frac{9}{7},\ -\frac{11}{7},\ \frac{15}{7}\right)$

$\therefore$ The required distance

= the distance between the points (1, –2, 3) and $\left(\frac{9}{7},\ -\frac{11}{7},\ \frac{15}{7}\right)$

$$=\sqrt{\left(1-\frac{9}{7}\right)^2+\left(-2+\frac{11}{7}\right)^2+\left(3-\frac{15}{7}\right)^2}=\frac{1}{7}\sqrt{49}=1\text{ unit.}$$

Q28. In a triangle ABC if cos A + 2cos B + cos C = 2. The sides of the triangle are in:

(A) H.P.
(B) G.P.
(C) A.P.
(D) None of these

Sol. (C)

cos A + 2 cos B + cos C =2 or, cos A + cos B = 2(1 – cos B)

$$\Rightarrow 2\cos\left(\frac{A+C}{2}\right)\cos\left(\frac{A-C}{2}\right)=4\sin^2\frac{B}{2}$$

$$\Rightarrow \cos\frac{A-C}{2}=2\sin\frac{B}{2} \Rightarrow \cos\frac{A-C}{2}=2\cos\frac{A+C}{2}$$

$$\Rightarrow \cos\frac{A}{2}\cos\frac{C}{2}+\sin\frac{A}{2}\sin\frac{C}{2}=2\cos\frac{A}{2}\cos\frac{C}{2}-2\sin\frac{A}{2}\sin\frac{C}{2}$$

$$\Rightarrow \cot\frac{A}{2}\ \text{Cot}\frac{C}{2}=3 \Rightarrow \sqrt{\frac{s(s-a)}{(s-b)(s-c)}}\cdot\sqrt{\frac{s(s-c)}{(s-a)(s-b)}}=3$$

$$\Rightarrow \frac{s}{s-b}=3 \Rightarrow s=3s-3b \Rightarrow 2s=3b$$

$\Rightarrow$ a + c =2b $\Rightarrow$ a, b, c are in A.P.

Q29.

If A and B are independent events such that P (A) = 0.3, P $(A \cup \overline{B})$ = 0.8, then P (B) equals to

(A) $\frac{1}{7}$

(B) $\frac{2}{7}$

(C) $\frac{3}{4}$

(D) $\frac{1}{4}$

Sol. (B)

$P(A) + P(\overline{B}) - P(A)P(\overline{B}) = 0.8$

$0.3 + (1 - x) - 0.3(1 - x) = 0.8$

$(1 - x)(0.7) = 0.5$

$1 - x = \frac{5}{7} \Rightarrow x = 1 - \frac{5}{7} = \frac{2}{7}$

Q30. The solution set of the inequality $\log_{10}(x^2 - 16) \leq \log_{10}(4x - 11)$

(A) (3, 5]

(B) (4, 5]

(C) (6, 5]

(D) n

Sol. (B)

Since base of log is same both the sides and greater than 1, hence inequality will remain same.

$\Rightarrow x^2 - 16 \leq 4x - 11 \Rightarrow x^2 - 4x - 5 \leq 0 \Rightarrow -1 \leq x \leq 5$ ....(1)

Also $x^2 - 16 > 0$ and $4x - 11 > 0 \Rightarrow$ either $x < -4$ or $x > 4$ ....(2)

Taking intersection of (1) and (2) ...

$x \in (4, 5]$