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ſ,	Com	nbined Std. X - Alge	bra Solutions
	Pa	^{aper} Chapter 1 an	
Q.1	Atte	empt any four of the following :	
	(1)	$t_n = n^2 + n$	
		For $n = 2$, $t_2 = 2^2 + 2$	[½ M]
		$t_2 = 4 + 2 = 6$	
		For $n = 3$, $t_3 = 3^2 + 3$	[½ M]
		$t_3 = 9 + 2 = 12$	
		$\therefore t_2 = 6 \text{ and } t_3 = 12$	
	(2)	$x - 4x^2 + 5 = 0$	
		$\therefore 4x^2 - x - 5 = 0$	[½ M]
		Comparing with $ax^2 + bx + c = 0$	
	(2)	a = 4, $b = -1$, $c = -5Find the part two terms of the sequence 102 -06 48$	[½ M]
	(3)	Find the next two terms of the sequence $192, -96, 48$,-24
		$\mathbf{t}_5 = \frac{\mathbf{t}_4}{-2}$	
		$t_5 = \frac{-24}{-2} = 12$	[½ M]
		$t_6 = \frac{t_5}{-2}$	
		$t_6 = \frac{12}{-2} = -6$	[½ M]
		\therefore Next two terms are $t_5 = 12$ and $t_6 = -6$	
	(4)	$(\mathbf{P}-4)\mathbf{P}=0$	
		$\therefore P^2 - 4P = 0$	[½ M]
		\therefore Degree of the equation is 2 and a $\neq 0$ Hence it is a quadratic equation	[½ M]

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	(5)	If $a = 2.5$ and $d = 1.5$	
		\therefore First term = a = 2.5	
		Second term = $t_2 = a + d = 2.5 + 1.5$	
		t ₂ = 4	[½ M]
		Third term $= t_3 = t_2 + d = 4 + 2.5$	
		t ₃ = 6.5	[½ M]
Q.2	Atte	empt any three of the following :	
	1)	The given A.P. 1, 7, 13, 19	
		First term = $a = 1$	
		Common difference = $7 - 1 = 6$	[½ M]
		$\mathbf{t}_{n} = \mathbf{a} + (n-1)\mathbf{d}$	[½ M]
		$t_{18} = 1 + (18 - 1) \times 6$	
		$t_{18} = 1 + 17 \times 6$	[½ M]
		$t_{18} = 1 + 102 = 103$	[½ M]
		Eighteen term of the given A.P. is 103	
	(2)	Let the three consecutive terms in A.P. be	
		a - d, a, a + d	[½ M]
		According to the condition	
		$\therefore a-d+a+a+d=27$	
		$\therefore 3a = 27$	
		$\therefore a = 9$	[½ M]
		a(a-d)(a+d) = 504	
		$(9-d)(9+d) = \frac{504}{9}$	[½ M]
		$9^2 - d^2 = \frac{504}{9}$	
		$81 - d^2 = 56$	
		$d^2 = 81 - 56$	
		$d^2 = 25$	
		$d = \pm 5$	[½ M]
		The three terms are 14, 9, 4 OR 4, 9, 14	[½ M]
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	(3)	One root of the quadratic equation is 4	
		Hence it satisfies the equation	[½ M]
		$\therefore \text{ Substitute } x = 4 \text{ in } x^2 - 7x + k = 0$	
		$\therefore (4)^2 - 7 \times 4 + k = 0$	[½ M]
		$\therefore 16-28+k=0$	[½ M]
		$\therefore -12 + k = 0$	
		$\therefore k = 12$	[½ M]
		Hence value of k is 12	
	(4)	The given equation is $2x^2 + 5\sqrt{3}x + 16 = 0$	
		Compare it with $ax^2 + bx + c = 0$	[½ M]
		$a = 2, b = 5\sqrt{3}, c = 16$	
		$\Delta = b^2 - 4ac$	
		$\Delta = \left(5\sqrt{3}\right)^2 - 4 \times 2 \times 16$	[½ M]
		$\Delta 25 \times 3 - 128$	
		$\Delta = 75 - 128$	[½ M]
		$\Delta = -53$	
		$\therefore \Delta < 0$	[½ M]
Q.3	Atte	\therefore No real roots for the equation. empt any Two of the following :	
	(1)	The given equation is $3y^2 + 7y + 1 = 0$	
		Divide throughout by 3	
		$3y^2 + 7y + 1 = 0$	
		$y^2 + \frac{7}{3}y = -\frac{1}{3}(1)$	[½ M]
		$\therefore \text{ Third term} = \left(\frac{1}{2} \times \text{co-efficient of y}\right)^2$	
		$= \left(\frac{1}{2} \times \frac{7}{3}\right)^2$	
		$=\left(\frac{7}{6}\right)^2$	
		$=\frac{49}{36}$	[½ M]
			NA/_ h _:4.
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	Adding this on both sides of equation (1)	
	$y^{2} + \frac{7}{3}y + \frac{49}{36} = -\frac{1}{3} + \frac{49}{36}$	
	$\left(y + \frac{7}{6}\right)^2 = \frac{-12 + 49}{36}$	
	$\left(y+\frac{7}{6}\right)^2 = \frac{37}{36}$	[½ M]
	$\therefore y + \frac{7}{6} = \pm \sqrt{\frac{37}{36}}$	
	$\therefore y = -\frac{7}{6} + \sqrt{\frac{37}{36}} \text{ OR } y = -\frac{7}{6} - \sqrt{\frac{37}{36}}$	
	$\therefore y = \frac{-7 + \sqrt{37}}{6}$ OR $y = \frac{-7 - \sqrt{37}}{6}$	[½ M]
	$\therefore \text{ Solution set } \left\{ \left(\frac{-7 + \sqrt{37}}{6}, \frac{-7 - \sqrt{37}}{6} \right) \right\}$	[½ M]
2)	Number of rows in the meeting hall are	
	20, 24, 28	[½ M]
	which is in A.P. with	
	First term = $a = 20$ Common difference = $d = 24-20 = 4$	$[\frac{1}{2}M]$
		J
	Hall has 30 rows \therefore n = 30 To find the total number of seats in the hall	
	i.e. S ₃₀	
	$\therefore S_n = \frac{n}{2} \left[2a + (n-1)d \right]$	[½ M]
	$\therefore S_{30} = \frac{30}{2} \Big[2 \times 20 + (30 - 1) \times 4 \Big]$	
	$\therefore S_{30} = 15 [40 + (29) \times 4]$	[½ M]
	$\therefore S_{30} = 15[40 + 116]$	
	$\therefore S_{30} = 15[156]$	[½ M]
	$\therefore S_{30} = 2340$	[½ M]
	Hence total number of seats in the hall are 2340	

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Hence length of the rectangle is 'x+2' cm[½ M] According to the condition $\ell \times b = area of rectangle[½ M]$ $x \times (x + 2) = 24$ $x^2 = 2x - 24 = 0$ [½ M] $x \times (x + 6) = 4x - 24 = 0$ [½ M] $x \times (x + 6) = 4x - 24 = 0$ [½ M] x + 6 = 0 or $x - 4 = 0$		(3)	GuruAanklan / Xth Std / Algebra / Combined / Chapt Let the breadth of the rectangle be 'x' cm	er 1 & 3 / Solutions
$x \times (x+2) = 24$ $x^{2} = 2x - 24 = 0$ $x^{2} + 6x - 4x - 24 = 0$ $x^{2} + 6x - 4x - 24 = 0$ $x \times (x+6) - 4 \times (x+6) = 0$ $(x+6)(x-4) = 0$ $x \times (x+6) - 4 \times (x+6) = 0$ $(x+6)(x-4) = 0$ $x + 6 = 0 \text{ or } x - 4 = 0$ $\therefore x = -6 \text{ or } x = 4$ $ [½ M]$ But the length cannot be negative $\therefore x = -6$ is not acceptable Hence breadth of the rectangle is 4 cms $ [½ M]$ Runce length of the rectangle is $x + 2 = 4 + 2 = 6$ cms $Q.4 \text{ Attempt any one of the following :}$ $(1) 2\left(x^{2} + \frac{1}{x^{2}}\right) - 9\left(x + \frac{1}{x}\right) + 14 = 0$ (1) Let $\left(x + \frac{1}{x^{2}}\right) = m^{2} - 2$ $ [½ M]$ Substitute in equation (1) $2(m^{2} - 2) - 9(m) + 14 = 0$ $2m^{2} - 4 - 9m + 14 = 0$ $2m^{2} - 4m - 5m + 10 = 0$ $2m^{2} - 4m - 5m + 10 = 0$ $2m \times (m - 2) - 5 \times (m - 2) = 0$ $ [½ M]$			Hence length of the rectangle is ' $x+2$ ' cm	[½ M]
$x^{2} = 2x - 24 = 0$ $x^{2} + 6x - 4x - 24 = 0$ $x^{2} + 6x - 4x - 24 = 0$ $x + 6) - 4x (x + 6) = 0$ $(x + 6)(x - 4) = 0$ $x + 6 = 0 \text{ or } x - 4 = 0$ $\therefore x = -6 \text{ or } x = 4$ $[½ M]$ But the length cannot be negative $\therefore x = -6$ is not acceptable Hence breadth of the rectangle is 4 cms $[½ M]$ Runce length of the rectangle is $x + 2 = 4 + 2 = 6 \text{ cms}$ Q.4 Attempt any one of the following : (1) $2\left(x^{2} + \frac{1}{x^{2}}\right) - 9\left(x + \frac{1}{x}\right) + 14 = 0$ (1) Let $\left(x + \frac{1}{x}\right) = m$ $\therefore \left(x^{2} + \frac{1}{x^{2}}\right) = 9\left(x + \frac{1}{x}\right) + 14 = 0$ $2m^{2} - 4 - 9m + 14 = 0$ $2m^{2} - 4 - 9m + 14 = 0$ $2m^{2} - 4m - 5m + 10 = 0$ $2m \times (m - 2) - 5 \times (m - 2) = 0$ $[½ M]$			$\ell \times b = area of rectangle$	[½ M]
$\begin{aligned} x^{2} + 6x - 4x - 24 &= 0 & [!^{2} M] \\ x \times (x + 6) - 4 \times (x + 6) &= 0 & [!^{2} M] \\ x + 6 &= 0 \text{ or } x - 4 &= 0 & [!^{2} M] \\ B x + 6 &= 0 \text{ or } x - 4 &= 0 & [!^{2} M] \\ B ut the length cannot be negative \therefore x = -6 is not acceptableHence breadth of the rectangle is 4cms & [!^{2} M] \\ Hence length of the rectangle is 4cms & [!^{2} M] \\ Hence length of the rectangle is x + 2 &= 4 + 2 &= 6cms \\ Q.4 \text{ Attempt any one of the following :} & (1) \\ Let \left(x + \frac{1}{x^{2}}\right) = 9\left(x + \frac{1}{x}\right) + 14 &= 0 & (1) \\ Let \left(x + \frac{1}{x^{2}}\right) = m^{2} - 2 & [!^{2} M] \\ Substitute in equation (1) \\ 2(m^{2} - 2) - 9(m) + 14 &= 0 & [!^{2} M] \\ 2m^{2} - 9m + 10 &= 0 & [!^{2} M] \\ 2m^{2} - 9m + 10 &= 0 & [!^{2} M] \\ 2m^{2} - 4m - 5m + 10 &= 0 & [!^{2} M] \\ 2m \times (m - 2) - 5 \times (m - 2) &= 0 & [!^{2} M] \\ \therefore 2m - 5 &= 0 \text{ OR } m - 2 &= 0 \end{aligned}$			$\mathbf{x} \times (\mathbf{x} + 2) = 24$	
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			(2m-5)(m-2) = 0	[½ M]
$\therefore 2m = 5$			$\therefore 2m - 5 = 0 \text{ OR } m - 2 = 0$	
			$\therefore 2m = 5$	
$\therefore \mathbf{m} = \frac{5}{2} \text{ or } \mathbf{m} = 2 \qquad \dots [\frac{1}{2} \mathbf{M}]$			$\therefore m = \frac{5}{2} \text{ or } m = 2$	[½ M]
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	Re-substitute $\left(x + \frac{1}{x}\right) = m$	
	$x + \frac{1}{x} = \frac{5}{2} \text{ OR } x + \frac{1}{x} = 2$	[½ M]
	Considering $x + \frac{1}{x} = \frac{5}{2}$	
	Multiplying throughout by 2x	
	$2x^2 + 2 = 5x$	
	$\therefore 2x^2 - 5x + 2 = 0$	
	$\therefore 2x^2 - 4x - x + 2 = 0$	
	$\therefore 2x \times (x-2) - 1 \times (x-2) = 0$	
	$\therefore (x-2)(2x-1) = 0$	
	$\therefore x - 2 = 0 \text{ OR } 2x - 1 = 0$	[½ M]
	$\therefore x = 2$ OR $x = \frac{1}{2}$	
	Considering $x + \frac{1}{x} = 2$	
	Multiplying x on both sides	
	$x^2 + 1 = 2x$	
	$\therefore x^2 - 2x + 1 = 0$	
	$\therefore (\mathbf{x} - 1)^2 = 0$	[½ M]
	$\therefore x - 1 = 0$	
	$\therefore x = 1$	
	$\therefore \text{ Solution set} = \left\{1, 2\frac{1}{2}\right\}$	[½ M]
(2)	$t_{11} = 16$ and $t_{21} = 29$	
	Let the first term = a, common difference = d	
	$\mathbf{t}_{n} = \left[\mathbf{a} + (n-1)\mathbf{d}\right]$	[½ M]
	$\mathbf{t}_{11} = \left[\mathbf{a} + (11 - 1)\mathbf{d}\right]$	
	16 = [a + 10d]	[½ M]
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a + 10d = 16(1)	
$\mathbf{t}_{21} = \left[\mathbf{a} + (21 - 1)\mathbf{d}\right]$	
29 = [a + 20d]	
a + 20d = 29(2)	[½ M]
Substracting (1) from (2) 10d = 13	
$\therefore d = \frac{13}{10} = 1.3$	[½ M]
Substitute in equation (1)	
$a + 10 \times \frac{13}{10} = 16$	
a + 13 = 16	
a = 16 - 13 = 3 $\therefore a = 3$	[½ M]
	···[/2 1¥1]
$\therefore \mathbf{t}_{34} = \begin{bmatrix} 3 + (34 - 1) \times 1.3 \end{bmatrix}$	
$\therefore \mathbf{t}_{34} = \left[3 + (33) \times 1.3\right]$	
$\therefore t_{34} = [3 + 42.9]$	
$\therefore t_{34} = 45.9$	[½ M]
n such that $t_n = 55$	
$\mathbf{t}_{n} = \left[\mathbf{a} + (n-1)\mathbf{d}\right]$	
$\therefore 55 = \left[3 + (n-1) \times 1.3\right]$	
$\therefore 55 - 3 = \left[\left(n - 1 \right) \times 1.3 \right]$	
$\therefore 52 = \left[(n-1) \times 1.3 \right]$	
$\therefore \frac{52}{1.3} = (n-1)$	
$\therefore 40 = n - 1$	
\therefore n = 40 + 1	
$\therefore n = 41$ First term = a = 3	[½ M]
First term $-a - 3$ Common difference $= d = 1.3$	
$t_{34} = 45.9$	
n such that $t_n = 55 = 41$	[½ M]
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