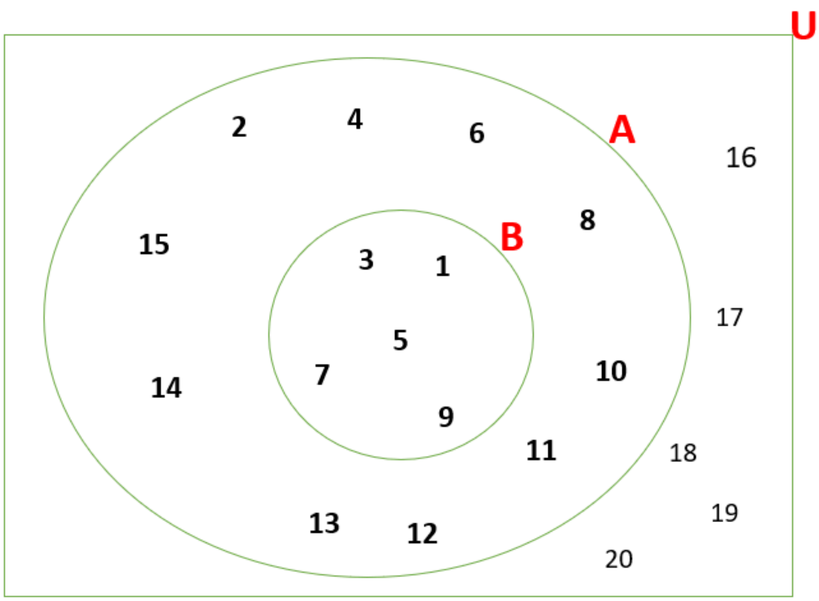
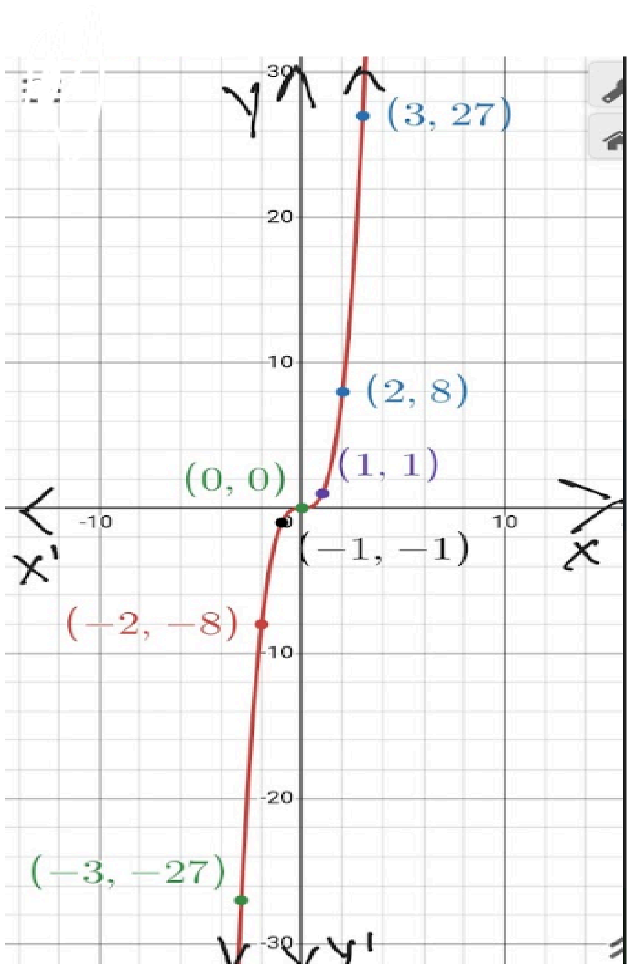
MARKING SCHEME
Class - XI
Mathematics

Q. No.	Key Points	Point Value	Total
1.	(A) 0	1	1
2.	(D)$\frac{1}{2}$	1	1
3.	(C) 48	1	1
4.	(A) 0	1	1
5.	(C) (0,0) ; $\sqrt{\frac{7}{3}}$	1	1
6.	(A) 2	1	1
7.	(A) 14	1	1
8.	(C) ± 1	1	1
9.	(D) 93.32	1	1
10.	(B) $\sqrt{3}$ units	1	1
11.	(C) 100^{o}	1	1
12.	(B) $(-\infty, 2)$	1	1
13.	(C) 4.5	1	1
14.	(C) {0,1,2,3,4}	1	1
15.	(A) $\frac{3}{2}$	1	1
16.	(D) $5(1 + i)$	1	1
17.	(C) 4^{n}	1	1
18.	(D) $E \cap F = \phi$	1	1
19.	(B) Both A and R are true but R is not the correct explanation of A.	1	1

20.	(D) A is false but R is true.	1	1
21.	$\lvert 2p + iq\rvert = \frac{\lvert a+ib\rvert}{\lvert a-ib\rvert}$ $4p^2 + q^2 = 1$	1 1	2
22.	 B is subset of A i.e B⊂A	1 1	2
23.	**Left hand limit** $= \lim_{x \to 0^-} \frac{\lvert x\rvert}{x}$ $let\ x = o - h$ $= \lim_{x \to 0^-} \frac{\lvert 0-h\rvert}{(0-h)}$ $= \lim_{x \to 0^-} \frac{h}{-h} =- 1$ **Right hand limit** $= \lim_{x \to 0^+} \frac{\lvert x\rvert}{x}$ $let\ x = o + h$ $= \lim_{x \to 0^-} \frac{\lvert 0+h\rvert}{(0+h)}$ $= \lim_{x \to 0^-} \frac{h}{h} = 1$ Since left hand limit of the function is not equal to right hand limit of the function.	1 + ½	2

	Therefore $\lim_{x \to 0} f(x)$ does not exist OR $for\ x > \frac{3}{2},\ f'(x) = 9\ and\ for\ x < \frac{3}{2},\ f'(x) = 6x$ $f'(2) - f'(1) = 9 - 6 = 3$	½ 1 1	
24.	In Roster form A = {(2 , 0) , (2 , 3), (3 , 2), (5 , 4),(7 , - 1)} Given relation is not a function as 2 has two images 0 and 3. OR $(\frac{f}{g})(x) = \frac{2x^2 + 3x - 5}{x-1}, x \neq 1$ Domain = R − { 1 } Now $\frac{2x^2 + 3x - 5}{x-1} = \frac{(2x+5)(x-1)}{x-1} = 2x + 5$ Range = R − { 7 }	1 1 ½ ½ ½ ½	2
25.	Coordinates of the point P are (6,7,0) Coordinates of the point Q are (6,7,-8) PQ = $\sqrt{0 + 0 + 8^2}$ = 8 units	½ ½ 1	2
26.	2 E's Total number of arrangements = $\frac{6!}{2!}$ = 360 Possible positions of 2 E's I, IV II, V III, VI Total number of cases = 3 The Remaining 4 letters can be arranged in 4! ways Arrangements in which there are exactly 2 letters between 2 E's = 3 x 4! = 72 OR TELANGANA - 3 A's , 2 N's Total permutations = $\frac{9!}{2!\,3!}$ = 30240 When 3 A's are together	 1 ½ ½ 1 1	3

	<table><tr><td>AAA</td><td>TELNGN</td></tr></table> Total 7 units Number of permutations in which 3 A's are together = $\frac{7!}{2!}$ = 2520 Number of permutations in which 3 A's do not come together = 30240 − 2520 = 27720	½ ½ ½ ½	
27.	<table><tr><td>**x**</td><td>**−3**</td><td>**−2**</td><td>**−1**</td><td>**0**</td><td>**1**</td><td>**2**</td><td>**3**</td></tr><tr><td>**y**</td><td>**−27**</td><td>**−8**</td><td>**−1**</td><td>**0**</td><td>**1**</td><td>**8**</td><td>**27**</td></tr></table> Range = **R**	1 1 1	3

<table>
<tr><td>28.</td><td>

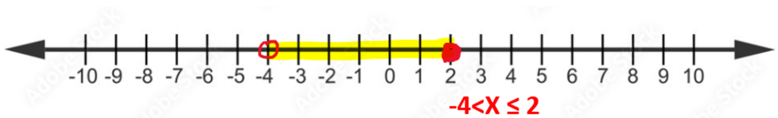
x	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$	2π
y	0	2	3.46	4	3.46	2	0	- 2	- 3.46	- 4	- 3.46	-2	0

Range = { y : $y \in R$ and $-4 \leq y \leq 4$ }</td><td>2

1</td><td>3</td></tr>
<tr><td>29.</td><td>Let x be the pH value for the third day.
$8.2 < \frac{8.1 + 8.6 + x}{3} < 8.5$
$24.6 < 16.7 + x < 25.5$
$7.9 < x < 8.8$
Range of pH value for the third reading is (7.9, 8.8)

OR

4x + 7 > x - 5
x > -4
12 – 7 x ≥ - 2
x ≤ 2
Solution is -4 < x ≤ 2


</td><td>½
1
1
½

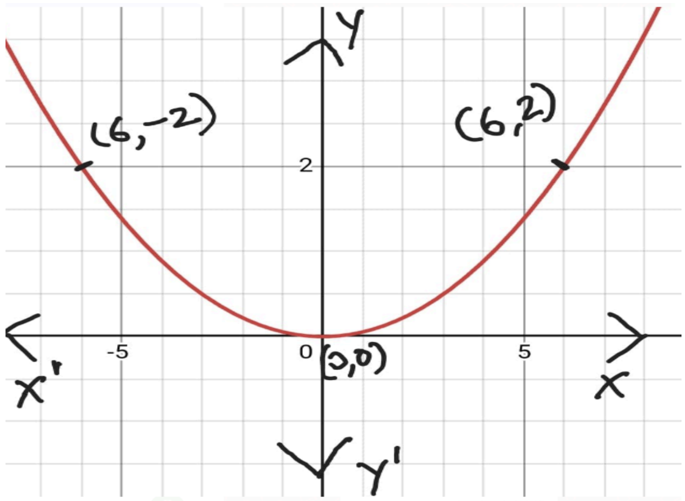
1
½
½

1</td><td>3</td></tr>
<tr><td>30.</td><td>$f^{/}(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$
$= \lim_{h \to 0} \frac{\frac{2(x+h)+3}{x+h-2} - \frac{2x+3}{x-2}}{h}$
$= \lim_{h \to 0} \frac{(2x^2 - 4x + 2hx - 4h + 3x - 6) - (2x^2 + 2hx - 4x + 3x + 3h - 6)}{h(x+h-2)(x-2)}$
$= \lim_{h \to 0} \frac{-7h}{h(x+h-2)(x-2)}$
$= \frac{-7}{(x-2)^2}$
$f^{/}(x) = \frac{-7}{(x-2)^2}$</td><td>½
½

1
½
½</td><td>3</td></tr>
</table>

31.

Since the parabola is vertical and has its vertex at origin therefore its equation must be of the form $x^2 = 4ay$ ½



Point (6,2) lies on parabola so

$36 = 4a(2)$ 1

$\Rightarrow a = \frac{36}{8}$

$\Rightarrow a = 4.5$ ½

Ans: Receiver should be placed 4.5 m from the vertex. ½

Equation of parabola $x^2 = 4ay$

$x^2 = 4(4.5)y$ ½

$x^2 = 18y$

OR 3

Arch is in the form of a semi-ellipse ,8m wide and 2m high .

Length of major axis = 2a

$\Rightarrow$ 8 = 2a

$\Rightarrow$ 4 = a

Here Length of Minor axis b = 2

Equation of semi-ellipse is 1

$\frac{x^2}{4^2} + \frac{y^2}{2^2} = 1 \Rightarrow \frac{x^2}{16} + \frac{y^2}{4} = 1$

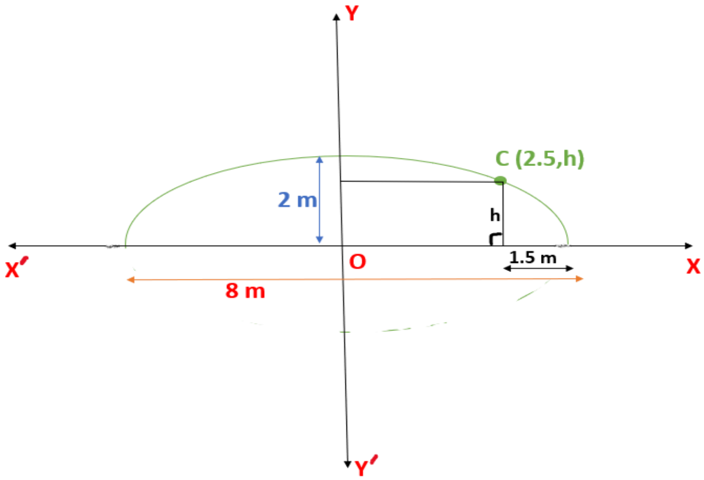
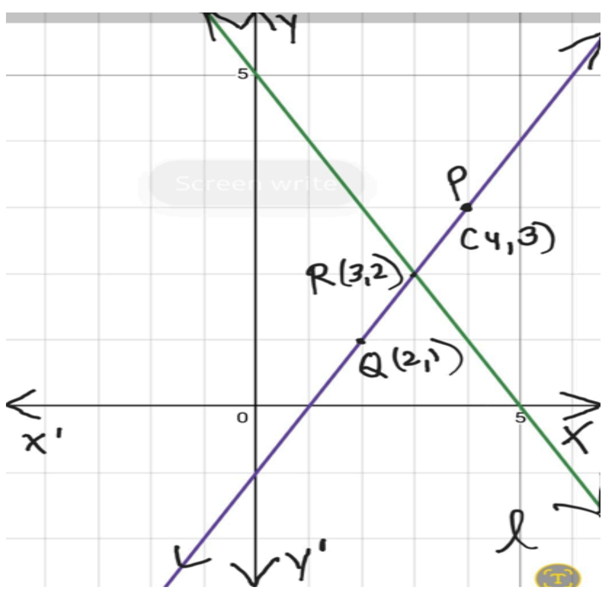
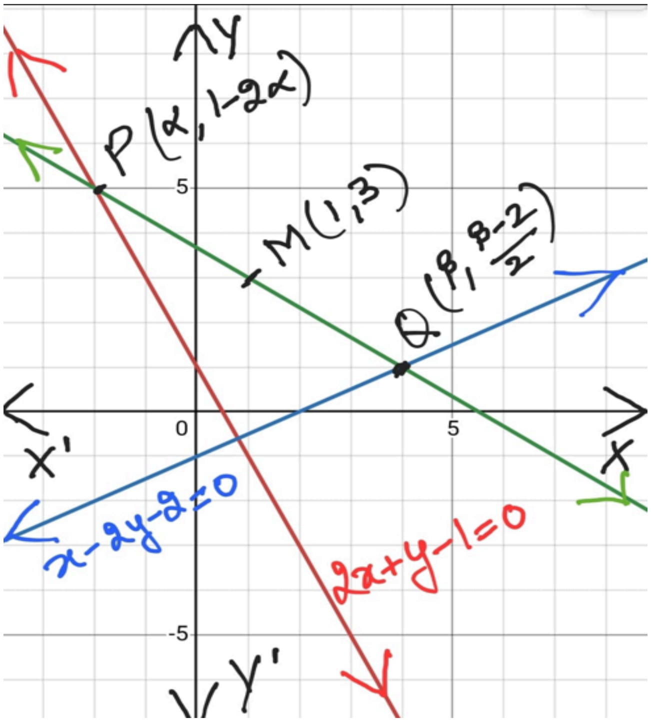
	 AB= 1.5 m ⇒ OA = 4-1.5=2.5m Let CA = h Therefore coordinates of C are (2.5,h) and it lies on the ellipse $\Rightarrow \frac{(2.5)^2}{16} + \frac{h^2}{4} = 1 \Rightarrow h^2 = \frac{9.75}{4} \Rightarrow h^2 = 2.44$ (approx.) $\Rightarrow h = \sqrt{2.44}$ or 1.56m (approx)	½ ½ ½ ½	
32.	 Let the points (4,3) and (2,1) be represented by P and Q respectively and the image of P is Q. Let the points (4,3) and (2,1) be represented by P and Q respectively and the		5

	image of P is Q. By using midpoint formula coordinates of point R which lies on line are (3,2). Slope of PQ = $\frac{1-3}{2-4} = \frac{-2}{-2} = 1$ Since PQ is perpendicular to line *l* therefore slope of line =-1 Equation of line *l* $y - y_1 = m(x - x_1)$ $y - 2 = -1(x - 3)$ $\Rightarrow x + y - 5 = 0$ Line $3x + 3y + k = 0$ can be written as $x + y + \frac{k}{3} = 0$ which is parallel to the line *l* Therefore, $\frac{\lvert c_1 - c_2 \rvert}{\sqrt{1+m^2}} = \frac{14}{\sqrt{2}}$ $\Rightarrow \frac{\lvert \frac{k}{3}+5 \rvert}{\sqrt{2}} = \frac{14}{\sqrt{2}}$ $\Rightarrow \frac{k}{3} + 5 = \pm 14$ $\Rightarrow \frac{k}{3} = 9 \; or \; \Rightarrow \frac{k}{3} = -19$ $\Rightarrow k = 27 \; or \; k = -57$ OR Given lines are 2x + y – 1 = 0 —-------(1) and x – 2y – 2 = 0 —---------(2)	½ ½ ½ 1 ½ 1 1	

	 	½ Fig	5
	Let the required line intersects the given lines (1) and (2) at the points P $(\alpha\,,\ 1\ -\ 2\alpha)$ and Q $(\beta,\ \frac{\beta-2}{2})$ respectively.(figure ↑)	1	
	We are given that the midpoint of the segment PQ is M(1,3) therefore,using midpoint formula $\frac{\alpha+\beta}{2}\ =\ 1\quad and\quad \frac{1-2\alpha+\frac{\beta-2}{2}}{2}\ =\ 3$	½	
	$\Rightarrow \alpha\ +\ \beta\ =\ 2\ and\ \ -\ 4\alpha\ +\ \beta\ =\ 12$	1	
	On solving above equations,we get $\alpha\ =\ \ -\ 2\ and\,\beta\ =\ 4$	1	
	Equation of required line passing through P(-2,5) and M(1,3) is $y\ -\ 5\ =\frac{3-5}{1+2}(x\ +\ 2)$ $y\ -\ 5\ =\frac{-2}{3}(x\ +\ 2)$ $3y\ -\ 15\ =-\ 2x\ -\ 4$ $2x\ +\ 3y\ =\ 11$	1	

33.

$C.I.$	fi	xi	yi	$fiyi$	$fiyi^2$
10-20	5	15	-2	-10	20
20-30	8	25	-1	-8	8
30-40	8	35→ a	0	0	0
40-50	15	45	1	15	15
50-60	14	55	2	28	56
	$\Sigma fi = 50$ Or N=50			$\Sigma fiyi = 25$	$\Sigma fiyi^2 = 99$

2 marks For table

Mean

$$\overline{x} = a + \frac{\Sigma fiyi}{\Sigma fi} \times h$$

$$\Rightarrow \overline{x} = 35 + \frac{25}{50} \times 10$$

$$\Rightarrow \overline{x} = 35 + 5 = 40$$

1 mark for mean

Variance

$$\sigma^2 = \frac{h^2}{N^2}(N\Sigma fiyi^2 - (\Sigma fiyi)^2)$$

$$\Rightarrow \sigma^2 = \frac{10^2}{50^2}(50 \times 99 - (25)^2)$$

$$\Rightarrow \sigma^2 = \frac{100}{2500}(4950 - 625)$$

$$\Rightarrow \sigma^2 = \frac{1}{25}(4325) = 173$$

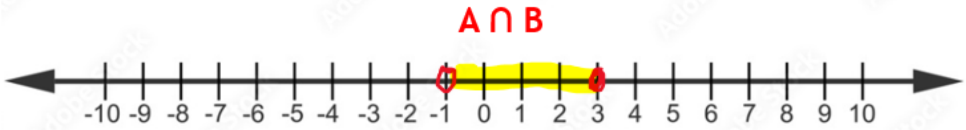
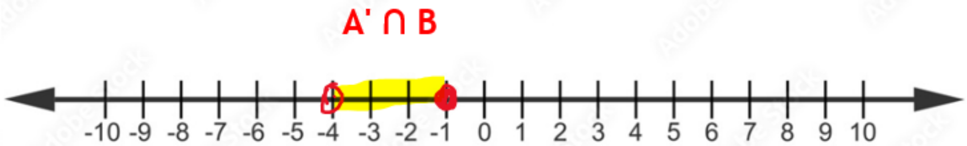
2 marks For Variance

OR

5

$$\overline{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

	$\Rightarrow \sum xi = n\bar{x} = 100 \times 4 = 4000$ $\sigma_x^2 = \frac{1}{n} \sum_{i=1}^{n} x_i^2 - \overline{(x)}^2$ $\Rightarrow \sum_{i=1}^{n} x_i^2 = n[\sigma^2 + \overline{(x)}^2]$ $= 100(26.01+1600)$ $= 162601$ Corrected $\sum x_i = 4000 - 50 + 40 = 3990$ Corrected $\sum x^2 = 162601 - (50)^2 + (40)^2 = 161701$ Corrected Mean $= \frac{3990}{100} = 39.9$ Corrected $\sigma_x^2 = \frac{161701}{100} - (39.9)^2 = 25$ Corrected Standard Deviation = 5	½ 1 ½ 1 ½ 1 ½	
34.	$(x + 3)^5 = x^5 + 15x^4 + 90x^3 + 270x^2 + 405x + 243$ $(2 - x)^6$ $= 64 - 192x + 240x^2 - 160x^3 + 60x^4 - 12x^5 + x^6$ Coefficient of x^5 $= 1(64) - 15(192) + 90(240) - 270(160) + 405(60) - 243(12)$ $= 64 + 21600 + 24300 - (2880 + 43200 + 2916)$ $= 45964 - 48996$ $= -3032$	1½ 1½ ½ 1 ½	5

35.	(i) A ∩ B = { x : $-1 < x \leq 3$,x ϵ R }  (ii) A' ∩ B = { x : $-4 < x \leq -1$,x ϵ R }  (iii) A − B ={ x : $3 < x \leq 5$,x ϵ R }  	½ 1 1 1 ½ 1	5
36.	(i) $\sin(90^o + 45^o) = \cos 45^o = \frac{1}{\sqrt{2}}$ (ii) 225^o, SW (iii)(a) $\theta = \frac{\pi}{6}$ $l = r\theta$ $\Rightarrow r = \frac{66}{\pi}$ $= 21$ cm OR (iii)(b) $l = r\,\theta$ $\Rightarrow 22 = 10\,\theta$ $\Rightarrow \theta = \frac{22}{10}\ radians$ $= \frac{22}{10} \times \frac{180}{\pi} = 126^o$	1 1 ½ ½ ½ ½ ½ ½ 1	4

37.	(i) 1,2,4,8,... Sequence is G.P. (ii) Number of nuclei in 10th generation = 2^9 $= 512$ (iii)(a) Total number of neutrons produced till 7th generation $= 1\frac{1(2^7-1)}{2-1}$ $= 127$ OR (iii)(b) $2^{m-1} - 2^{n-1} = 96$ 128 - 32 = 96 $\therefore$ m = 8 and n = 6	½ ½ ½ ½ 1 1 ½ ½ 1	4
38.	(i) $\frac{C(8,4)\,C(12,7)}{C(20,11)}$ $= \frac{\frac{8!}{4!\times 4!}\times\frac{12!}{7!\times 5!}}{\frac{20!}{11!\times 9!}}$ (ii) $\frac{C(5,4)\,C(15,7)+C(5,5)\,C(15,6)}{C(20,11)}$ $= \frac{\frac{5!}{4!}\times\frac{15!}{7!\times 8!}+\frac{15!}{6!\times 9!}}{\frac{20!}{11!\times 9!}}$	1 1 1 1	4