

CCE PF

ಕರ್ನಾಟಕ ಪ್ರೌಢ ಶಿಕ್ಷಣ ಪರೀಕ್ಷಾ ಮಂಡಳಿ, ಮಲ್ಲೇಶ್ವರಂ, ಬೆಂಗಳೂರು – 560 003

**KARNATAKA SECONDARY EDUCATION EXAMINATION BOARD, MALLESWARAM,
BANGALORE – 560 003**

ಎಸ್.ಎಸ್.ಎಲ್.ಸಿ. ಪರೀಕ್ಷೆ, ಮಾರ್ಚ್ / ಏಪ್ರಿಲ್ — 2015

S. S. L. C. EXAMINATION, MARCH/APRIL, 2015

ಮಾದರಿ ಉತ್ತರಗಳು
MODEL ANSWERS

ದಿನಾಂಕ : 06. 04. 2015]

ಸಂಕೇತ ಸಂಖ್ಯೆ : **81-E**

Date : 06. 04. 2015]

CODE No. : **81-E**

ವಿಷಯ : ಗಣಿತ

Subject : MATHEMATICS

(ಹೊಸ ಪಠ್ಯಕ್ರಮ / New Syllabus)

(ಖಾಸಗಿ ಅಭ್ಯರ್ಥಿ / Private Fresh)

(ಇಂಗ್ಲಿಷ್ ಭಾಷಾಂತರ / English Version)

[ಪರಮಾವಧಿ ಅಂಕಗಳು : 100

[Max. Marks : 100

Qn. Nos.	Ans. Key	Value Points	Marks allotted
I. 1.	A	$\frac{8}{3}$	1
2.	C	1	1
3.	D	$\frac{1}{6}$	1
4.	B	2250	1
5.	B	- 2	1
6.	D	3	1
7.	A	5 units	1
8.	C	7	1



PF-3022



[Turn over

Qn. Nos.	Value Points	Marks allotted	
II.			
9.	$210 = \boxed{2 \times 3 \times 5 \times 7}$ $\begin{array}{r l} 2 & 210 \\ \hline 3 & 105 \\ \hline 5 & 35 \\ \hline & 7 \end{array}$ $\frac{1}{2} + \frac{1}{2}$	1	
10.	$A \setminus B = \{2, 3, 4\}$	1	
11.	$C : V = \left(\frac{\sigma}{x} \right) \times 100$ $= \frac{4}{80} \times 100$ $\therefore CV = 5$	$\frac{1}{2}$ $\frac{1}{2}$	1
12.	$f(x) = x^2 - 4$ $f(4) = 4^2 - 4$ $= 16 - 4$ $\therefore f(4) = 12$	$\frac{1}{2}$ $\frac{1}{2}$	1
13.	$\frac{AX}{BX} = \frac{AY}{CY}$ $\frac{4}{BX} = \frac{1}{2}$ $\therefore BX = 8$	$\frac{1}{2}$ $\frac{1}{2}$	1
14.	$x = 90^\circ$		1
III. 15.	<p>If possible let us assume $3 + \sqrt{5}$ is a rational number.</p> $3 + \sqrt{5} = \frac{p}{q}$ where $p, q \in \mathbb{Z}, q \neq 0$ $3 - \frac{p}{q} = -\sqrt{5}$ $\frac{3q - p}{q} = -\sqrt{5}$ $\Rightarrow -\sqrt{5}$ is a rational number. $\therefore \frac{3q - p}{q}$ is a rational number. But, $-\sqrt{5}$ is not a rational number \therefore Our supposition $3 + \sqrt{5}$ is a rational number is wrong. $\Rightarrow 3 + \sqrt{5}$ is an irrational number.	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2



Qn. Nos.	Value Points	Marks allotted
16.	<p>Number of students who have passed in Physics, $n(P) = 55$.</p> <p>Number of students who have passed in Mathematics, $n(M) = 67$.</p> <p>Number of students who have passed in both subjects, $n(P \cap M) = ?$</p> <p>Number of students in the classroom, $n(P \cup M) = 100$</p> $n(P) + n(M) = n(P \cup M) + n(P \cap M)$ $55 + 67 = 100 + n(P \cap M)$ $n(P \cap M) = 122 - 100$ $n(P \cap M) = 22$ <p>Number of students who have passed in Physics only</p> $= n(P) - n(P \cap M)$ $= 55 - 22$ $= 33.$ <p style="text-align: center;">OR</p> $n(U) = 700$ $n(A) = 200$ $n(B) = 300$ $n(A \cap B) = 100$ $n(A) + n(B) = n(A \cup B) + n(A \cap B)$ $200 + 300 = n(A \cup B) + 100$ $500 - 100 = n(A \cup B)$ $n(A \cup B) = 400$ $n(A \cup B)^c = n(A^c \cap B^c)$ $= n[U \setminus (A \cup B)]$ $= n(U) - n(A \cup B)$ $= 700 - 400$ $n(A \cup B)^c = 300$ <p>OR $n(A^c \cap B^c) = 300$</p>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2 $\frac{1}{2}$
17.	<p>Given digits : 1, 2, 3, 7, 8, 9</p> <p>a) 4-digit number can be formed in 6P_4 ways</p> ${}^6P_4 = 6 \times 5 \times 4 \times 3$ ${}^6P_4 = 360.$	$\frac{1}{2}$ $\frac{1}{2}$



Qn. Nos.	Value Points	Marks allotted								
	<p>b) Even numbers :</p> <table border="1" data-bbox="395 360 794 488"> <tr> <td><i>T</i></td> <td><i>H</i></td> <td><i>Ten</i></td> <td><i>U</i></td> </tr> <tr> <td>3P_1</td> <td>4P_1</td> <td>5P_1</td> <td>2P_1</td> </tr> </table> <p>Units place can be filled in 2P_1 ways Tens place can be filled in 5P_1 ways Hundreds place can be filled in 4P_1 ways Thousands place can be filled in 3P_1 ways Total number of ways = ${}^2P_1 \times {}^5P_1 \times {}^4P_1 \times {}^3P_1$ $= 2 \times 5 \times 4 \times 3$ $= 120.$</p>	<i>T</i>	<i>H</i>	<i>Ten</i>	<i>U</i>	3P_1	4P_1	5P_1	2P_1	$\frac{1}{2}$ $\frac{1}{2}$ 2
<i>T</i>	<i>H</i>	<i>Ten</i>	<i>U</i>							
3P_1	4P_1	5P_1	2P_1							
18.	<p>$D = 35, n = ?$ $D = {}^nC_2 - n$ $35 = \frac{{}^nP_2}{2!} - n$ $35 = \frac{n(n-1)}{2} - n$ $35 = \frac{n^2 - n}{2} - n$ $35 = \frac{n^2 - 3n}{2}$ $n^2 - 3n - 70 = 0$ $n^2 - 10n + 7n - 70 = 0$ $n(n-10) + 7(n-10) = 0$ $n = 10$ OR $n = -7$ Neglecting $n = -7$ $n = 10$ \Rightarrow Number of sides = 10.</p>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2								
19.	<p>$S = \{ (1, 1), (1, 2), \dots \dots (1, 6)$ $(6, 1), (6, 2), \dots \dots (6, 6) \}$ $\therefore n(S) = 36.$</p>	$\frac{1}{2}$								



Qn. Nos.	Value Points	Marks allotted																		
	<p>a) Same number on both faces :</p> <p>Let A be the even.</p> $A = \{ (1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6) \}$ $n(A) = 6$ $P(A) = \frac{n(A)}{n(S)}$ $P(A) = \frac{6}{36}.$	$\frac{1}{2}$																		
20.	<p>b) Both faces having multiples of five :</p> <p>Let B be the event.</p> $B = \{ (5, 5) \}$ $\therefore n(B) = 1$ $P(B) = \frac{n(B)}{n(S)}$ $\therefore P(B) = \frac{1}{36}.$ <p>$X = 2, 4, 6, 8, 10$</p> <table border="1" data-bbox="395 1216 866 1529"> <thead> <tr> <th>X</th> <th>$D = X - \bar{x}$</th> <th>D^2</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>-4</td> <td>16</td> </tr> <tr> <td>4</td> <td>-2</td> <td>4</td> </tr> <tr> <td>6</td> <td>0</td> <td>0</td> </tr> <tr> <td>8</td> <td>2</td> <td>4</td> </tr> <tr> <td>10</td> <td>4</td> <td>16</td> </tr> </tbody> </table> $n = 5 \quad \sum D^2 = 40$ $\bar{x} = \frac{\sum X}{n} = \frac{30}{5} = 6 \quad \therefore \bar{x} = 6$ $\text{Variance} = \sigma^2 = \frac{\sum D^2}{n}$ $= \frac{40}{5}$ <p>Variance = $\sigma = 8$.</p>	X	$D = X - \bar{x}$	D^2	2	-4	16	4	-2	4	6	0	0	8	2	4	10	4	16	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2
X	$D = X - \bar{x}$	D^2																		
2	-4	16																		
4	-2	4																		
6	0	0																		
8	2	4																		
10	4	16																		



Qn. Nos.	Value Points	Marks allotted
21.	L.C.M. of orders = 6 $\sqrt{2} = 2^{\frac{1}{2}} = 2^{\frac{3}{6}} = \sqrt[6]{8}$ $\sqrt[3]{5} = 5^{\frac{1}{3}} = 5^{\frac{2}{6}} = \sqrt[6]{25}$ $\therefore \sqrt{2} \times \sqrt[3]{5} = \sqrt[6]{8} \times \sqrt[6]{25}$ $= \sqrt[6]{200}.$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2
22.	$\frac{\sqrt{6} + \sqrt{3}}{\sqrt{6} - \sqrt{3}} \times \frac{\sqrt{6} + \sqrt{3}}{\sqrt{6} + \sqrt{3}} \quad (\text{Multiplying by RF})$ $= \frac{(\sqrt{6} + \sqrt{3})^2}{6 - 3}$ $= \frac{6 + 3 + 2\sqrt{18}}{3}$ $= \frac{9 + 6\sqrt{2}}{3}$ $= \frac{3(3 + 2\sqrt{2})}{3}$ $= 3 + 2\sqrt{2}.$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2
23.	Let $P(x) = x^3 - 3x^2 + ax - 10$ By factor theorem, $(x - 5)$ is a factor of $P(x)$ iff $P(5) = 0$ $P(5) = (5)^3 - 3(5)^2 + a(5) - 10$ $0 = 125 - 75 + 5a - 10$ $0 = 5a + 40$ $5a = -40$ $a = -8.$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2

OR

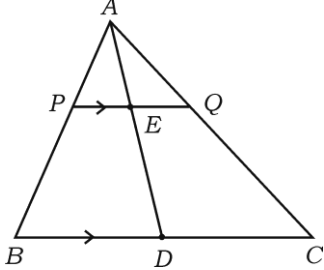
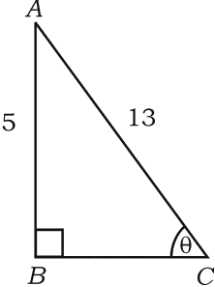


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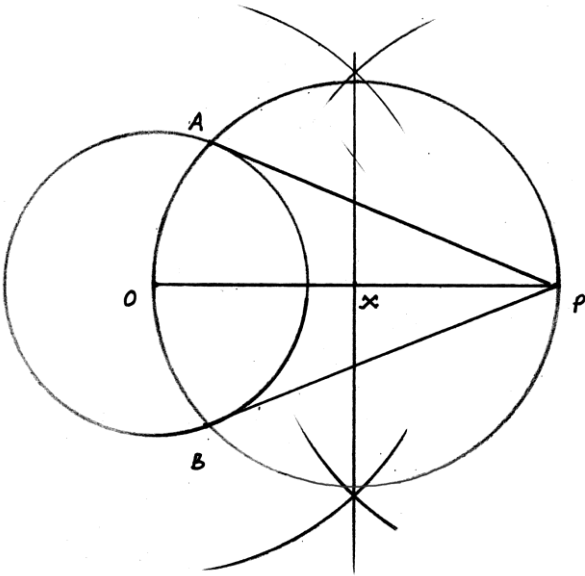


Qn. Nos.	Value Points	Marks allotted
24.	<p>By division algorithm for polynomials,</p> $P(x) = [g(x) \cdot q(x)] + r(x)$ $P(x) - r(x) = g(x) \cdot q(x)$ $P(x) + \{-r(x)\} = g(x) \cdot q(x)$ $x^2 + 2x - 3 \overline{) x^4 + 2x^3 - 2x^2 + x - 1}$ $\underline{x^4 + 2x^3 - 3x^2}$ $\quad \quad \quad - \quad \quad \quad +$ $\quad \quad \quad \underline{x^2 + x - 1}$ $\quad \quad \quad \quad \quad \quad \underline{x^2 + 2x - 3}$ $\quad \quad \quad \quad \quad \quad \quad \quad \quad - \quad - \quad +$ $\quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad - \quad x + 2$ <p>$\therefore r(x) = -x + 2 \Rightarrow \{-r(x)\} = x - 2$</p> <p>Hence, we should add $(x - 2)$ to $P(x)$ so that the resulting polynomial is exactly divisible by $g(x)$.</p> $x^2 - 4x + 2 = 0$ $a = 1$ $b = -4$ $c = 2$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(-4) \pm \sqrt{16 - 4(1)(2)}}{2(1)}$ $= \frac{4 \pm \sqrt{16 - 8}}{2}$ $= \frac{4 \pm \sqrt{8}}{2}$ $= \frac{4 \pm 2\sqrt{2}}{2}$ $= \frac{2(2 \pm \sqrt{2})}{2}$ $x = 2 \pm \sqrt{2}.$ <p>\therefore Roots are $2 + \sqrt{2}$ OR $2 - \sqrt{2}$.</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$ 2</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$ 2</p>

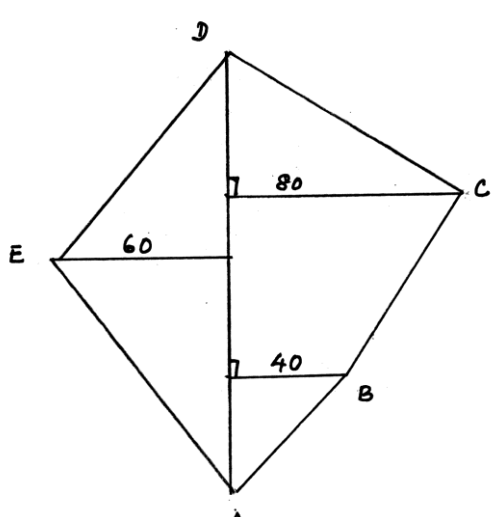


Qn. Nos.	Value Points	Marks allotted
25.	<div style="text-align: center;">  </div> <p>To prove : $PE = EQ$</p> <p>Proof : In $\triangle ABD$, $PE \parallel BD$ $\therefore PQ \parallel BC$</p> <p>$\therefore \frac{AP}{AB} = \frac{AQ}{AC} = \frac{PE}{BD}$ (i) (\therefore Thale's theorem)</p> <p>Similarly In $\triangle ADC$, $\frac{AE}{AD} = \frac{AQ}{AC} = \frac{EQ}{DC}$ (ii)</p> <p>From (i) and (ii) $\frac{PE}{BD} = \frac{EQ}{DC}$</p> <p>But, $BD = DC$ ($\therefore AD$ is the median)</p> <p>$\therefore PE = EQ$.</p>	<div style="text-align: right; border-left: 1px solid black; padding-left: 5px;"> $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2 </div>
26.	<div style="text-align: center;">  </div> <p>In $\triangle ABC$, $\angle B = 90^\circ$</p> <p>$\therefore AC^2 = AB^2 + BC^2$ $13^2 = 5^2 + BC^2$ (Pythagoras' theorem)</p> <p>$BC^2 = 169 - 25 = 144$ $BC = 12$</p> <p>$\cos \theta = \frac{\text{Adjacent side}}{\text{Hypotenuse}} = \frac{BC}{AC}$</p> <p>$\therefore \cos \theta = \frac{12}{13}$</p> <p>$\tan \theta = \frac{\text{Opposite side}}{\text{Adjacent side}} = \frac{AB}{BC}$</p> <p>$\therefore \tan \theta = \frac{5}{12}$.</p>	<div style="text-align: right; border-left: 1px solid black; padding-left: 5px;"> $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2 </div>



Qn. Nos.	Value Points	Marks allotted
27.	<p>Let</p> $A = (x_1, y_1) = (3, 10)$ $B = (x_2, y_2) = (5, 2)$ $C = (x_3, y_3) = (14, 12)$ $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(5 - 3)^2 + (2 - 10)^2}$ $AB = \sqrt{4 + 64} = \sqrt{68} \text{ units.}$ <p>Similarly</p> $BC = \sqrt{(14 - 5)^2 + (12 - 2)^2} = \sqrt{81 + 100} = \sqrt{181} \text{ units}$ $AC = \sqrt{(14 - 3)^2 + (12 - 10)^2} = \sqrt{121 + 4} = \sqrt{125} \text{ units}$ <p>Perimeter = $AB + BC + AC$</p> $P = \left(\sqrt{68} + \sqrt{181} + \sqrt{125} \right) \text{ units.}$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2
28.	<p>$r = 3 \text{ cm}, \quad d = 8 \text{ cm.}$</p>  <p>PA and PB are tangents.</p> <p>Drawing circle of radius 3 cm</p> <p>Bisecting OP</p> <p>Drawing tangents PA, PB.</p>	$\frac{1}{2}$ $\frac{1}{2}$ 1 2

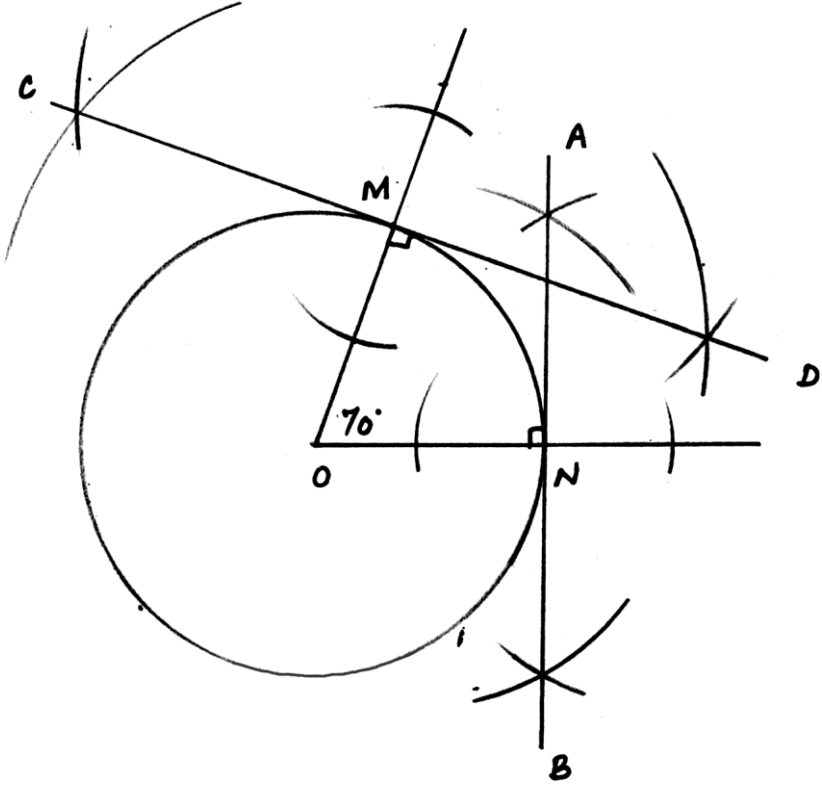


Qn. Nos.	Value Points	Marks allotted
29.	<p>Scale : 20 m = 1 cm 40 m = 2 cm 60 m = 3 cm 80 m = 4 cm 100 m = 5 cm 150 m = 7.5 cm</p> <p style="text-align: right;">Calculation Field drawing</p> 	$\frac{1}{2}$ $1\frac{1}{2}$ 2
30.	<p>$F = 6$ $V = 8$ $E = 12$</p> <p style="padding-left: 40px;">$F + V = E + 2$ $6 + 8 = 12 + 2$ $14 = 14.$</p>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2
31.	<p>$U = \{1, 2, 3, 4, 5, 6, 7, 8\}$ $A = \{1, 2, 3\}$ $B = \{2, 3, 4, 5\}$</p> <p>To prove : $(A \cup B)^c = A^c \cap B^c$</p> <p>Proof: $A^c = \{4, 5, 6, 7, 8\}$ $B^c = \{1, 6, 7, 8\}$</p> <p>$(A \cup B) = \{1, 2, 3, 4, 5\} \therefore (A \cup B)^c = \{6, 7, 8\}$ (i) $A^c \cap B^c = \{4, 5, 6, 7, 8\} \cap \{1, 6, 7, 8\}$ $A^c \cap B^c = \{6, 7, 8\}$ (ii)</p> <p>From (i) and (ii) $(A \cup B)^c = A^c \cap B^c$</p>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2

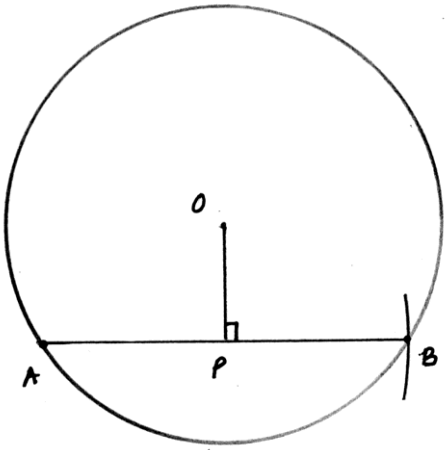
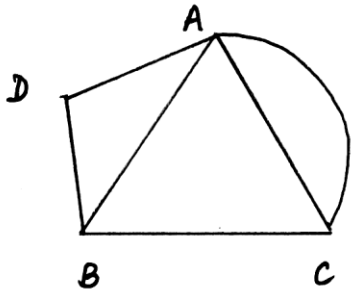


Qn. Nos.	Value Points	Marks allotted
32.	$100, 96, 92, \dots, 12$ $a = 100, d = 96 - 100 = -4, T_n = 12, n = ?$ $T_n = a + (n - 1)d$ $12 = 100 + (n - 1)(-4)$ $12 = 100 - 4n + 4$ $12 = 104 - 4n$ $4n = 104 - 12$ $4n = 92$ $\therefore n = \frac{92}{4}$ $n = 23.$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2
33.	${}^n P_r = 840, {}^n C_r = 55$ ${}^n C_r = \frac{{}^n P_r}{r!}$ $35 = \frac{840}{r!}$ $35.r! = 840$ $r! = 24$ $r = 4$ ${}^n P_r = 840$ ${}^n P_4 = 840$ ${}^n P_4 = 7 \times 6 \times 5 \times 4$ $\therefore n = 7.$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2
34.	$\sqrt{75} + \sqrt{108} - \sqrt{192}$ $= 5\sqrt{3} + \sqrt{36 \times 3} - \sqrt{64 \times 3}$ $= 5\sqrt{3} + 6\sqrt{3} - 8\sqrt{3}$ $= 11\sqrt{3} - 8\sqrt{3}$ $= 3\sqrt{3}.$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2



Qn. Nos.	Value Points	Marks allotted									
	$\therefore \frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle BDE} = \frac{BC^2}{BD^2}$ $= \frac{(2BD)^2}{BD^2} \quad (\because BD = DC)$ $= \frac{4BD^2}{BD^2}$ $\therefore \frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle BDE} = \frac{4}{1}$	<table border="1"> <tr> <td style="width: 50px; text-align: center;">1/2</td> <td style="width: 50px;"></td> </tr> <tr> <td style="text-align: center;">1</td> <td></td> </tr> <tr> <td style="text-align: center;">1/2</td> <td style="text-align: center;">2</td> </tr> </table>	1/2		1		1/2	2			
1/2											
1											
1/2	2										
<p>38.</p>	<p>$r = 3 \text{ cm}$</p> <p>Angle between the radii = 70°.</p>  <p>AB and CD are tangents.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 50px;">Drawing circle of radius 3 cm</td> <td style="width: 50px; text-align: center;">1/2</td> <td style="width: 50px;"></td> </tr> <tr> <td>Constructing angle 70°</td> <td style="text-align: center;">1/2</td> <td></td> </tr> <tr> <td>Drawing AB and CD.</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> </tr> </table>	Drawing circle of radius 3 cm	1/2		Constructing angle 70°	1/2		Drawing AB and CD .	1	2	
Drawing circle of radius 3 cm	1/2										
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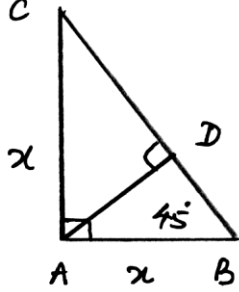


Qn. Nos.	Value Points	Marks allotted															
39.	<p>$r = 3.5 \text{ cm}$</p> <p>$2l = 6 \text{ cm.}$</p>  <p>Perpendicular distance = 1.8 cm.</p> <p>Drawing circle of radius 3.5 cm</p> <p>Drawing chord AB</p> <p>Measuring \perp^r distance and writing the same</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2}$ 2</p>															
40.	 <table border="1" data-bbox="319 1590 1061 1870"> <thead> <tr> <th>Name of the node</th> <th>Order</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>4</td> <td>Even</td> </tr> <tr> <td>B</td> <td>3</td> <td>Odd</td> </tr> <tr> <td>C</td> <td>3</td> <td>Odd</td> </tr> <tr> <td>D</td> <td>2</td> <td>Even</td> </tr> </tbody> </table> <p>For each row $\frac{1}{2} \times 4$</p>	Name of the node	Order	Type	A	4	Even	B	3	Odd	C	3	Odd	D	2	Even	<p>2</p>
Name of the node	Order	Type															
A	4	Even															
B	3	Odd															
C	3	Odd															
D	2	Even															



Qn. Nos.	Value Points	Marks allotted
IV. 41.	$T_3 = \frac{1}{7}, T_7 = \frac{1}{5}$ $\therefore T_3 \text{ and } T_7 \text{ of A.P. are } 7, 5$ $d = \frac{T_p - T_q}{p - q}$ $= \frac{T_7 - T_3}{7 - 3} = \frac{5 - 7}{4} = \frac{-2}{4} = -\frac{1}{2}$ $\therefore d = -\frac{1}{2}$ $T_3 = 7$ $a + 2d = 7$ $a + 2\left(-\frac{1}{2}\right) = 7 \qquad a - 1 = 7 \qquad \therefore a = 8$ $T_n = a + (n - 1)d$ $T_{15} = 8 + \left(14 \times -\frac{1}{2}\right)$ $= 8 - 7$ $T_{15} = 1$ $\therefore 15\text{th term of HP} = 1$ <p>Note : For alternate method full marks may be given.</p>	<p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>3</p>
42.	<p>Let the number of books be x</p> <p>Total cost = Rs. 60</p> $\therefore \text{Cost of each book} = \text{Rs. } \frac{60}{x}$ <p>If the number of books = $(x + 5)$</p> <p>Then cost of each book = Rs. $\frac{60}{(x + 5)}$</p> <p>But, $\frac{60}{x} - \frac{60}{(x + 5)} = 1$</p> $\frac{60(x + 5) - 60x}{x(x + 5)} = 1$ $\frac{60x + 300 - 60x}{x^2 + 5x} = 1$ $x^2 + 5x = 300$	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>

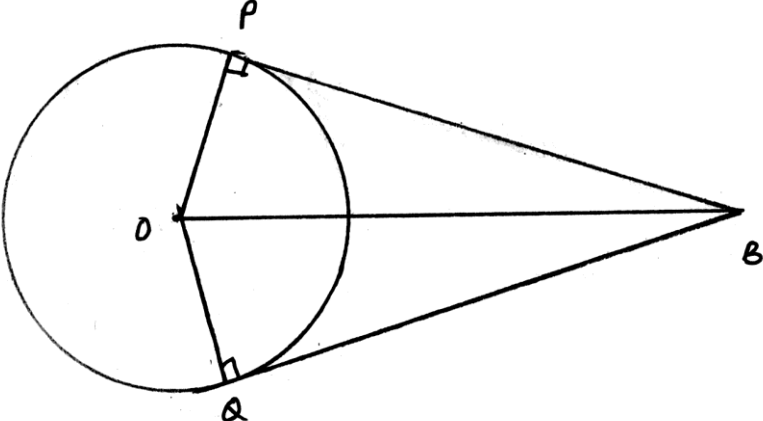


Qn. Nos.	Value Points	Marks allotted
	$x^2 + 5x - 300 = 0$ $x^2 + 20x - 15x - 300 = 0$ $x(x + 20) - 15(x + 20) = 0$ $x = -20 \quad \text{OR} \quad 15$ <p>Neglecting $x = -20 \quad \therefore x = 15$</p> $\Rightarrow \text{No. of books purchased by Aniruddha} = 15$ <p style="text-align: center;">OR</p> <p>Let the number of years be x</p> $\therefore \text{Kavya's and Karthik's ages are } (11 + x) \text{ and } (14 + x)$ <p>Product of their ages = 304</p> $(11 + x)(14 + x) = 304$ $154 + 11x + 14x + x^2 - 304 = 0$ $x^2 + 25x - 150 = 0$ $x^2 + 30x - 5x - 150 = 0$ $x(x + 30) - 5(x + 30) = 0$ $x = 5 \quad \text{OR} \quad -30$ <p>Neglecting $x = -30$</p> $x = 5.$ <p><i>i.e.</i> After 5 years, product of their ages will be 304.</p>	$\frac{1}{2}$ $\frac{1}{2}$ 3 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2}$ 3
43.	<div style="text-align: center;">  </div> <p>In ΔABC,</p> $\hat{A} = 90^\circ, \quad AB = x, \quad \hat{B} = 45^\circ \quad \Rightarrow \quad \hat{C} = 45^\circ$ $\Rightarrow AB = AC = x$ $BD = CD = \frac{BC}{2}$ $BC^2 = AC^2 + AB^2 \quad \dots \text{Pythagoras' theorem}$	$\frac{1}{2}$ $\frac{1}{2}$



Qn. Nos.	Value Points	Marks allotted
44.	<p>Adding (ii) and (iii)</p> $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{AB \cdot BD} + \frac{1}{AB \cdot AD}$ $= \frac{1}{AB} \left(\frac{1}{BD} + \frac{1}{AD} \right)$ $= \frac{1}{AB} \left(\frac{AD + BD}{BD \cdot AD} \right) = \frac{1}{AB} \cdot \frac{AB}{p^2} \quad [\text{from (i)}]$ <p>$\therefore \frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{p^2}$</p> <p>To prove : $\frac{\sec \theta - \tan \theta}{\sec \theta + \tan \theta} = 1 - 2 \sec \theta \cdot \tan \theta + 2 \tan^2 \theta$</p> <p>Proof: LHS = $\frac{\sec \theta - \tan \theta}{\sec \theta + \tan \theta}$</p> $= \frac{\sec \theta - \tan \theta}{\sec \theta + \tan \theta} \times \frac{\sec \theta - \tan \theta}{\sec \theta - \tan \theta}$ $= \frac{(\sec \theta - \tan \theta)^2}{\sec^2 \theta - \tan^2 \theta}$ $= \frac{\sec^2 \theta + \tan^2 \theta - 2 \sec \theta \cdot \tan \theta}{1} \quad (\because \sec^2 \theta - \tan^2 \theta = 1)$ $= \sec^2 \theta + \tan^2 \theta - 2 \sec \theta \cdot \tan \theta$ $= 1 + \tan^2 \theta + \tan^2 \theta - 2 \sec \theta \cdot \tan \theta$ $\quad (\because \sec^2 \theta = 1 + \tan^2 \theta)$ $= 1 - 2 \sec \theta \cdot \tan \theta + 2 \tan^2 \theta$ $= \text{RHS.}$ <p style="text-align: center;">OR</p> $\text{LHS} = \sqrt{\frac{1 + \cos \theta}{1 - \cos \theta}}$ <p>Multiplying by RF</p> $= \sqrt{\frac{1 + \cos \theta}{1 - \cos \theta} \times \frac{1 + \cos \theta}{1 + \cos \theta}}$	<p style="text-align: center;">1 3</p> <p style="text-align: center;">1/2 </p> <p style="text-align: center;">1/2 </p> <p style="text-align: center;">1/2 </p> <p style="text-align: center;">1/2 </p> <p style="text-align: center;">1 3</p> <p style="text-align: center;">1/2 </p>



Qn. Nos.	Value Points	Marks allotted
45.	$= \sqrt{\frac{(1 + \cos \theta)^2}{1 - \cos^2 \theta}}$ $= \sqrt{\frac{(1 + \cos \theta)^2}{\sin^2 \theta}}$ $= \frac{1 + \cos \theta}{\sin \theta}$ $= \frac{1}{\sin \theta} + \frac{\cos \theta}{\sin \theta}$ $= \operatorname{cosec} \theta + \cot \theta$ $= \text{RHS}$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 3
	<div style="text-align: center;">  </div> <p><i>Data :</i> O is the centre of the circle B is the external point BP and BQ are the tangents.</p> <p><i>To prove :</i> BP = BQ</p> <p><i>Proof :</i> In $\triangle BOP$, $\hat{BPO} = 90^\circ$ Similarly in $\triangle BOQ$, $\hat{BQO} = 90^\circ$ (\because radius, tangents at the point of contact are perpendicular)</p> <p>In 2 right angled triangles BOP and BOQ Hypotenuse BO = Hypotenuse BO Common side OP = OQ ... radii $\therefore \triangle BOP \cong \triangle BOQ$ $\therefore BP = BQ.$</p>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 3

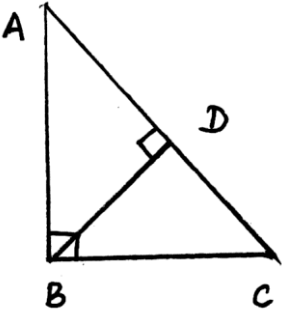


Qn. Nos.	Value Points	Marks allotted
46.	<p>CSA of cylinder = $\frac{1}{3}$ TSA of cylinder</p> $2\pi rh = \frac{1}{3} \cdot 2\pi r (r + h)$ $= \frac{1}{3} \times 462$ $2\pi rh = 154$ <p>TSA of cylinder = $2\pi r (r + h)$</p> $462 = 2\pi r^2 + 2\pi rh$ $462 = 2\pi r^2 + 154$ $462 - 154 = 2\pi r^2$ $2\pi r^2 = 308$ $r^2 = \frac{308}{2 \times \frac{22}{7}}$ $= \frac{308 \times 7}{44}$ $r^2 = 49$ $r = 7 \text{ cm.}$ <p style="text-align: center;">OR</p> <p>$r_1 = 12 \text{ cm, } h_1 = 20 \text{ cm, } r_2 = 3 \text{ cm, } h_2 = ?$</p> <p>We know,</p> $\frac{r_1}{r_2} = \frac{h_1}{h_2}$ $\frac{12}{3} = \frac{20}{h_2}$ $12h_2 = 60 \quad \therefore h_2 = 5 \text{ cm}$ <p>Volume of frustum = $\frac{1}{3} \pi h (r_1^2 + r_2^2 + r_1 r_2)$</p> $= \frac{1}{3} \times \frac{22}{7} \times 15 (12^2 + 3^2 + 12 \times 3)$ $= \frac{110}{7} (144 + 9 + 36)$ $= \frac{110}{7} \times 189$ <p>Volume of frustum = 2970 cubic cm.</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>3</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>3</p>

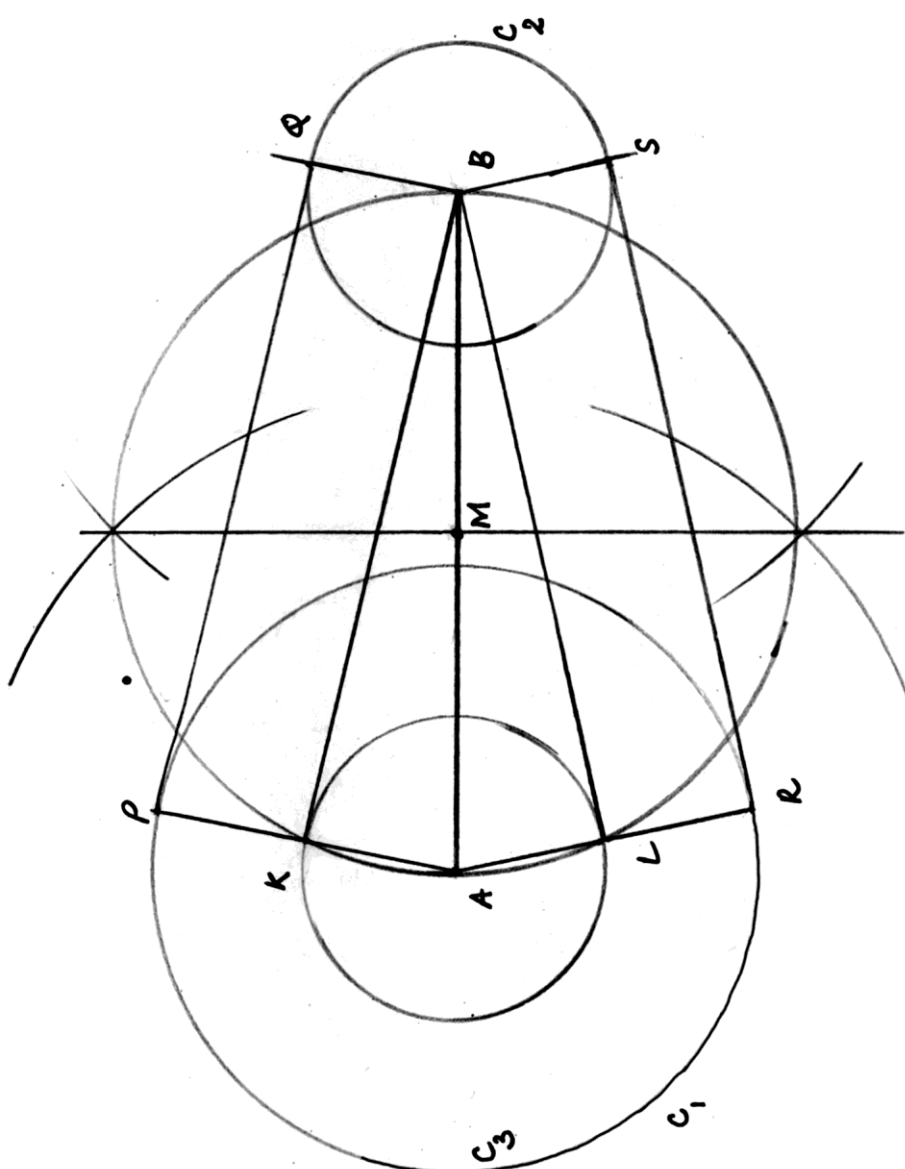


Qn. Nos.	Value Points	Marks allotted
V. 47.	<p>Let the three consecutive terms of the A.P. be $(a - d), a, (a + d)$</p> <p>Sum = 6</p> $a - d + a + a + d = 6$ $3a = 6$ $\therefore a = 2$ <p>Product = - 120</p> $(a - d) \cdot a (a + d) = - 120$ $(a^2 - d^2) a = - 120$ $(2^2 - d^2) 2 = - 120$ $4 - d^2 = - 60$ $- d^2 = - 64$ $d^2 = 64 \qquad \qquad \qquad \therefore d = \pm 8$ <p>If $a = 2, d = 8$ then the three numbers are - 6, 2, 10</p> <p>If $a = 2, d = - 8$, then the three numbers are 10, 2, - 6</p> <p style="text-align: center;">OR</p> <p>Let the three consecutive terms be $\frac{a}{r}, a, ar$</p> <p>Product = 216</p> $\frac{a}{r} \cdot a \cdot ar = 216$ $a^3 = 216 \qquad \qquad \qquad \therefore a = 6$ <p>Sum of their products in pairs = 156</p> $\left(\frac{a}{r} \cdot a \right) + (a \cdot ar) + \left(\frac{a}{r} \cdot ar \right) = 156$ $\frac{a^2}{r} + a^2 r + a^2 = 156$ $\frac{36}{r} + 36r + 36 = 156$ $\frac{36}{r} + 36r = 120$ $\frac{36 + 36r^2}{r} = 120$ $36r^2 - 120r + 36 = 0$ $3r^2 - 10r + 3 = 0$ $r = 3 \qquad \text{or} \qquad \frac{1}{3}$	<p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>4</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p>

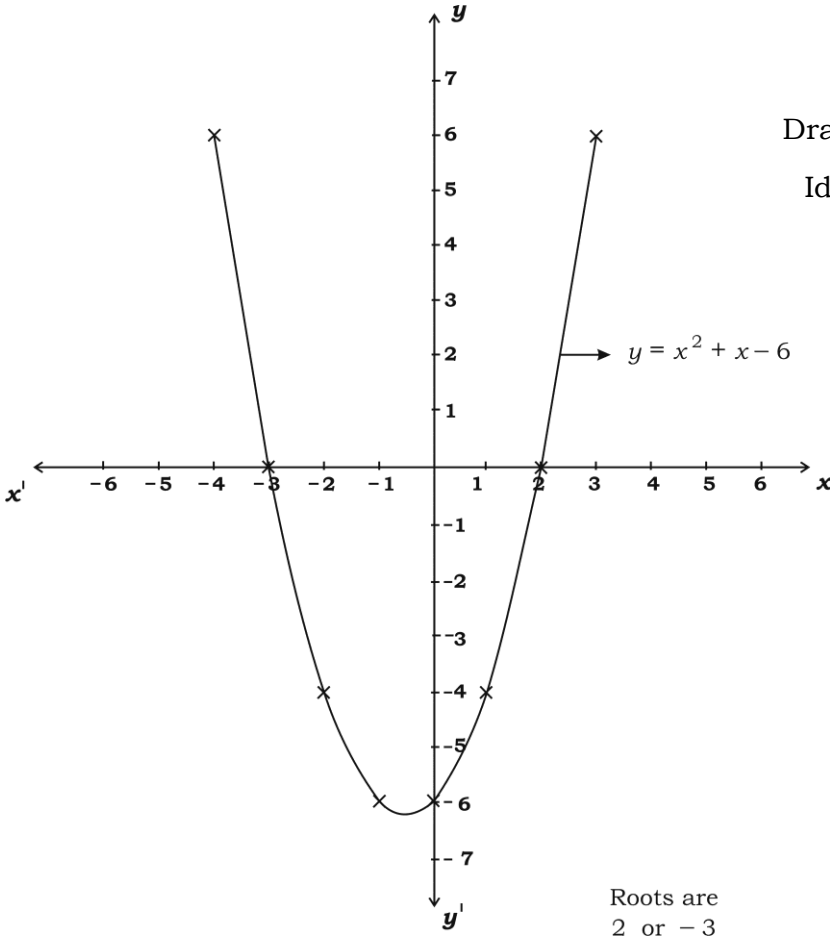


Qn. Nos.	Value Points	Marks allotted	
48.	a) If $a = 6$, $r = 3$, the 3 consecutive numbers are 2, 6, 18 b) If $a = 6$, $r = \frac{1}{3}$, the 3 consecutive numbers are 18, 6, 2	$\frac{1}{2}$	4
	<div style="text-align: center;">  </div> <p><i>Data :</i> In $\triangle ABC$, $\hat{B} = 90^\circ$</p> <p><i>To prove :</i> $AC^2 = AB^2 + BC^2$</p> <p><i>Constr. :</i> Draw $BD \perp AC$</p> <p><i>Proof :</i> In 2 triangles ABC, ADB</p> <p style="padding-left: 40px;">$\hat{A}BC = 90^\circ$, $\hat{A}DB = 90^\circ$</p> <p style="padding-left: 40px;">\hat{BAD} ... common angle</p> <p>$\therefore \triangle ABC \sim \triangle ADB$</p> <p>$\Rightarrow \frac{AB}{AD} = \frac{AC}{AB}$</p> <p>$AB^2 = AC \cdot AD$ (i)</p> <p>In 2 triangles ABC and BDC</p> <p style="padding-left: 40px;">$\hat{A}BC = \hat{B}DC = 90^\circ$</p> <p style="padding-left: 40px;">\hat{ACB} is common</p> <p>$\therefore \triangle ABC \sim \triangle BDC$</p> <p>$\Rightarrow \frac{BC}{DC} = \frac{AC}{BC} \quad \therefore BC^2 = AC \cdot DC$ (ii)</p> <p>Adding (i) and (ii)</p> <p style="padding-left: 40px;">$AB^2 + BC^2 = (AC \cdot AD) + (AC \cdot DC)$</p> <p style="padding-left: 80px;">$= AC (AD + DC)$</p> <p>$AB^2 + BC^2 = AC^2 \quad \text{OR} \quad AC^2 = AB^2 + BC^2$</p>	$\frac{1}{2}$	
		$\frac{1}{2}$	$\frac{1}{2}$
		$\frac{1}{2}$	$\frac{1}{2}$
		$\frac{1}{2}$	$\frac{1}{2}$
		1	4



Qn. Nos.	Value Points	Marks allotted
49.	<p>$d = 9 \text{ cm}, R = 4 \text{ cm}, r = 2 \text{ cm}, R - r = 2 \text{ cm}.$</p> <p>Drawing AB and marking mid-point M</p> <p>Drawing circles C_1, C_2 and C_3</p> <p>Joining BK, BL, PQ, RS</p> <p>Measuring and writing the length</p>  <p>Required tangents $PQ = RS = 8.7 \text{ cm}.$</p>	<p>1</p> <p>1½</p> <p>1</p> <p>½</p> <p style="text-align: right;">4</p>



Qn. Nos.	Value Points	Marks allotted																										
50.	$x^2 + x - 6 = 0$ Let $y = x^2 + x - 6$ <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;">x</td> <td style="padding: 5px;">0</td> <td style="padding: 5px;">1</td> <td style="padding: 5px;">-1</td> <td style="padding: 5px;">2</td> <td style="padding: 5px;">-2</td> <td style="padding: 5px;">3</td> <td style="padding: 5px;">-3</td> <td style="padding: 5px;">-4</td> </tr> <tr> <td style="padding: 5px;">y</td> <td style="padding: 5px;">-6</td> <td style="padding: 5px;">-4</td> <td style="padding: 5px;">-6</td> <td style="padding: 5px;">0</td> <td style="padding: 5px;">-4</td> <td style="padding: 5px;">6</td> <td style="padding: 5px;">0</td> <td style="padding: 5px;">6</td> </tr> </table>  <p style="text-align: right;"> Table 2 Drawing parabola 1 Identifying roots 1 </p> <p><i>Alternate Method :</i></p> <table style="width: 100%; border: none;"> <tr> <td style="padding-left: 40px;">Table</td> <td style="text-align: right; padding-right: 20px;">1 + 1</td> </tr> <tr> <td style="padding-left: 40px;">Parabola</td> <td style="text-align: right; padding-right: 20px;">1/2</td> </tr> <tr> <td style="padding-left: 40px;">Straight line</td> <td style="text-align: right; padding-right: 20px;">1/2</td> </tr> <tr> <td style="padding-left: 40px;">Drawing perpendiculars and identifying roots</td> <td style="text-align: right; padding-right: 20px;">1/2 + 1/2</td> </tr> </table> <p style="text-align: right;">4</p>	x	0	1	-1	2	-2	3	-3	-4	y	-6	-4	-6	0	-4	6	0	6	Table	1 + 1	Parabola	1/2	Straight line	1/2	Drawing perpendiculars and identifying roots	1/2 + 1/2	
x	0	1	-1	2	-2	3	-3	-4																				
y	-6	-4	-6	0	-4	6	0	6																				
Table	1 + 1																											
Parabola	1/2																											
Straight line	1/2																											
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