

**CCE RF**  
**CCE RR**

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 — 2016

**S. S. L. C. EXAMINATION, MARCH/APRIL, 2016**

ಮಾದರಿ ಉತ್ತರಗಳು  
**MODEL ANSWERS**

ದಿನಾಂಕ : 04. 04. 2016 ]

ಸಂಕೇತ ಸಂಖ್ಯೆ : **81-E**

Date : 04. 04. 2016 ]

CODE NO. : **81-E**

ವಿಷಯ : ಗಣಿತ

**Subject : MATHEMATICS**

( ಹೊಸ ಪಠ್ಯಕ್ರಮ / New Syllabus )

( ಶಾಲಾ ಅಭ್ಯರ್ಥಿ + ಪುನರಾವರ್ತಿತ ಶಾಲಾ ಅಭ್ಯರ್ಥಿ / Regular Fresh + Regular Repeater )

( ಇಂಗ್ಲಿಷ್ ಭಾಷಾಂತರ / English Version )

[ ಪರಮಾವಧಿ ಅಂಕಗಳು : 80

[ Max. Marks : 80

Qn. Nos.	Ans. Key	Value Points	Marks allotted
I. 1.	C	12	1
2.	A	5	1
3.	C	0.7	1
4.	D	3	1
5.	B	5 units	1
6.	D	$\sqrt{3}$	1
7.	B	$\frac{5}{3}$	1
8.	A	12.	1



RF+RR-426



[ Turn over

Qn. Nos.	Value Points	Marks allotted
II.		
9.	$A' = U - A$ $A' = \{1, 2, 3, 4, 5\} - \{2, 4, 5\}$ $\therefore A' = \{1, 3\}$	$\frac{1}{2}$   $\frac{1}{2}$
10.	$(a, b) \text{ L.C.M.} = \frac{a \times b}{(a, b) \text{ H.C.F.}}$ $\text{L.C.M.} = \frac{12 \times 18}{6} = 36$	$\frac{1}{2}$   $\frac{1}{2}$
11.	$f(x) = 2x^2 + 3x + 2$ $f(2) = 2(2)^2 + 3(2) + 2$ $= 8 + 6 + 2$ $= 16$	$\frac{1}{2}$   $\frac{1}{2}$
12.	$d = 10 \text{ cm}$ $R = \frac{10}{2} = 5 \text{ cm}$ Distance between centres $d = R + r$ $d = 5 + 2 = 7 \text{ cm}$	$d = 4 \text{ cm}$ $r = \frac{4}{2} = 2 \text{ cm}$   $\frac{1}{2}$   $\frac{1}{2}$
13.	In a right angled triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.	1
14.	Total surface area of cylinder = $2\pi r(r + h)$ sq.units.	1
III. 15.	$n = 8$ Number of diagonals = ${}^n C_2 - n$ $= {}^8 C_2 - 8$ $= \frac{1}{2} {}^8 P_2 - 8$ $= \frac{8 \times 7}{2} - 8$ $= 28 - 8.$ Number of diagonals = 20	$\frac{1}{2}$ $\frac{1}{2}$   $\frac{1}{2}$   $\frac{1}{2}$
	OR	



Qn. Nos.	Value Points	Marks allotted
16.	$n = 8$	
	Number of diagonals = ${}^n C_2 - n$	$\frac{1}{2}$
	= $\frac{n(n-3)}{2}$	$\frac{1}{2}$
	= $\frac{8(8-3)}{2}$	$\frac{1}{2}$
	= $\frac{8 \times 5}{2}$	
	Number of diagonals = 20.	$\frac{1}{2}$
	If possible, let us assume $2 + \sqrt{5}$ is a rational number.	$\frac{1}{2}$
	$2 + \sqrt{5} = \frac{p}{q}$ where $p, q \in \mathbb{Z}, q \neq 0$ ,	
	$2 - \frac{p}{q} = -\sqrt{5}$	
	$\frac{2q-p}{q} = -\sqrt{5}$ .	$\frac{1}{2}$
$\Rightarrow -\sqrt{5}$ is a rational number		
$\therefore \frac{2q-p}{q}$ is a rational number	$\frac{1}{2}$	
But $-\sqrt{5}$ is not a rational number.		
$\therefore$ Our supposition $2 + \sqrt{5}$ is a rational number is wrong.	$\frac{1}{2}$	
$\Rightarrow 2 + \sqrt{5}$ is an irrational number.	$\frac{1}{2}$	
17.	Total number of watches $n(S) = 500$	$\frac{1}{2}$
	Number of watches defective $n(A) = 50$	$\frac{1}{2}$
	$P(A) = \frac{n(A)}{n(S)}$	$\frac{1}{2}$
	$P(A) = \frac{50}{500} = \frac{1}{10}$	
	Probability of watches	
	to be defective = $\frac{1}{10}$ or $\frac{50}{500}$	$\frac{1}{2}$



Qn. Nos.	Value Points	Marks allotted
18.	$\sqrt{3} \times \sqrt[3]{2}$ <p>L.C.M. of 2 and 3 is 6</p> $\sqrt{3} = 3^{\frac{1}{2} \times \frac{6}{6}} = 3^{3/6} = \sqrt[6]{3^3} = \sqrt[6]{27}$ $\sqrt[3]{2} = 2^{\frac{1}{3} \times \frac{6}{6}} = 2^{2/6} = \sqrt[6]{2^2} = \sqrt[6]{4}$ $\sqrt{3} \times \sqrt[3]{2} = \sqrt[6]{27 \times 4}$ $= \sqrt[6]{108}$	<p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>2</p>
19.	$\frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} \times \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ $\frac{\sqrt{9} + \sqrt{6} + \sqrt{6} + \sqrt{4}}{\sqrt{9} - \sqrt{4}}$ $\frac{3 + 2\sqrt{6} + 2}{3 - 2}$ $\frac{5 + 2\sqrt{6}}{1}$	<p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>2</p>
	OR	
	$\frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} \times \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ $\frac{(\sqrt{3} + \sqrt{2})^2}{(\sqrt{3})^2 - (\sqrt{2})^2}$ $\frac{3 + 2\sqrt{6} + 2}{3 - 2}$ $5 + 2\sqrt{6}.$	<p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>2</p>



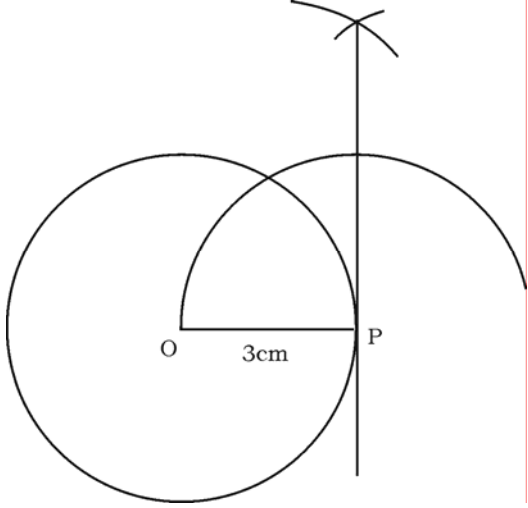
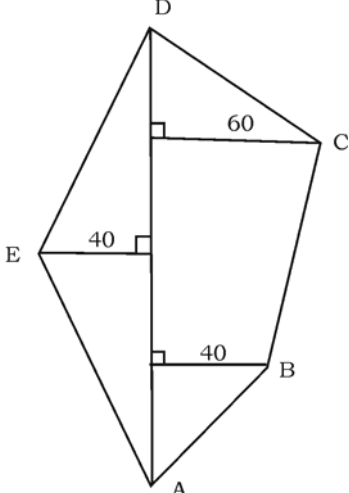


Qn. Nos.	Value Points	Marks allotted
	$x^2 + 2x - 3 \overline{) x^4 + 2x^3 - 2x^2 + x - 1}$ $\begin{array}{r} x^4 + 2x^3 - 3x^2 \\ (-) \quad (-) \quad (+) \\ \hline x^2 + x - 1 \\ x^2 + 2x - 3 \\ (-) \quad (-) \quad (+) \\ \hline -x + 2 \end{array}$ <p><math>r(x) = -x + 2 \Rightarrow \{-r(x)\} = x - 2</math></p> <p>Hence we should add <math>(x - 2)</math> to <math>P(x)</math></p> <p>so that the resulting polynomial is exactly divisible by <math>g(x)</math></p>	<p>1/2</p> <p>1/2</p> <p>1/2</p> <p>2</p>
21.	<p>In <math>\Delta ABC</math>, <math>DE \parallel AB</math></p> $\frac{CD}{CA} = \frac{CE}{CB} \quad (\text{Corollary to B.P.T.})$ $\frac{5}{12} = \frac{CE}{18}$ $12 \times CE = 5 \times 18$ $CE = \frac{5 \times 18}{12} = \frac{15}{2}$ $CE = 7.5 \text{ cm}$	<p>1/2</p> <p>1/2</p> <p>1/2</p> <p>2</p>
22.	$\sqrt{3} \tan \theta = 1$ $\tan \theta = \frac{1}{\sqrt{3}}$ <p>We know that <math>\tan 30^\circ = \frac{1}{\sqrt{3}} \quad \therefore \theta = 30^\circ</math></p> $\therefore \sin 30 = \sin 3 (30^\circ)$ $\sin 30 = \sin 90^\circ = 1.$	<p>1/2</p> <p>1/2</p> <p>2</p>



Qn. Nos.	Value Points	Marks allotted
23.	$(x_1, y_1) = (2, 3)$ and $(x_2, y_2) = (4, 7)$ <span style="float: right;">1/2</span>  Mid-point = $\left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$ <span style="float: right;">1/2</span> = $\left( \frac{2+4}{2}, \frac{3+7}{2} \right)$ <span style="float: right;">1/2</span> = $\left( \frac{6}{2}, \frac{10}{2} \right)$ = $(3, 5)$ . <span style="float: right;">1/2</span>	2
24.	$r = 7$ cm $l = 10$ cm C.S.A. of cone = $\pi r l$ <span style="float: right;">1/2</span> = $\frac{22}{7} \times 7 \times 10$ <span style="float: right;">1/2 + 1/2</span> = 220 sq.cm. <span style="float: right;">1/2</span> <div style="text-align: center;">OR</div> Volume of cylinder = $\pi r^2 h$ <span style="float: right;">1/2</span> = $\frac{22}{7} \times 7 \times 7 \times 10$ <span style="float: right;">1/2</span> = $22 \times 70$ <span style="float: right;">1/2</span> = 1540 c.c. <span style="float: right;">1/2</span>	2
25.	$x^2 - 4x + 2 = 0$ $a = 1, b = -4, c = 2$ <span style="float: right;">1/2</span> $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ <span style="float: right;">1/2</span> $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(2)}}{2(1)}$ <span style="float: right;">1/2</span> $x = \frac{4 \pm \sqrt{16 - 8}}{2}$ $x = \frac{4 \pm \sqrt{8}}{2}$ $x = \frac{4 \pm 2\sqrt{2}}{2}$ = $\frac{2(2 \pm \sqrt{2})}{2}$ <span style="float: right;">1/2</span> $x = 2 \pm \sqrt{2}$ .	2



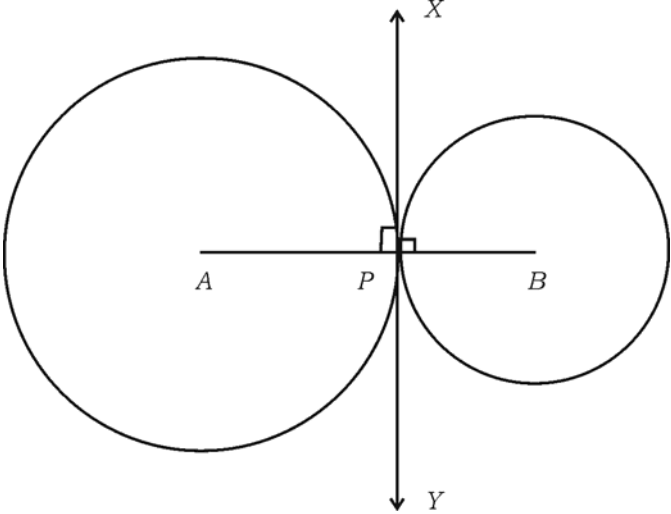
Qn. Nos.	Value Points	Marks allotted
26.	 <p data-bbox="889 821 1279 1003">                     Construction of circle <math>\frac{1}{2}</math>                      Radius <math>OP</math> <math>\frac{1}{2}</math>                      Arcs <math>\frac{1}{2}</math>                      Tangent at <math>P</math> <math>\frac{1}{2}</math> </p>	2
27.	<p data-bbox="321 1031 630 1310">                     Scale : 20 m = 1 cm                      40 m = 2 cm                      80 m = 4 cm                      120 m = 6 cm                      160 m = 8 cm                      60 m = 3 cm                 </p>  <p data-bbox="959 1709 1263 1780">                     Calculation <math>\frac{1}{2}</math>                      Field drawing <math>1\frac{1}{2}</math> </p>	2





Qn. Nos.	Value Points	Marks allotted
28.	$n(M) = 12, \quad n(D) = 15, \quad n(M \cap D) = 7$ $n(M \cup D) = ?$ $n(M) + n(D) = n(M \cup D) + n(M \cap D)$ <p style="text-align: center;">OR</p> $n(M \cup D) = n(M) + n(D) - n(M \cap D)$ $= 12 + 15 - 7$ $= 27 - 7$ $n(M \cup D) = 20$ <p>Number of people in the group = 20</p>	<p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;">2</p>
29.	<p>Volume of hemisphere = Volume of cylinder</p> $\frac{2}{3} \pi r_1^3 = \pi r_2^2 h$ $\frac{2}{3} \times 12 \times 12 \times 12 = 6 \times 6 \times h$ $32 = h$ <p><math>\therefore h = 32</math> cm</p>	<p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;">2</p>
30.	$4 + 7 + 10 + \dots$ $a = 4, \quad d = 7 - 4$ $= 3$ $S_{20} = ?$ $S_n = \frac{n}{2} [2a + (n - 1)d]$ $S_{20} = \frac{20}{2} [2 \times 4 + (20 - 1)3]$ $= 10 [8 + 57]$ $= 10 \times 65$ $S_{20} = 650$ <p>Sum of the first 20 terms of the series = 650</p>	<p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;"><math>\frac{1}{2}</math></p> <p style="text-align: right;">2</p>



Qn. Nos.	Value Points	Marks allotted																																										
IV. 31.	<div style="text-align: center;">  </div> <p style="text-align: right; margin-right: 20px;"><math>\frac{1}{2}</math></p> <p><i>Data</i> : A and B are the centres of touching circles. P is point of contact. <span style="float: right;"><math>\frac{1}{2}</math></span></p> <p><i>To proof</i>: A, P and B are collinear <span style="float: right;"><math>\frac{1}{2}</math></span></p> <p><i>Construction</i> : Draw the common tangent XPY <span style="float: right;"><math>\frac{1}{2}</math></span></p> <p><i>Proof</i> :</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"><math>\angle APX = 90^\circ</math></td> <td style="width: 15%;">(i)</td> <td style="width: 40%;">(<math>AP \perp XY</math>)</td> <td style="width: 30%;"></td> </tr> <tr> <td><math>\angle BPX = 90^\circ</math></td> <td>(ii)</td> <td>(<math>BP \perp XY</math>)</td> <td><math>\frac{1}{2}</math></td> </tr> </table> <p>Add (i) and (ii)</p> $\angle APX + \angle BPX = 180^\circ$ $\angle APB = 180^\circ$ <p>APB is a straight line</p> <p><math>\therefore</math> A, P, B are collinear. <span style="float: right;"><math>\frac{1}{2}</math></span></p>	$\angle APX = 90^\circ$	(i)	( $AP \perp XY$ )		$\angle BPX = 90^\circ$	(ii)	( $BP \perp XY$ )	$\frac{1}{2}$	3																																		
$\angle APX = 90^\circ$	(i)	( $AP \perp XY$ )																																										
$\angle BPX = 90^\circ$	(ii)	( $BP \perp XY$ )	$\frac{1}{2}$																																									
32.	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>C.I.</th> <th>f</th> <th>x</th> <th>fx</th> <th><math>x - \bar{x} = D</math></th> <th><math>D^2</math></th> <th><math>f D^2</math></th> </tr> </thead> <tbody> <tr> <td>1 – 5</td> <td>4</td> <td>3</td> <td>12</td> <td>- 5</td> <td>25</td> <td>100</td> </tr> <tr> <td>6 – 10</td> <td>3</td> <td>8</td> <td>24</td> <td>0</td> <td>00</td> <td>00</td> </tr> <tr> <td>11 – 15</td> <td>2</td> <td>13</td> <td>26</td> <td>5</td> <td>25</td> <td>50</td> </tr> <tr> <td>16 – 20</td> <td>1</td> <td>18</td> <td>18</td> <td>10</td> <td>100</td> <td>100</td> </tr> <tr> <td colspan="2"><math>N = 10</math></td> <td colspan="2"><math>\sum fx = 80</math></td> <td colspan="3"><math>\sum f D^2 = 250</math></td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;"><math>\frac{1}{2}</math></p>	C.I.	f	x	fx	$x - \bar{x} = D$	$D^2$	$f D^2$	1 – 5	4	3	12	- 5	25	100	6 – 10	3	8	24	0	00	00	11 – 15	2	13	26	5	25	50	16 – 20	1	18	18	10	100	100	$N = 10$		$\sum fx = 80$		$\sum f D^2 = 250$			
C.I.	f	x	fx	$x - \bar{x} = D$	$D^2$	$f D^2$																																						
1 – 5	4	3	12	- 5	25	100																																						
6 – 10	3	8	24	0	00	00																																						
11 – 15	2	13	26	5	25	50																																						
16 – 20	1	18	18	10	100	100																																						
$N = 10$		$\sum fx = 80$		$\sum f D^2 = 250$																																								



Qn. Nos.	Value Points	Marks allotted								
33.	Mean $\bar{x} = \frac{\sum fx}{N} = \frac{80}{10} = 8$	1/2								
	$\sigma = \pm \sqrt{\frac{\sum f D^2}{N}} = \pm \sqrt{\frac{250}{10}} = \sqrt{25} = 5$	1								
	Given digits : 1, 2, 3, 4, 5, 6									
	a) 4-digit number can be formed in ${}^6P_4$ ways	1/2								
	${}^6P_4 = 6 \times 5 \times 4 \times 3$	1/2								
	${}^6P_4 = 360.$	1/2								
	b) Less than 5000 :									
	<table border="1" data-bbox="423 743 1101 861"> <thead> <tr> <th data-bbox="423 743 594 800">Th</th> <th data-bbox="594 743 760 800">H</th> <th data-bbox="760 743 930 800">Ten</th> <th data-bbox="930 743 1101 800">U</th> </tr> </thead> <tbody> <tr> <td data-bbox="423 800 594 861"><math>{}^4P_1</math> ways</td> <td data-bbox="594 800 760 861"><math>{}^5P_1</math> ways</td> <td data-bbox="760 800 930 861"><math>{}^4P_1</math> ways</td> <td data-bbox="930 800 1101 861"><math>{}^3P_1</math> ways</td> </tr> </tbody> </table>	Th	H	Ten	U	${}^4P_1$ ways	${}^5P_1$ ways	${}^4P_1$ ways	${}^3P_1$ ways	1/2
	Th	H	Ten	U						
	${}^4P_1$ ways	${}^5P_1$ ways	${}^4P_1$ ways	${}^3P_1$ ways						
Unit's place can be filled in ${}^3P_1$ ways										
Ten's place can be filled in ${}^4P_1$ ways										
Hundred's place can be filled in ${}^5P_1$ ways										
Thousand's place can be filled in ${}^4P_1$ ways										
Total number of ways = ${}^3P_1 \times {}^4P_1 \times {}^5P_1 \times {}^4P_1$ $= 3 \times 4 \times 5 \times 4$	1/2									
The number less than 5000 = 240.	1/2									
<p style="text-align: center;">OR</p> $16 {}^n P_3 = 13 {}^{n+1} P_3$ $16 \cdot n(n-1)(n-2) = 13(n+1)n(n-1)$ $16(n-2) = 13(n+1)$ $16n - 32 = 13n + 13$ $16n - 13n = 13 + 32$ $3n = 45$ $n = \frac{45}{3}$ $n = 15.$	3									



Qn. Nos.	Value Points	Marks allotted
34.	$\text{LHS} = \frac{\sin(90^\circ - \theta)}{1 + \sin \theta} + \frac{\cos \theta}{1 - \cos(90^\circ - \theta)}$ $= \frac{\cos \theta}{1 + \sin \theta} + \frac{\cos \theta}{1 - \sin \theta} \quad \frac{1}{2}$ $= \frac{\cos \theta(1 - \sin \theta) + \cos \theta(1 + \sin \theta)}{1 - \sin^2 \theta} \quad \frac{1}{2}$ $= \frac{\cos \theta - \cos \theta \cdot \sin \theta + \cos \theta + \cos \theta \cdot \sin \theta}{1 - \sin^2 \theta} \quad \frac{1}{2}$ $= \frac{2 \cos \theta}{\cos^2 \theta} \quad \frac{1}{2}$ $= \frac{2}{\cos \theta} \quad \frac{1}{2}$ $= 2 \sec \theta \quad \frac{1}{2}$ <p>LHS = RHS</p> <p style="text-align: center;">OR</p> $\text{LHS} = \cos(A + B)$ $= \cos(60^\circ + 30^\circ) \quad \frac{1}{2}$ $= \cos 90^\circ$ $= 0 \quad \frac{1}{2}$ $\text{RHS} = \cos A \cdot \cos B - \sin A \cdot \sin B$ $= \cos 60^\circ \cdot \cos 30^\circ - \sin 60^\circ \cdot \sin 30^\circ \quad \frac{1}{2}$ $= \left( \frac{1}{2} \times \frac{\sqrt{3}}{2} \right) - \left( \frac{\sqrt{3}}{2} \times \frac{1}{2} \right) \quad \frac{1}{2}$ $= \frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{4} \quad \frac{1}{2}$ $= 0 \quad \frac{1}{2}$ <p>LHS = RHS.</p>	3

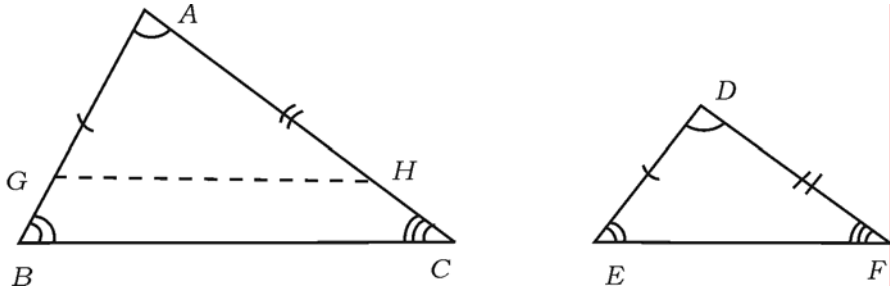


Qn. Nos.	Value Points	Marks allotted
35.	<p>Let the number of pupils = <math>x</math></p> <p>Total cost = Rs. 1000</p> <p>Each share = Rs. <math>\frac{1000}{x}</math></p> <p>If 10 of them are failed to join the function then number of pupils joined = <math>x - 10</math></p> <p>Total cost = Rs. 1000</p> <p>Each share = Rs. <math>\frac{1000}{x - 10}</math></p> <p>Each would have to pay Rs. 5 more</p> $\frac{1000}{x - 10} - \frac{1000}{x} = 5$ $\frac{1000x - 1000(x - 10)}{x(x - 10)} = 5$ $1000x - 1000x + 10000 = 5x^2 - 50x$ $5x^2 - 50x - 10000 = 0$ <p style="text-align: center;">÷ by 5</p> $x^2 - 10x - 2000 = 0$ $x^2 - 50x + 40x - 2000 = 0$ $x(x - 50) + 40(x - 50) = 0$ $(x - 50)(x + 40) = 0$ $x = 50, -40$ <p>∴ <math>x = 50</math></p> <p>Number of pupils of the class = 50.</p> <p style="text-align: center;">OR</p> $x^2 - 5x + 3 = 0$ $a = 1, \quad b = -5, \quad c = 3$ $m + n = \frac{-b}{a} = \frac{-(-5)}{1} = 5$ $m + n = \frac{c}{a} = \frac{3}{1} = 3$	<p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p>3</p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>



Qn. Nos.	Value Points	Marks allotted
36.	i) $(m+n)^2 + (m-n)^2 = (m+n)^2 + [(m+n)^2 - 4mn]$ $= 5^2 + 5^2 - 4(3)$ $= 25 + 25 - 12$ $= 50 - 12$ $= 38$	1/2
	ii) $(m+n)^3 + 4mn = (5)^3 + 4(3)$ $= 125 + 12$ $= 137.$	1/2 1/2
	$AM^2 + CN^2 = AB^2 + BM^2 + BN^2 + BC^2$ $(AB^2 + BC^2 = AC^2)$	1/2
	$AM^2 + CN^2 = AC^2 + BM^2 + BN^2$ $= AC^2 + \left(\frac{BC}{2}\right)^2 + \left(\frac{AB}{2}\right)^2$	1/2 1/2
	$AM^2 + CN^2 = AC^2 + \frac{BC^2}{4} + \frac{AB^2}{4}$ $= \frac{4AC^2 + BC^2 + AB^2}{4}$	1/2
	$4(AM^2 + CN^2) = 4AC^2 + BC^2 + AB^2$ $(BC^2 + AB^2 = AC^2)$	1/2
	$4(AM^2 + CN^2) = 4AC^2 + AC^2$	1/2
	$4(AM^2 + CN^2) = 5AC^2.$	3
	OR	
	In $\triangle AOB$ $\angle O = 90^\circ$	1/2
	$AB^2 = OA^2 + OB^2$	1/2
	$= \left(\frac{AC}{2}\right)^2 + \left(\frac{BD}{2}\right)^2$	1/2
	$= \frac{AC^2}{4} + \frac{BD^2}{4}$	1/2
	$AB^2 = \frac{AC^2 + BD^2}{4}$	1/2
	$\therefore 4AB^2 = AC^2 + BD^2.$	1/2 3



Qn. Nos.	Value Points	Marks allotted
V. 37.	<div style="display: flex; justify-content: space-around; align-items: center;">  </div> <p style="text-align: right; margin-right: 20px;"><math>\frac{1}{2}</math></p> <p><i>Data</i> : In <math>\triangle ABC</math> and <math>\triangle DEF</math></p> <p style="margin-left: 40px;"><math>\angle BAC = \angle EDF</math></p> <p style="margin-left: 40px;"><math>\angle ABC = \angle DEF</math> <span style="float: right;"><math>\frac{1}{2}</math></span></p> <p><i>To prove</i> : <math>\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}</math> <span style="float: right;"><math>\frac{1}{2}</math></span></p> <p><i>Construction</i> : Mark points <math>G</math> and <math>H</math> on <math>AB</math> and <math>AC</math> such that <math>AG = DE</math> and <math>AH = DF</math>. Join <math>G</math> and <math>H</math>. <span style="float: right;"><math>\frac{1}{2}</math></span></p> <p><i>Proof</i> : In <math>\triangle AGH</math> and <math>\triangle DEF</math></p> <p style="margin-left: 40px;"><math>AG = DE</math> <span style="margin-left: 100px;"><math>\because</math> Construction</span></p> <p style="margin-left: 40px;"><math>\angle GAH = \angle EDF</math> <span style="margin-left: 100px;"><math>\because</math> Data</span> <span style="float: right;"><math>\frac{1}{2}</math></span></p> <p style="margin-left: 40px;"><math>AH = DF</math> <span style="margin-left: 100px;"><math>\therefore</math> Construction</span></p> <p><math>\therefore \triangle AGH \cong \triangle DEF</math> <span style="margin-left: 100px;"><math>\because</math> SAS</span></p> <p style="margin-left: 40px;"><math>\angle AGH = \angle DEF</math> <span style="float: right;"><math>\frac{1}{2}</math></span></p> <p>But, <math>\angle ABC = \angle DEF</math></p> <p><math>\Rightarrow \angle AGH = \angle ABC</math></p> <p><math>\therefore GH \parallel BC</math>. <span style="float: right;"><math>\frac{1}{2}</math></span></p> <p>In <math>\triangle ABC</math> <math>\frac{AB}{AG} = \frac{BC}{GH} = \frac{CA}{HA}</math></p> <p>Hence <math>\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}</math>. <span style="float: right;"><math>\frac{1}{2}</math></span></p>	4



Qn. Nos.	Value Points	Marks allotted
38.	<p><math>d = 8 \text{ cm}, \quad R = 4 \text{ cm} \quad r = 2 \text{ cm}</math>  <math>R - r = 4 - 2 = 2 \text{ cm}</math></p> <p>Drawing <math>AB</math> and marking mid-point <math>M</math></p> <p>Drawing circles <math>C_1, C_2, C_3</math></p> <p>Joining <math>BK, BL, PQ, RS</math></p> <p>Measuring and writing the length of tangents <math>PQ = RS</math>  <math>(PQ = RS = 7.8 \text{ cm})</math></p>	<p>1</p> <p><math>1\frac{1}{2}</math></p> <p>1</p> <p><math>\frac{1}{2}</math></p> <p>4</p>
39.	<p><math>a, a + d, a + 2d \dots</math> A.P.</p> <p><math>a + a + 2d + a + 4d = 39</math></p> <p><math>3a + 6d = 39</math></p> <p><math>3(a + 2d) = 39</math></p> <p><math>a + 2d = \frac{39}{3} = 13 \quad \dots (i)</math></p> <p><math>a + d + a + 3d + a + 5d = 51</math></p> <p><math>3a + 9d = 51</math></p> <p><math>3(a + 3d) = 51</math></p> <p><math>a + 3d = \frac{51}{3} = 17 \quad \dots (ii)</math></p>	<p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>

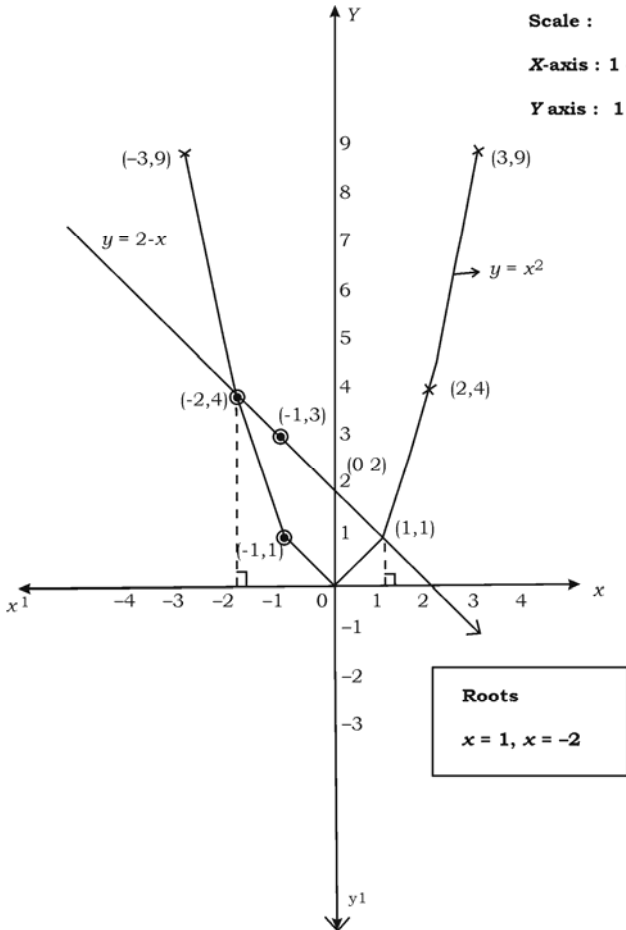






Qn. Nos.	Value Points	Marks allotted
	$1 + 2 + 4 = \frac{7}{a}$	$\frac{1}{2}$
	$a = \frac{7}{7} = 1$	
	$T_1 = a = 1, \quad T_2 = 1 \times 2 = 2, \quad T_3 = 2 \times 2 = 4$	$\frac{1}{2}$
	$\therefore 1, 2, 4, 8 \dots \text{G.P.}$	$\frac{1}{2}$
	<p><i>Alternate method :</i></p>	
	$S_3 = 7$	
	$a \left( \frac{r^3 - 1}{r - 1} \right) = 7$	$\frac{1}{2}$
	$\frac{r^3 - 1}{r - 1} = \frac{7}{a} \quad \dots (i)$	$\frac{1}{2}$
	$S_6 - S_3 = a \left( \frac{r^6 - 1}{r - 1} \right) - 7 = 56$	$\frac{1}{2}$
	$\frac{a(r^3 + 1)(r^3 - 1)}{(r - 1)} = 56 + 7 = 63$	$\frac{1}{2}$
	$a(r^3 + 1) \frac{7}{a} = 63$	
	$r^3 + 1 = \frac{63}{7} = 9$	
	$r^3 = 9 - 1 = 8$	
	$r^3 = 2^3$	
	$r = 2$	$\frac{1}{2}$
	$\frac{7}{a} = \frac{r^3 - 1}{r - 1} = \frac{2^3 - 1}{2 - 1}$	$\frac{1}{2}$
	$\frac{7}{a} = \frac{7}{1}$	
	$a = \frac{7}{7} = 1$	$\frac{1}{2}$
	$T_1 = a = 1, \quad T_2 = 1 \times 2 = 2, \quad T_3 = 2 \times 2 = 4$	
	$1, 2, 4 \dots \text{G.P.}$	$\frac{1}{2}$



Qn. Nos.	Value Points	Marks allotted																														
40.	<p> <math>x^2 + x - 2 = 0</math>  <math>x^2 = 2 - x</math>  <math>y = x^2 ; \quad y = 2 - x</math>  <math>y = x^2</math> </p> <table border="1" data-bbox="305 478 1019 590"> <tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>-1</td><td>-2</td><td>-3</td></tr> <tr><td>y</td><td>0</td><td>1</td><td>4</td><td>9</td><td>1</td><td>4</td><td>9</td></tr> </table> <p><math>y = 2 - x</math></p> <table border="1" data-bbox="305 640 930 751"> <tr><td>x</td><td>0</td><td>1</td><td>-1</td><td>2</td><td>-2</td><td>3</td></tr> <tr><td>y</td><td>2</td><td>1</td><td>3</td><td>0</td><td>4</td><td>-1</td></tr> </table> <p style="text-align: right;">Table — ( 1 + 1 ) = 2                      Parabola — ½                      Straight line — ½                      Drawing perpendiculars and identifying roots — 1</p> <div style="text-align: right;"> <p>Scale :</p> <p>X-axis : 1 cm = 1 unit</p> <p>Y axis : 1 cm = 1 unit</p> </div> 	x	0	1	2	3	-1	-2	-3	y	0	1	4	9	1	4	9	x	0	1	-1	2	-2	3	y	2	1	3	0	4	-1	4
x	0	1	2	3	-1	-2	-3																									
y	0	1	4	9	1	4	9																									
x	0	1	-1	2	-2	3																										
y	2	1	3	0	4	-1																										



Qn. Nos.	Value Points	Marks allotted
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Alternate Method :

$$x^2 + x - 2 = 0$$

$$y = x^2 + x - 2$$

x	0	1	2	3	-1	-2	-3
y	-2	0	4	10	-2	0	4

Table — 2

Drawing parabola — 1

Identifying roots — 1

4

Scale :

X-axis : 1 cm = 1 unit

Y axis : 1 cm = 1 unit

