

माध्यमिक शिक्षा परीक्षा (SEE Supplementary/Upgrade 2019)

(पुरक/ग्रेडबुद्धि)

उत्तरकुञ्जिका - (Marking scheme)

पूर्णाङ्क:- १००

विषय: ऐच्छिक गणित

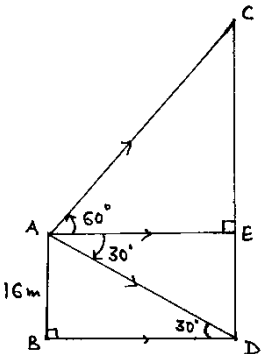
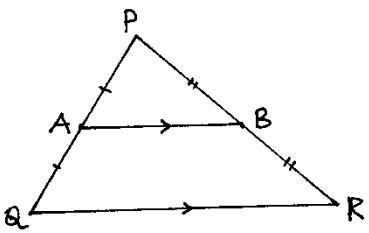
उत्तरपुस्तिका परीक्षणकुञ्जिका उत्तरपुस्तिका परीक्षणको निम्ति परीक्षकलाई सामान्य मार्गनिर्देशन हो । परीक्षकले उत्तरको शुद्धता, स्तरीयता मौलिकता आदि हेरी आवश्यकताअनुसार विवेक प्रयोग गरी स्तरअनुसार सहि, स्पष्ट, उपयुक्त, मापनीय र स्तरीय मूल्याङ्कन गर्नुपर्ने छ । सम्भव भएसम्म कुञ्जिकाले निर्देश गरेको परिधि र सीमाभित्र रही मूल्याङ्कन गर्नुपर्ने छ ।

Note : Give the relevant mark(s) for other correct method.

S.No.	Answer	Marks
Group A		
1.a	i. $g g (1) = g (4)$ ii. 19	1 1
1.b	i. $f(-1)=3(-1)^3 - 5.(-1)^2 + k(-1) - 10$ Or, $0=-3-5-k-10$ ii. $k = -18$	1 1
2.a	i. $t_{15} = 2+(15 - 1) \times 3$ ii. $= 44$	1 1
2.b	i. Definition ii. If the determinant of the matrix is zero.	1 1
3.a	i. Let $\begin{bmatrix} 4 \\ 1 \end{bmatrix} \begin{bmatrix} a & b \end{bmatrix} = \begin{bmatrix} -8 & 12 \\ -2 & 3 \end{bmatrix}$ OR, $\begin{bmatrix} 4a & 4b \\ a & b \end{bmatrix} = \begin{bmatrix} -8 & 12 \\ -2 & 3 \end{bmatrix}$ ii. $a = -2, b=3$	1 1
3.b	i. $\tan \theta = \pm \frac{m_1 - m_2}{1 + m_1 m_2}$ ii. $m_1 m_2 = -1$	1 1
4.a	i. $a=9, h = -\frac{m}{2}, b = 16$ $h^2 = ab$ Or, $\frac{m^2}{4} = 9 \times 16$ ii. $m^2 = (24)^2$ $m=24$	1 1

4.b	i. $(y-0)(y-5)+(x-1)(x-0)=0$	1
	ii. $x^2 + y^2 - x - 5y = 0$	1
5.a	i. $\sin 105^\circ = \sin (60+45)^\circ$ $= \sin 60^\circ \cdot \cos 45^\circ + \cos 60^\circ \cdot \sin 45^\circ$	1
	ii. $= \frac{\sqrt{3}+1}{2\sqrt{2}}$	1
5.b	i. $LHS = \cos \alpha$ $= 4\cos^3 \frac{\alpha}{3} - 3\cos \frac{\alpha}{3}$	1
	ii. $= 4 \times \frac{1}{8} - 3 \times \frac{1}{2} = -1$	1
6. a	i. $LHS = \frac{2\cos^2 A}{2\sin A \cdot \cos A}$	1
	ii. $= \cot A = RHS$	1
6.b	i. $\cos \theta = \pm \frac{1}{\sqrt{2}}$	1
	ii. $\theta = 45^\circ$	1
7.a	i. $\cos 30^\circ = \frac{6}{2\sqrt{3} \vec{a} }$	1
	ii. $ \vec{a} =2$	1
7.b	i. $\vec{OG} = \frac{1(3\vec{i}-7\vec{j})+2(3\vec{i}-2\vec{j})}{2+1}$	1
	ii. $= 3\vec{i} - \vec{j}$	1
8.a	i. $A(3, 4) \xrightarrow[\text{Rotation } (+90^\circ)]{R_2} A'(-4, 3)$	1
	ii. $A'(-4, 3) \xrightarrow[\text{Reflection-y-axis}]{R_1} A''(4, 3)$	1
8.b	i. $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -y \\ -x \end{pmatrix}$	1
	ii. $(x, y) = (-y, -x)$ $\therefore \text{The reflection in } y = -x$	1
Group B		
9.	i. $\text{gof}(x) = 4x + 1$	1
	ii. $g^{-1}(x) = \frac{x+5}{2}$	1
	iii. $4x + 1 = \frac{x+5}{2}$	1
	iv. $x = \frac{3}{7}$	1

10.	<p>i. $x^3 - x^2 + 11x - 6 = 0$ or, $x^3 - x^2 - 5x^2 + 5x + 6x - 6 = 0$</p> <p>ii. or, $(x - 1)(x^2 - 5x + 6) = 0$</p> <p>iii. or, $(x - 1)(x - 2)(x - 3) = 0$</p> <p>iv. $\therefore x = 1, 2, 3$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
11.	<p>i. $ar = 6$ and $ar^4 = 48$</p> <p>ii. $a = 3$ and $r = 2$</p> <p>iii. $s_6 = 3 \left[\frac{(2)^6 - 1}{2 - 1} \right]$</p> <p>iv. $= 189$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
12.	<p>i. $x^2 - x - 6 = 0 = y$ (sup.) $\therefore y = x^2 - x - 6$ and $y = 0$ Vertex of parabola $= \left(\frac{1}{2}, 6\frac{1}{4}\right)$</p> <p>ii. Table for graph $y = x^2 - x - 6$</p> <p>iii. Graph of $y = x^2 - x - 6$</p> <p>iv. $x = -2, 3$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
13	<p>i. $\begin{bmatrix} 4 & 3 \\ 3 & -2 \end{bmatrix} \begin{bmatrix} \frac{1}{x} \\ \frac{1}{y} \end{bmatrix} = \begin{bmatrix} 1 \\ 1/24 \end{bmatrix}$</p> <p>ii. $IA1 = -17 \neq 0$</p> <p>iii. $A^{-1} = \frac{1}{17} \begin{pmatrix} -2 & -3 \\ -3 & 4 \end{pmatrix}$</p> <p>iv. $x = 8$ & $y = 6$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
14	<p>i. Slope of given line (m_1) $= \frac{2}{3}$</p> <p>ii. Slope of required line (m_2) $= -\frac{3}{2}$</p> <p>iii. Required equation $y - 1 = -\frac{3}{2}(x - 4)$</p> <p>iv. $3x + 2y - 14 = 0$ Note: Give the relevant marks for using the point (4, -1).</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
15	<p>i. $\tan 45^\circ = \pm \frac{2\sqrt{\left(\frac{k}{2}\right)^2 - 6}}{5}$</p> <p>ii. $k = 7$</p> <p>iii. Equation of pair of lines is $2x^2 + 7xy + 3y^2 = 0$</p> <p>iv. $(2x + y) = 0$ and $x + 3y = 0$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
16.	<p>i. Center of circle B = (2, -3)</p> <p>ii. Radius of circle A = 10 units</p> <p>iii. Equation of circle A</p>	<p>1</p> <p>1</p>

	$(x+4)^2 + (y-5)^2 = 10^2$ iv. $x^2 + y^2 + 8x - 10y - 59 = 0$	1 1
17.	i. $\frac{1}{2} \cos 20^\circ \cdot \cos 40^\circ \cdot \cos 80^\circ$ ii. $\frac{1}{4} \cos 20^\circ \cdot (\cos 120^\circ + \cos 40^\circ)$ iii. $-\frac{1}{8} \cos 20^\circ + \frac{1}{8} (\cos 60^\circ + \cos 20^\circ)$ iv. $\frac{1}{16}$	1 1 1 1
18.	i. $\sin \frac{R+Q}{2} = \cos \frac{P}{2}, \cos \frac{R+Q}{2} = \sin \frac{P}{2}$ ii. $2 \cos \frac{P}{2} \cos \frac{Q-R}{2} + \sin P$ iii. $2 \cos \frac{P}{2} (\cos \frac{Q-R}{2} + \cos \frac{Q+R}{2})$ iv. $4 \cos \frac{P}{2} \cdot \cos \frac{Q}{2} \cdot \cos \frac{R}{2}$	1 1 1 1
19.	i. $\sqrt{3} \sin \theta + \cos \theta = \sqrt{3}$ ii. $\sin \theta \cdot \cos 30^\circ + \cos \theta \cdot \sin 30^\circ = \frac{\sqrt{3}}{2}$ iii. $\sin(\theta + 30^\circ) = \sin 60^\circ, \sin(180^\circ - 60^\circ)$ iv. $\theta = 30^\circ, 90^\circ$	1 1 1 1
20.	i. For correct figure with description. ii. In the right angle triangle ABD, $\tan 30^\circ = \frac{16m}{BD}$ $\therefore BD = 16\sqrt{3}m$ iii. In the right angled triangle AEC, $\tan 60^\circ = \frac{CE}{16\sqrt{3}}$ $\therefore CE = 48m$ iv. Height of pole = CD = (48+16)m = 64m	 1 1 1 1
21.	i) $\vec{AB} = \vec{AP} + \vec{PB}$ ii) $\vec{AP} = \frac{1}{2} \vec{QP}, \vec{PB} = \frac{1}{2} \vec{PR},$ iii) $\vec{AB} = \frac{1}{2} \vec{QR}$ iv) $AB \parallel QR$	 1 1 1 1

22.	<p>i. $A(2,3) \xrightarrow{T=\begin{pmatrix} -2 \\ 3 \end{pmatrix}} A'(0,6)$ $B(2,6) \xrightarrow{T=\begin{pmatrix} -2 \\ 3 \end{pmatrix}} B'(0,9)$ $C(3,4) \xrightarrow{T=\begin{pmatrix} -2 \\ 3 \end{pmatrix}} C'(1,7)$</p> <p>ii. $A'(0,6) \xrightarrow{E=[(0,0),2]} A''(0,12)$ $B'(0,9) \xrightarrow{E=[(0,0),2]} B''(0,18)$ $C'(1,7) \xrightarrow{E=[(0,0),2]} A''(2,14)$</p> <p>iii. Graph of ΔABC and $\Delta A'B'C'$</p> <p>iv. Graph of $\Delta A''B''C''$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>														
23.	<p>i. $\begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} 4 & 7 \\ 1 & 5 \end{bmatrix} = \begin{bmatrix} -4 & -7 \\ 1 & 5 \end{bmatrix}$</p> <p>ii. $4a+b=-4$ $4c+d=1$ $7a+5b=-7$ $7c+5d=5$</p> <p>iii. $a = -1, b = 0, c = 0$ and $d = 1$</p> <p>iv. $\therefore \begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>														
24.	<p>i.</p> <table style="margin-left: 20px;"> <tr> <td>X</td> <td>$D = x-M_d$</td> </tr> <tr> <td>10</td> <td>25</td> </tr> <tr> <td>20</td> <td>15</td> </tr> <tr> <td>30</td> <td>5</td> </tr> <tr> <td>40</td> <td>5</td> </tr> <tr> <td>50</td> <td>15</td> </tr> <tr> <td>60</td> <td>25</td> </tr> </table> <hr style="width: 20%; margin-left: 20px;"/> <p>$N=6$ $\sum D = 90$</p> <p>ii. Median (M_d) = 35</p> <p>iii. $MD = \frac{90}{6} = 15$</p> <p>iv. Coefficient of MD = $\frac{15}{35} = 0.43$</p>	X	$ D = x-M_d $	10	25	20	15	30	5	40	5	50	15	60	25	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
X	$ D = x-M_d $															
10	25															
20	15															
30	5															
40	5															
50	15															
60	25															

25	i.							
	CI	f	m	fm	d=m-\bar{x}	d²	fd²	
	0-20	2	10	20	-50	2500	5000	
	20-40	3	30	90	-30	900	2700	
	40-60	4	50	200	-10	100	400	
	60-80	5	70	350	10	100	500	
	80-100	6	90	540	30	900	5400	1
	N=20			$\Sigma fm = 1200$			$\Sigma fd^2 = 14000$	
	ii. Mean (\bar{x})=60							1
	iii. Standard deviation (σ) = $\sqrt{\frac{14000}{20}} = 26.46$							1
iv. Coefficient of variable = $\left(\frac{26.46}{60} \times 100\right)\%$ = 44.1%							1	