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Secondary School Examination

Term–II, 2022

Marking Scheme : MATHEMATICS (Basic) (Subject Code : 241)

[Paper Code : 430/4/3]

General Instructions :

1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2. **“Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, evaluation done and several other aspects. Its leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in Newspaper/ Website, etc., may invite action under IPC.”**
3. Evaluation is to be done as per instruction provided in the Marking Scheme. It should not be done according to one’s own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and marks be awarded to them. In Class-X, while evaluating two competency based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, marks should be awarded.**
4. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
5. Evaluators will mark (3) wherever answer is correct. For wrong answer ‘7’ be marked. Evaluators will not put right kind of mark while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
6. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totalled up and written in the left-hand margin and encircled. This may be followed strictly.
7. If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.

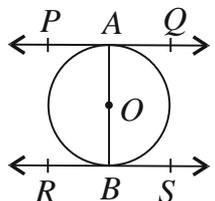
8. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
9. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
10. A full scale of marks _____ (example 0–40 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.
11. Every examiner has to necessarily do evaluation work for full working hours, i.e., 8 hours everyday and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).
12. Ensure that you do not make the following common types of errors committed by the Examiner in the past :
 - Leaving answer or part thereof unassessed in an answer book
 - Giving more marks for an answer than assigned to it
 - Wrong totalling of marks awarded on a reply
 - Wrong transfer of marks from the inside pages of the answer book to the title page
 - Wrong questionwise totalling on the title page
 - Wrong totalling of marks of the two columns on the title page
 - Wrong grand total
 - Marks in words and figures not tallying
 - Wrong transfer of marks from the answer book to online award list
 - Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the 7 for incorrect answer).
 - Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
13. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as (7) and awarded zero (0) Mark.
14. Any unassessed portion, non-carrying over of marks to the title page, or totalling error detected by the candidates shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
15. The examiners should acquaint themselves with the guidelines given in the guidelines for spot evaluation before starting the actual evaluation.
16. Every examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totalled and written in figures and words.
17. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.

MARKING SCHEME

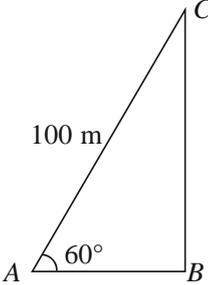
Secondary School Examination TERM–II, 2022

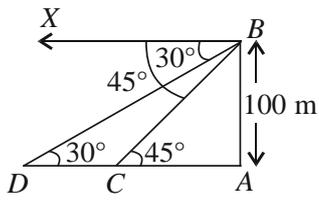
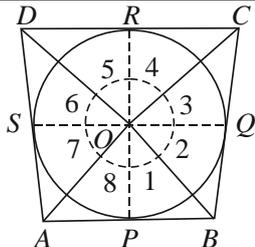
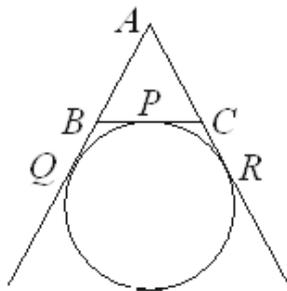
MATHEMATICS (Basic) (Subject Code–241)

[Paper Code : 430/4/3]

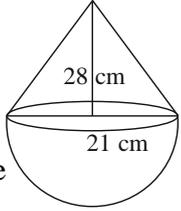
Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks																					
	SECTION—A																						
1(a)	<p>15th term from the end of 3, 8, 13, ..., 253, is same as 15th term from the beginning of 253, 248, ..., 13, 8, 3</p> <p>$a = 253, d = -5$</p> <p>$a_{15} = a + 14d = 253 + 14(-5)$</p> <p align="center">$= 253 - 70 = 183$</p> <p align="center">Or</p>	1 1																					
1(b)	<p>$\sqrt{5}, \sqrt{20}, \sqrt{45}$</p> <p>$\sqrt{20} = \sqrt{2 \times 2 \times 5} = 2\sqrt{5}$</p> <p>$\sqrt{45} = \sqrt{3 \times 3 \times 5} = 3\sqrt{5}$</p> <p>$\therefore$ Next two terms are $4\sqrt{5}, 5\sqrt{5}$ or $\sqrt{80}, \sqrt{125}$</p>	1 $\frac{1}{2} + \frac{1}{2}$																					
2.	<p>AOB is a diameter</p> <p>\therefore Distance between parallel tangents = Diameter = 13 cm</p> <p>\therefore Radius = $\frac{13}{2} = 6.5$ cm</p>	 <p align="center">1 $\frac{1}{2}$ $\frac{1}{2}$</p>																					
3.	<table border="0"> <thead> <tr> <th>Class</th> <th>f</th> <th>Cf</th> </tr> </thead> <tbody> <tr> <td>50–55</td> <td>10</td> <td>10</td> </tr> <tr> <td>55–60</td> <td>15</td> <td>25</td> </tr> <tr> <td>60–65</td> <td>8</td> <td>33</td> </tr> <tr> <td>65–70</td> <td>13</td> <td>46</td> </tr> <tr> <td>70–75</td> <td>9</td> <td>55</td> </tr> <tr> <td>75–80</td> <td>5</td> <td>60</td> </tr> </tbody> </table> <p>Modal Class : 55 - 60 } Median Class : 60 - 65 }</p> <p>Correctly identifying or using lower limit of modal class & upper limit of median class</p> <p>Required Sum = $55 + 65 = 120$</p>	Class	f	Cf	50–55	10	10	55–60	15	25	60–65	8	33	65–70	13	46	70–75	9	55	75–80	5	60	1 1
Class	f	Cf																					
50–55	10	10																					
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70–75	9	55																					
75–80	5	60																					

<p>4(a)</p>	<p>Getting $l = 17\text{cm}$ Curved surface area of cone $= \pi rl$ $= \frac{22}{7} \times 8 \times 17 = \frac{2992}{7} \text{ cm}^2$ or 427.4 cm^2</p> <p style="text-align: center;">OR</p> <p>4(b)</p> $4\pi r^2 = 616$ $4 \times \frac{22}{7} r^2 = 616$ $\therefore r = 7 \text{ cm}$	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
<p>5.</p>	$2x^2 + \frac{7}{2}x + \frac{3}{4} = 0$ $\Rightarrow 8x^2 + 14x + 3 = 0$ $8x^2 + 12x + 2x + 3 = 0$ $4x(2x + 3) + 1(2x + 3) = 0$ $\Rightarrow (2x + 3)(4x + 1) = 0$ $\Rightarrow x = -\frac{3}{2}, -\frac{1}{4}$	<p>1</p> <p>$\frac{1}{2} + \frac{1}{2}$</p>
<p>6.</p>	<p>Modal class is 5–7</p> $\therefore \text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$ $= 5 + \left(\frac{80 - 45}{160 - 45 - 55} \right) \times 2$ $= 5 + 1.17 = 6.17$	<p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p>
SECTION—B		
<p>7.</p>	<p>* Drawing a line segment of length 7 cm and making acute angle(s) * Dividing the line segment in the ratio 5:3 correctly</p>	<p>1</p> <p>2</p>
<p>8(a)</p>	<p>$x = 3$ is one root of the quadratic equation $\therefore 2(3)^2 + p(3) + 30 = 0 \Rightarrow 18 + 3p + 30 = 0$ $p = -16$ $\therefore 2x^2 - 16x + 30 = 0$ $\Rightarrow x^2 - 8x + 15 = 0 \Rightarrow (x - 5)(x - 3) = 0$ $x = 5, 3 \quad \therefore \text{Other Root} = 5$</p>	<p>1</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p>

<p>8(b)</p>	<p style="text-align: center;">OR</p> <p>Let Breadth of the park = x m \therefore Length = $(2x+5)$ m Area = 250 $\Rightarrow (2x+5)x = 250$ $2x^2 + 5x = 250 \Rightarrow 2x^2 + 5x - 250 = 0$ $(x-10)(2x+25) = 0$ $\Rightarrow x-10 = 0, \quad 2x+25 = 0$ $x = 10 \quad x = -\frac{25}{2}$ (Not possible) \therefore Length = $2x+5 = 25$ m and Breadth = $x = 10$ m</p>	<p style="text-align: center;">1/2 1/2 1 1</p>
<p>9.</p>	<p>$S_n = 3n^2 + 2n$ $n = 1, S_1$ (Sum of one term i.e. 1st term) = $3(1)^2 + 2(1) = 5$ $n = 2, S_2$ (Sum of two terms) = $3(4) + 2(2) = 16$ \therefore 2nd term $a_2 = S_2 - S_1 = 16 - 5 = 11$ Common difference $d = a_2 - a_1 = 11 - 5 = 6$ \therefore A.P is 5, 11, 17, 23, ...</p>	<p style="text-align: center;">1/2 1/2 1/2 1/2 1</p>
<p>10.</p>	<div style="text-align: center;">  </div> <p>In right $\triangle ABC$, $\sin 60^\circ = \frac{BC}{AC}$</p> $\frac{\sqrt{3}}{2} = \frac{BC}{100}$ $\Rightarrow BC = 50\sqrt{3} = 50(1.73) = 86.5$ <p>\therefore Height of kite = 86.5 m</p> <p><u>Note:</u> If $\sqrt{3} = 1.73$ is not used in calculation of the height BC, 1/2 mark to be deducted.</p>	<p style="text-align: center;">Correct figure: 1 1 1</p>

SECTION—C		
11.	 <p>In right $\triangle ABC$, $\tan 45^\circ = \frac{100}{AC}$ $AC = 100 \text{ m}$</p> <p>In right $\triangle ABD$, $\tan 30^\circ = \frac{100}{AD} \Rightarrow AD = 100\sqrt{3} \text{ m}$</p> <p>$\therefore CD = \text{Distance between ships} = AD - AC$ $CD = 100\sqrt{3} - 100 = 73.2 \text{ m}$</p> <p><u>Note:</u> If $\sqrt{3} = 1.732$ is not used in calculation of the distance CD, $\frac{1}{2}$ mark to be deducted.</p>	<p>Correct Figure: 1</p> <p>1</p> <p>1</p> <p>1</p>
12(a)	 <p>$\triangle OBP \cong \triangle OBQ$ (sss) $\Rightarrow \angle 1 = \angle 2$ cpct</p> <p>Similarly $\angle 3 = \angle 4$, $\angle 5 = \angle 6$ and $\angle 7 = \angle 8$</p> <p>As $\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 = 360^\circ$ $\Rightarrow 2\angle 8 + 2\angle 1 + 2\angle 4 + 2\angle 5 = 360^\circ \Rightarrow \angle 8 + \angle 1 + \angle 4 + \angle 5 = 180^\circ$ $\Rightarrow \angle AOB + \angle COD = 180^\circ$ similarly $\angle BOC + \angle AOD = 180^\circ$</p> <p style="text-align: center;">OR</p>	<p>Correct figure 1</p> <p>1</p> <p>1</p> <p>1</p>
12(b)		

	<p>We know that tangents drawn from the external point to the circle are equal</p> $\left. \begin{aligned} \therefore BP &= BQ \\ CP &= CR \\ AQ &= AR \end{aligned} \right\}$ $2AQ = AQ + AR$ $= (AB + BQ) + (AC + CR)$ $= AB + BP + AC + CP$ $= AB + AC + BP + CP$ $= AB + AC + BC$ $AQ = \frac{1}{2}(AB + AC + BC)$					1½
						1
						½
						1
13.	<i>Daily Distance</i> (in km)	<i>x</i>	<i>Number of Buses</i> (<i>f</i>)	<i>cf</i>	<i>fx</i>	
	100–120	110	12	12	1320	
	120–140	130	14	26	1820	
	140–160	150	8	34	1200	
	160–180	170	6	40	1020	
	180–200	190	10	50	1900	
			50		7260	
(a)	$\frac{N}{2} = \frac{50}{2} = 25$ <p>∴ Median Class → 120–140</p> $Median = l + \frac{\left(\frac{N}{2} - C\right)}{f} \times h = 120 + \frac{(25 - 12)}{14} \times 20$ $Median = 120 + \frac{130}{7} = 120 + 18.57 = 138.57 \text{ km}$					½
(b)	$Mean = \frac{\sum fx}{\sum f} = \frac{7260}{50} = 145.2 \text{ km}$					1 for $\sum fx$ & 1 for Mean

<p>14.</p>	<p>$r = 21$ cm $h = 28$ cm</p> <p>(a) Volume of 1 toy = volume of hemisphere + volume of cone</p> $= \frac{2}{3}\pi r^3 + \frac{1}{3}\pi r^2 h$ $= \frac{1}{3}\pi r^2 [2r + h]$ $= \frac{1}{3} \times \frac{22}{7} \times 21 \times 21 [2 \times 21 + 28]$ $= 22 \times 21 \times 70 = 32340 \text{ cm}^3$ <p>Volume of 50 toys = 50×32340</p> $= 1617000 \text{ cm}^3$ <p>(b) $\frac{\text{Volume of hemisphere}}{\text{Volume of cone}} = \frac{\frac{2}{3}\pi r^3}{\frac{1}{3}\pi r^2 h}$</p> $= \frac{3}{2}$ <p>Required ratio is 3:2</p>	 <p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>1</p>
