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INDIAN SCHOOL SALALAH

FIRST TERM EXAMINATION – SEPTEMBER (AY- 2024-25)



Class: X

MATHEMATICS (041)

Date: 22/09/2024

Time: 3 hours

Maximum Marks: 80

General Instructions:


- This Question Paper has 5 Sections A, B, C, D and E.
- Section A has 20 MCQs carrying 1 mark each.
- Section B has 5 questions carrying 02 marks each.
- Section C has 6 questions carrying 03 marks each.
- Section D has 4 questions carrying 05 marks each.
- Section E has 3 case based integrated units of assessment (04 marks each) with sub- parts of the values of 1, 1 and 2 marks each respectively.
- All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E.
- Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

	SECTION A	MARKS
1	The HCF of 12,21,15 is a) 3 b) 4 c)12 d) 15	1
2	A quadratic polynomial, whose zeroes are -4 and -5 , is a) $x^2 - 9x + 20$ b) $x^2 + 9x + 20$ c) $x^2 - 9x - 20$ d) $x^2 + 9x - 20$	1
3	The nature of graphs of dependent system is a) parallel lines b) intersecting lines c) coincident lines d) perpendicular lines	1
4	$x(x + 1) + 8 = (x + 2)(x - 2)$ is a) linear equation b) quadratic equation c) cubic equation d) bi-quadratic equation	1

12	The roots of quadratic equation $2x^2 + x + 4 = 0$ are: a) Positive and negative c) Both Negative	b) Both Positive d) No real roots	1		
13	A card is drawn from the set of 52 playing cards. Find the probability of getting a queen card. a) $\frac{1}{26}$	b) $\frac{1}{13}$	c) $\frac{4}{53}$	d) $\frac{4}{13}$	1
14	Which term of the A.P. 3, 8, 13, 18, ... is 78? a) 12 th	b) 13 th	c) 15 th	d) 16 th	1
15	In ABC, DE AB. If CD = 3 cm, EC = 4 cm, BE = 6 cm, then DA is equal to a) 7.5 cm	b) 3 cm	c) 4.5 cm	d) 6 cm	1
16	If arithmetic mean of a, a+3, a+6, a+9 and a+12 is 10, then 'a' is equal to a) 1	b) 2	c) 3	d) 4	1
17	The ratio of LCM and HCF of the least composite number and the least prime number is a) 1:2	b) 2:1	c) 1:3	d) 3:1	1
18	The sum of the digits of a two-digit number is 9. If 27 is added to it, the digits of the number get reversed. The number is a) 27	b) 72	c) 45	d) 36	1
In question numbers 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.					
19	Assertion: Sum of first 10 terms of the arithmetic progression $-0.5, -1.0, -1.5, \dots$ is 31. Reason : Sum of n terms of an AP is given as $S_n = \frac{n}{2} [2a + (n-1)d]$ where a is first term and d is the common difference. a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A) b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of Assertion (A) c) Assertion (A) is true but reason(R) is false. d) Assertion (A) is false but reason(R) is true.			1	

20	<p>Assertion: If $P(E) = 0.07$, then its probability of 'not E' is 0.93</p> <p>Reason: $P(E) + P(\text{not } E) = 1$</p> <p>a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)</p> <p>b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of Assertion (A)</p> <p>c) Assertion (A) is true but reason(R) is false.</p> <p>d) Assertion (A) is false but reason(R) is true.</p>	1
SECTION B		
21	Check whether 8^n can end with the digit 0 for any natural number n.	2
22	<p>Solve the following system of linear equations by substitution method.</p> $2x - y = 2 ; x + 3y = 15$ <p style="text-align: center;">OR</p> <p>A lending library has a fixed charge for the first three days and an additional charge thereafter. Shristi paid ₹ 27 for a book kept for seven days, while Rekha paid ₹ 21 for a book she kept for 5 days. Find the fixed charge and additional charge paid by them.</p>	2
23	Find the value of k for which the following pair of linear equations have infinitely many solutions: $2x + 3y = 7; (k - 1)x + (k + 2)y = 3k$	2
24	In a marathon, three athletes step off together and their steps measure 54 cm, 60 cm and 48 cm, respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps?	2
25	<p>E is a point on the side AD produced of a parallelogram $ABCD$ and BE intersects CD at F. Show that $\triangle ABE \sim \triangle CFB$</p> <p style="text-align: center;">OR</p> <p>$ABCD$ is a trapezium in which $AB \parallel CD$ and its diagonals intersect each other at point O. Using similarity criterion of two triangles, show that $\frac{OA}{OB} = \frac{OC}{OD}$.</p>	2
SECTION C		
26	<p>How many terms of the AP: 24, 21, 18, . . . must be taken so that their sum is 78?</p> <p style="text-align: center;">OR</p>	

	If the sum of the first n terms of an AP is $4n - n^2$, what is the sum of the first two terms. Also find the second term and n^{th} terms.													
27	Find the mode of the following data. <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Marks</th> <th>Number of students</th> </tr> </thead> <tbody> <tr> <td>Below 10</td> <td>8</td> </tr> <tr> <td>Below 20</td> <td>20</td> </tr> <tr> <td>Below 30</td> <td>45</td> </tr> <tr> <td>Below 40</td> <td>58</td> </tr> <tr> <td>Below 50</td> <td>70</td> </tr> </tbody> </table>	Marks	Number of students	Below 10	8	Below 20	20	Below 30	45	Below 40	58	Below 50	70	3
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Below 50	70													
28	Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of ΔPQR . Show that $\Delta ABC \sim \Delta PQR$. <div style="text-align: center; margin: 10px 0;"> </div>	3												
29	Given $\sqrt{5}$ is irrational, prove that $3 + 2\sqrt{5}$ is irrational.	3												
30	If α and β are the zeroes of a quadratic polynomial $x^2 - x - 2$ then find the value of $\frac{1}{\alpha} - \frac{1}{\beta}$. <p style="text-align: center;">OR</p> Find the zeroes of the quadratic polynomial $5x^2 - 4 - 8x$ and verify the relationship between the zeroes and the coefficients of the polynomial.	3												
31	If the equation $(1 + m^2)x^2 + 2mcx + c^2 - a^2 = 0$ has equal roots then show that $c^2 = a^2(1 + m^2)$.	3												
SECTION D														
32	Draw the graphs of $2x + y = 6$ and $2x - y + 2 = 0$. Shade the region bounded by these lines and x-axis. Also Find the area of the shaded region.	5												

33	<p>A plane left 30 minutes late than its scheduled time and in order to reach the destination 1500 km away in time, it had to increase its speed by 100 km/h from the usual speed. Find its usual speed.</p> <p style="text-align: center;">OR</p> <p>The sum of the reciprocals of Rehman's ages in years 3 years ago and 5 years from now is $\frac{1}{3}$. Find out his present age.</p>	5																														
34	State and prove Thales theorem.	5																														
35	<p>If the mean of the following frequency distribution is 91 and the sum of frequencies is 150, find the missing frequencies x and y.</p> <table border="1"> <tr> <td>Classes</td> <td>0-30</td> <td>30-60</td> <td>60-90</td> <td>90-120</td> <td>120-150</td> <td>150-180</td> </tr> <tr> <td>Frequency</td> <td>12</td> <td>21</td> <td>x</td> <td>52</td> <td>y</td> <td>11</td> </tr> </table> <p style="text-align: center;">OR</p> <p>Find the values of x and y if the median of the following data is 31.</p> <table border="1"> <tr> <td>Classes</td> <td>0-10</td> <td>10-20</td> <td>20-30</td> <td>30-40</td> <td>40-50</td> <td>50-60</td> <td>Total</td> </tr> <tr> <td>Frequency</td> <td>5</td> <td>x</td> <td>6</td> <td>y</td> <td>6</td> <td>5</td> <td>40</td> </tr> </table>	Classes	0-30	30-60	60-90	90-120	120-150	150-180	Frequency	12	21	x	52	y	11	Classes	0-10	10-20	20-30	30-40	40-50	50-60	Total	Frequency	5	x	6	y	6	5	40	5
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SECTION E																																
36	<p>Case study 1:</p> <div style="text-align: center;">  </div> <p>Accumulation of plastics in the environment creates problems for wildlife and their habitats as well as for human. Plastics are a threat to the environment. The children of MATHEMATICS / X / 2021 – 22, Avantipur decided that they would contribute their service to put an end to the usage of plastics in their</p>																															

village. They fixed posters and hoisted placards which depicted the ill effects of plastics on human health and environment. They started their work on 15th June. They started collecting the thrown off plastic bottles in their locality and started counting them. To their astonishment, they found that the number of plastic bottles that they collected each day were in Arithmetic Progression which went like this: 417 ,404 ,391,

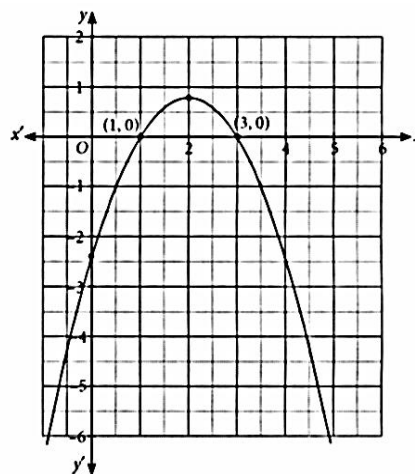
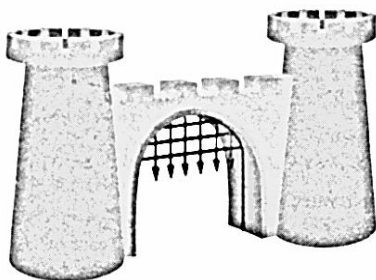
- i). Find the first term and common difference of the given A.P. 1
- ii) Find the total number of bottles collected by the children in the first eight days. 1
- iii) The children of Avantipur wanted to make their village a plastic free zone. Identify the day on which they got one bottle which was their dream day. 2

OR

- iii) How many bottles did they collect on June 25th?

37


Case Study 2:



Rohita visited a temple in Gwalior. On the way she sees the Agra Fort. The entrance gate of the fort has a shape of quadratic polynomial (parabolic). The mathematical representation of the gate is shown in the figure. Based on the above information answer the following questions.

- (i) If one zero of the polynomial $x^2 - 12x + (3k - 1)$ is five times than other, then find the value of k .

1

	<p>(ii) If the polynomial $x^2 + kx - 15$ represents the given curve with one of its zeros from the graph, then write the value of k.</p> <p>(iii) Find the zeroes of the polynomial using the graph above and write its quadratic equation.</p> <p style="text-align: center;">OR</p> <p>(iii) Write the zeros of the polynomial $6x^2 - 7x - 3$.</p>	<p>1</p> <p>2</p>
<p>38</p>	<p>Case study 3:</p>  <p>Rahul goes to a fete in Mussoorie. There he saw a game having prizes - wall clocks, power banks, puppets and water bottles. The game consists of a box having cards inside it, bearing the numbers from 1 to 200, one on each card. A person has to select a card at random. Now, the winning of prizes has the following conditions: Wall clock - If the number on the selected card is a perfect square. Power bank - If the number on the selected card is a multiple of 3. Puppet - If the number on selected card is divisible by 10. Water bottle - If the number on the selected card is a prime number more than 70 but less than 100. Better luck next time - If the number on the selected card is a perfect cube.</p> <p>Use the above information to answer the questions that follow:</p> <p>(i) Find the probability of winning a wall clock.</p> <p>(ii) Find the probability of winning a puppet.</p> <p style="text-align: center;">OR</p> <p>(ii) Find the probability of winning a water bottle.</p> <p>(iii) Find the probability of getting 'Better Luck next time'.</p>	<p>1</p> <p>2</p> <p>1</p>
